
"WOOD-WIND INSTRUMENTS AT THE CROSS-ROADS"

A SURVEY OF RECENT CHANGES.

Thesis submitted in partial fulfilment of the requirements
for the Degree of M. Mus. in Rhodes University.

by

Albert Edward Honey,

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A C K N O W L E D G M E N T S.

I should like to express my gratitude to all those concerned in assisting me to prepare this Thesis and my thanks are especially due to my Supervisors, Professor Rupert Mayr and Professor Percival R. Kirby (whose breadth of knowledge on the origins and use of Musical Instruments, combined with his practical experience as a Woodwind Instrumentalist, has made my research in this subject a constant source of interest and re-education).

To Rhodes University for a Research Grant and to the staff of Rhodes University Library for their willing and prompt services in obtaining books and photostats on my behalf.

To Messrs. Anthony Baines, Philip Bate, Lyndesay G. Langwill and their publishers for their personal goodwill and kind permission to reproduce such of their published material as I needed for this work.

To Messrs. Rudall Carte and Company of London, Messrs. Boosey and Hawkes and the Leblanc Corporation, Kenosha, Wisconsin, U.S.A., for their co-operation and generous presentation of photographs and catalogues.

And finally, to my old friend and colleague, Alexander Murray of Michigan State University, for details of his new invention which appear here for the first time in print.

Albert E. Honey,
Grahamstown, 1969.

P R E F A C E

I realise that this present Thesis is considerably larger than those generally submitted for a Master's Degree but I felt that, in order to present a clear picture of what had occurred throughout the ages it was necessary to bring together all possible facts so that correct conclusions might be drawn. As far as I am aware, so much material on the subject which I have chosen has never before appeared within two covers. My work, therefore, will serve future students as a kind of lexicon whence all important information about the evolution and use of Woodwind Instruments can be readily obtained.

I do not claim great originality for the contents of the present volume although I believe that a number of ideas in it are new but I feel that what I have set forth here presents as complete a picture as possible of the manufacture and use of the Woodwind Instruments in use in Europe from the earliest times, together with their origins wherever these have been ascertainable.

I have necessarily drawn freely from the work of Adam Carse, Anthony Baines, Philip Bate, Lyndesay G. Langwill, F.G. Rendall and others, but as a professional performer I have throughout the years come across a number of points which do not appear to have been observed by these great scholars.

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VOLUME I

GENERAL INTRODUCTION

CHAPTERS I TO XXVI

THE BACKGROUND.

Since the rise of the "Stile Rappresentativo" early in the seventeenth century, the composer has made definite and increasing demands on specific performance and tonal combination of instrumentalists which has materially affected the development in technique and, consequently, the improvement in construction and design of every musical instrument.

The monodic "Stile Rappresentativo" required expressive instruments with an extensive range to match the singers and, consequently, many instruments of the Renaissance period were rendered obsolescent. For instance, the shawms, pommers and crumhorns disappeared from concerted music-making, with the exception of military and outdoor use, mainly in German wind-bands.

More flexible instruments were required, and thus cornetts, flutes (mainly recorders and fipple-flutes), oboes and bassoons came gradually into their places, which for the main part they have occupied in the orchestra ever since that time. The String sections, too, underwent radical changes. A gradual metamorphosis from the Consort of Viols to the Violin Family took place following the work of the craftsmen Gasparo da Salò (1540 - 1609) and Giovanni Paolo Maggini of Brescia, perfected by the famous Cremonese school founded by Andrea Amati and continued by Stradivarius.

Claudio Monteverdi (1567 - 1643) is outstanding as the originator of orchestral affect but his innovations and daring attempts to exploit the individual resources of his instruments toward dramatic feeling in his operas "Orfeo" (1607) and "Il Combattimento di Tancred e Clorinda" (1624) were not followed

up by his successors and contemporaries.

Cavalli (1602 - 1676), Marcantonio Cesti (1623 - 1669) and Legrenzi (1626 - 1690) are the chief contributors to the development of the orchestra up until the rise of Jean Baptiste Lully (1633 - 1687) who used a five-part string ensemble, adding flutes, oboes and occasionally trumpets, drums and bassoons.

Stradella (c.1645 - 1681) and Pallavicino (1630 - 1688) were the Italian pioneers who broke away from the five-part string orchestra, writing only one tenor part. Matthew Locke (1630 - 1677) and Henry Purcell (1659 - 1695) in England had already begun to write in the four-part idiom.

The School of San Petronio in Bologna, founded by Marizio Cazzati (1620 - 1677) and the training ground of such great composer-players as Guiseppe Torelli (1658 - 1709) and Arcangelo Corelli (1653 - 1713), G.B. Vitali (1644 - 1692) and Handel's rival, Giovanni Bononcini (1670 - 1755) saw the rise and development of the Concerto Grosso - Italy's important contribution to Baroque instrumental music. This first Italian school of concerto-writers grew out of the Italian "Sonata da Chiesa". It had no real influence on the First German School, whose Concerto-writing stemmed from the French suites composed by students of Lully. The composers mainly concerned with this school were: Johann Pezel (1639 - 1694), virtuoso trumpeter and composer for the Leipzig Stadtpfeiffer, J.P. Krieger (1649 - 1725), J.H. Schmelzer (1623 - 1680) of Vienna, H. Biber (1644 - 1704) whose reputation was praised by Burney nearly one hundred years later, Georg Muffat (1645 - 1704), the apostle of Corelli's Concert Grossi.

The taste of the South German courts for keyboard suites and dance movements affected those German composers who did not study in France.

Johann Rosenmüller (1619 - 1684), Deputy Cantor of St. Thomas, Leipzig, J.S. Kusser (1660 - 1727) and Handel's friend,

Johann Christoph Pez (1664 - 1716), with the venerated and influential Johann Caspar Kerll (1627 - 1693) of Munich, all came under early Italian influence together with Vienna, where Agostini Steffani (1654 - 1728) and Ercole Bernabei (1620 - 1687) brought their Italian influence to bear on the Imperial Court. There was no great impact of the Italian Concerto Grosso on Germany until Antonio Vivaldi (1675 - 1743) "The Red Priest" of Venice whose compositions for many and diverse soloists or concertini with the standard string and continuo orchestra abound with the most difficult technical demands upon his players. For many years the scores of Vivaldi were a mystery to musicologists and artists, since the difficulties in instrumental performance appeared unusually demanding for the average instrumentalist of this period, until the research of Raymond Pincherle reveals in his famous work on Vivaldi the exceptionally high technical standard which his orchestra of orphans at the Ospedale de la Pieta in Venice afforded to this composer. The pupils at La Pieta achieved a particularly high standard on wind instruments especially and on the violins we see an enormous advance beyond even Corelli's technique.

The concertos of Vivaldi and Tomasso Albinoni (1671 - 1750), together with those of A. Marcello (1684 - 1750) and B. Marcello (1686 - 1739) reached German orchestras through Bavaria and Austria and gave rise to the Second German School where German concertos became modelled on Venetian styles. Vivaldi's Op.3 arrived in Saxony, Prussia, Hanover, Hesse, Darmstadt and Poland along with Italian operas and Italian singers. Handel's orchestral styles, modelled on Corelli, were already popular. This form of purely orchestral performance remained popular in Germany until superseded by the Symphony, when it developed in the Mannheim School founded by Johann

Stamitz (1717 - 1757), Franz Xavier Richter (1709 - 1787) and Ignaz Holzbauer (1711 - 1783) under the patronage of the Elector Carl Theodor, himself a capable performer. All new works were performed here and the work of Karl Stamitz (1746 - 1801), Christian Cannabich (1771 - 1805), Wilhelm Cramer (1745 - 1799) and Anton Stamitz (1753 - 1820) resulted in the finest orchestra in Europe at that time, where clarinets made their first appearance.

In 1709 Bartolomeo Cristofori had invented the pianoforte, but this was never taken up for the first half of the eighteenth century, mainly because the harpsichord continuo served contemporary composers well into the latter half of the century. Many of Joseph Haydn's early symphonies require the harpsichord continuo. Silbermann, in 1726, had begun a development of Cristofori's invention and in 1747 J.S. Bach, on a visit to Frederick II at Potsdam, played Silbermann's pianofortes. Silbermann's apprentice, J.C. Zumpe, came to London where he invented the "square" piano. John Christian Bach (1735 - 1782) gave the first public pianoforte recital on one of Zumpe's instruments in 1758, almost simultaneously with the attempt on the part of his brother, Carl Philipp Emanuel Bach (1714 - 1788) to revive the clavicord. The work of John Broadwood (1752 - 1812), successor to the harpsichord-maker, Burkart Tschudi (1702 - 1728), further developed the pianoforte. In 1800 Hawkins invented the upright piano in Philadelphia, first made in London by Robert Wornum in 1829 and Hawkins further invented the iron frame, allowing greater tension and thicker strings to be used.

Whereas the string section, forming a logically harmonious and homogenous group of instruments, had been born in the Consort days of the sixteenth century when part-writing was paramount, the woodwind section, by contrast, is the creation of the eighteenth century when the emphasis had shifted towards pure melody. Melodic tone-colours became more important than

the consort or group of similarly-voiced instruments.

In Lully's time, the basis of the woodwind section had been a pair of oboists, a pair being needed in order to accommodate the old predilection for writing melodies in thirds for two identical instruments - the two players being known as "First" or "Second" respectively. One or two bassoonists provided an independent bass.

When a fresh woodwind colour was required by the composer, the oboists laid aside their oboes and took up flutes, recorders or other instruments.

In the generation of J.S. Bach and Handel, the section was expanded to include specialist flautists, while the oboes and bassoons were frequently doubled or multiplied in order to boost their contribution in choruses and tuttis, since the woodwinds of those days possessed less of the penetrating power of those of the present day.

The wind obligati of J.S. Bach (1685 - 1750) who made many copies of Vivaldi's works, are full of tremendous technical difficulties for the relatively simple instruments of that time. Any flautist who has attempted to perform the six sonatas (B.G. IX and B.G. XLIII) on a one-keyed transverse flute will immediately appreciate this point. The corresponding transverse flute sonatas of G.F. Handel (1685 - 1759) Op.I (which includes four sonatas for recorder) and the separate set of three "Halleenser" flute sonatas, written for the transverse-flute in his native town of Halle before departing on his far-flung travels, are all, with the exception of the recorder sonatas, eminently playable on the Baroque transverse-flute having only the single D sharp key, the chromatic notes to the natural scale of D major on this

instrument being obtained by cross and forked fingerings. Two important works of this period concerning the technique of the flute are "Les Principes de la Flûte", 1707, by Jaques Hotteterre (d. 1760) and Johann Joachim Quantz (1697 - 1773) who added a second key for E flat besides D sharp. Although this idea was never followed up by flute-makers, we may observe that the single D sharp key governed the only tone-hole on the instrument which could not be adjusted or rectified to the pure scale through partial covering by the fingers.

Quantz' important work "Versuch einer Anweisung die Flöte Traversiere zu Spielen", 1752, gives diagrams of flute-fingering including the use of this key.

Oboes, flutes and bassoons retained their relatively simple design throughout the early part of the eighteenth century but as the demands of the composer brought more pressure to bear on the technique of the players, new tone-holes were added to the instrument tubes and keys were added to cover these, being kept closed by means of a flat-spring and controlled by the free fingers of the player.

The blending of two horns with the woodwind choir established a formal combination which has been used by composers ever since the eighteenth century. The horns have remained the closest associates of the woodwind section and by about 1780 the most important orchestras of Europe had adopted a pair of clarinets, invented in Germany some eighty years previously.

The classical woodwind section of eight musicians was then complete. The four main woodwind instruments - flute, oboe, clarinet and bassoon - are so well contrasted in colour, yet so perfectly balanced in tonal weight and expressive resources, that most composers have demanded little more in

their orchestral works. For special effects, however, and for richer blends in works of larger proportions, a wider range of colours are available.

The piccolo, cor anglais, bass-clarinet and contra-bassoon each supplement the four main instruments respectively and, with specialist performers, bring the woodwind personnel up to twelve.

The more rarely demanded "special" instruments, such as the alto-flute, oboe d'amore, heckelphone, basset-horn, small clarinet and saxophone, are also available as extra players in the modern symphony orchestra, while the world of "commercial music" (television, films and the theatre) has encouraged composers to seek novel effects among the exciting range of newly designed woodwind instruments, such as the contra-bass clarinets, bass flute and rarer sizes of saxophones.

It is known that by 1770 three keys had been added to the one-keyed flute (F natural, G sharp and B flat) and by 1806 a key for C. Plus the long F key (allowing a slur from D - F) and the extended foot-joint adding C - C sharp, the flute developed along rational lines through the designs of Johann George Tromlitz (1730 - 1805). The radical changes made in the fingering and acoustic functions of flutes by Theobald Boehm in 1832 led to similar changes in design on all the other woodwinds. String instruments had remained very much the same in design and construction as originally, with the exception of changes in the length of the neck of violins and width of fingerboards and the very important work of Francois Tourte (1747 - 1835) in designing the present-day bow with the concave curve of the stick, allowing greater delicacy of performance than had previously been possible.

The appearance of the clarinet in the orchestra around 1780 led composers to exploit this new and expressive instrument with its large compass and wide range of expression.

By Theobald Boehm's time the clarinet had almost ousted the flute as a solo instrument and much literature of the romantic (even of the classical) composers has been lost by the flute-player to the favourite solo instrument of Mozart, Schubert, Schumann, Mendelssohn and Brahms.

Boehm's improvements, along with the development of the clarinet by Klosé, led to the rise of the saxophone through Antoine Joseph ("Adolphe") Sax (1814 - 1894) about 1844 and this was quickly adopted by French military bands. The Sax family did much to develop the valve-mechanism on Brass instruments following the work of Blümmel in 1813 and Heinrich Stölzel (1780 - 1844).

Wilhelm Frederick Wieprecht (1802 - 1872) who re-organised Prussian military bands, is credited with inventing the bass-tuba.

The greatest figure in the history of orchestration, Hector Berlioz (1803 - 1869), exploited all the new resources available to him in the orchestras and military bands of his time. Such huge works as his "Grande Messe des Morts" and the "Te Deum" make a demand on the number of performers and weight of sound that are counted large even today.

Richard Wagner (1813 - 1883) used his brass instruments in such a manner as to be practically unhampered by want of notes. The awkward gaps in the brass harmonies of his predecessors disappeared when valve-instruments began to be freely employed. Wagner treated his orchestra as a compound of many choirs. The whole range of the orchestra was extended upwards and downwards as never before. Another generation of composers rose during the last thirty years of Wagner's life - Bruckner (1824 - 1896), Brahms (1833 - 1897), Humperdink (1854 - 1921), Franck (1822 - 1890), Lalo (1823 - 1892), St. Saëns (1835 - 1921), Delibes (1836 - 1891),

Massenet (1842 - 1912), Fauré (1845 - 1924), Tchaikovsky (1840 - 1893) and "The Mighty Five" Russians - Borodin, Moussorgsky, Cui, Balakirev, and the greatest writer on orchestration since Berlioz - Rimsky-Korsakov (1844 - 1908).

The tone poems of Richard Strauss (1864 - 1949) challenge the virtuosity of any modern orchestra. Likewise, the works of Claude Debussy (1862 - 1918) and Maurice Ravel (1875 - 1937) and with the atonal and serial composers, Arnold Schonberg, Alban Berg, Anton Webern and their successors in the field of modern composition, the musical performer is faced with a formidable challenge to his technical powers such as has never confronted the musicians of any previous age. Perhaps we have still a long way to go before musical instruments are truly equal to whatever reasonable demands may be made by any composer. We are now in the electronic age and the day may yet be not far distant when those instruments whose design has served, with only slight modifications, for over a century, could be relegated to the obscurity of the musical museum.

We see, therefore, that the composer throughout history from the Renaissance has through his development, given the driving impetus to the designer and inventor of more efficient musical instruments. The radical changes would at first appear to have been finally made, especially when we look around the modern orchestra and see comparatively little change in the appearance of string instruments and most of the wind. The past century has proved to be one of quiet, almost imperceptible metamorphosis, but changes there have been and changes are still under way amongst our present-day instrumentalists who will always seek newer, better and easier ways of performing their tasks.

While tracing the long story of mechanical and acoustic improvements to musical instruments, particularly in regard to woodwind instruments, one cannot fail to remark how each radical improvement, particularly concerning changes or adjustments in accepted fingerings, met with a hard core of resistance from conservative players who were either unable or unwilling to change or adapt their hard-won playing techniques to a new (and often admittedly superior) system.

Being myself a flautist, I must crave some indulgence for what may seem a biased approach in favour of the flute but perhaps this may need no apology, since almost the first attempts to add extra keys to woodwind were led by flautists. The invention of the Boehm fingering system triggered off a series of radical improvements on every one of the woodwinds and, again, the most recent modifications of Boehm's system in the "Murray-Cooper" flute of 1966 have given rise to a parallel mixed reaction of approbation, conservatism and criticism with which the early Boehm flutes were received over a century ago.

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SOURCES:

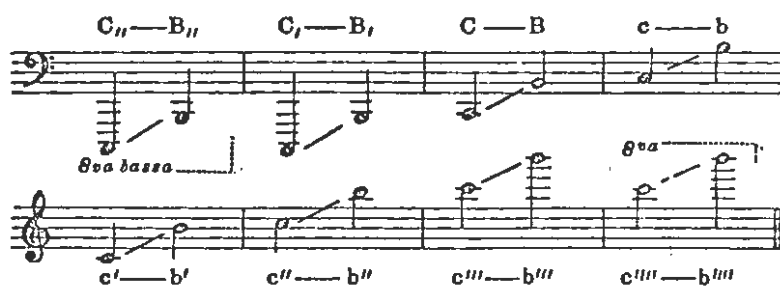
A. Carse.

A. Baines.

A.B.J. Hitchings - "The Baroque Concerto".

ABBREVIATIONS, DEFINITIONS, ETC.

THE notes of the musical staff are normally given in Roman capitals, but when it is necessary to indicate the notes in any particular octave the following plan is adopted :



R. = Right or right hand. L. = Left or left hand.

(E.) = English. (G.) = German. (F.) = French. (I.) = Italian.

The *head* or *upper end* of an instrument = the end at which it is blown.

The *foot*, *lower end* or *bell* of an instrument = the opposite end, even though it may be uppermost when the instrument is being played.

The *right* or *right-hand side* of an instrument = these sides from the standpoint of the player.

The *left* or *left-hand side* of an instrument = these sides from the standpoint of the player.

The *top*, *upper side* or *front* of an instrument = that which faces upwards or forwards when the instrument is being played.

The *bottom*, *under side* or *back* of an instrument = that which faces downwards or towards the player when the instrument is being played.

Fingers are named thus : thumb, first, second, third and little finger, and not as in "continental" piano-fingering.

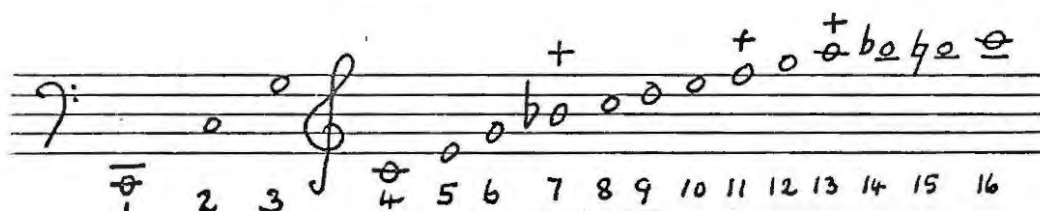
CHAPTER IPRACTICAL ACOUSTICS REGARDING WIND INSTRUMENTS.

The pitch of a musical sound produced on a wind instrument depends on the rate of frequency of the vibrations which cause the sound. In obedience to Nature's law, the column of air in a tube can be made to vibrate only at certain rates; therefore, a tube of any particular length can be made to produce only certain sounds and no others as long as the length of the tube is unaltered. Whatever the length of the tube, these various sounds always bear the same relationship one to the other but the actual pitch of the series will depend upon the length of the tube.

The player on a wind instrument, by varying the intensity of the air-stream which he injects into the mouthpiece, can produce at will all or some of the various sounds which that particular length of tube is capable of sounding. Thus, by compressing the air-stream with his lips, he increases the rate of vibration and produces higher sounds and by decompressing or slackening the intensity of the air-stream, he lowers the rate of vibration and produces lower-pitched sounds. In this way the Fundamental, or lowest note which a tube is capable of sounding, can be raised an octave, a twelfth, a double-octave and so on, the sounds becoming higher and higher by intervals which become smaller and smaller as they ascend.

These sounds are called Harmonics, or Upper Partials, and it is convenient to refer to them by number, counting the Fundamental as No. 1, the Octave Harmonic as No. 2 and so on.

The series of sounds available on a tube approximately eight feet in length is as follows:



A longer tube would produce a corresponding series of sounds proportionately lower in pitch, according to its length, while on a shorter tube the series would be correspondingly higher. The sounds of Nature's harmonic series do not all coincide exactly with the notes of the Musical or Tempered Scale. (Nos. 7, 11 and 13, for example, are noticeably out of tune).

Although the entire series of harmonics is nominally available on any tube, in actual practice the human lip can hardly vary the pressure to such an extent that all of them can be sounded on the same tube with the same mouthpiece. The number which may be produced depends mainly on the width of the tube in proportion to its length. A tube can be so wide or so narrow that no musical sound can be extracted from it; there must be some sort of reasonable proportion between width and length and a tube which is not considerably longer than it is wide would be of no practical use as a musical instrument.

A wide-bored tube will yield its fundamental more easily than a narrow one, and if not too wide can be made to sound the fundamental and a few of the lower harmonics, whereas a narrower tube can be made to sound up to the sixteenth note of the series but will then probably fail to sound the first two.

For example, a primitive instrument made from an ox-horn or an elephant's tusk may be so short and so wide in proportion that it will only give one note (the Fundamental) whereas an orchestral horn is long and proportionately so narrow that it will sound from the second note of the series up to even the sixteenth.

Herein lies the main essential difference between the woodwind and brass instruments; the woodwinds are in bore comparatively wide for their length and therefore play freely at the lower end of the harmonic series (indeed, most of their notes are Fundamentals and octave-harmonics); the bore of the brass instruments, on the other hand, is narrow for its length and plays freely in the middle or upper part of its harmonic series.

The above is a law of Nature and in obedience to it all wind instruments with a conical or partially conical bore can sound the series of harmonics or part of it shown in the diagram, the actual pitch of which will vary according to the length of the tube. Cylindrical bore instruments with an opening at both ends, such as a Boehm flute or a fife, also obey the same law but when one end of the cylindrical tube is virtually closed, as in the clarinet type (or "stopped" organ pipe), another law of nature modifies the relations between length of tube and pitch, also the sequence of available harmonics. Where another instrument requires a certain length of tube to sound a particular note, instruments of the clarinet family require only half that length of tube to sound the same note. (A "stopped" organ pipe is half as long as an open pipe sounding the same note). This explains

why a clarinet in C, although shorter than an ordinary flute, but behaving as a stopped pipe, can sound a sixth lower.

The bore of shorter instruments is not decreased proportionately to that of a longer instrument of the same type. The bore of a clarinet about nineteen inches long (high E flat) is not half as narrow as that of a clarinet which is twice as long (alto in E flat).

Nature allows very little tampering with the pitch of sounds available on any given tube but does allow a little latitude as to the length of the tube and still more to its width, yet the general principle holds good that the wide tube yields more readily the lower sounds of Nature's series, and the narrow tube gives forth more freely from its higher sounds.



After Adam Carse - "Musical Wind Instruments" 1939 (Macmillan)

1965 (Da Capo Press,
New York).

CHAPTER IITHE SPECIAL ACOUSTICS OF WOODWIND INSTRUMENTS

On all wind instruments the sound is made by causing air to vibrate inside a hollow container which, in its most serviceable form, is a tube enclosing a column of air which is thus separated from the surrounding atmosphere by the walls of the tube. This column of air must not be completely isolated and must be in touch with the surrounding air, for which purpose some part of the tube - usually one end of it - must be open.

The bore of the tube may be of the same width throughout, in which case it is described as cylindrical: or the bore may taper so as to expand at one end and contract at the opposite end, when it is described as conical.

Tubes may be partially cylindrical and partially conical and the entire length may be straight or curved. For practical use the tube must be made of some sufficiently hard and rigid material and its inside surface must be smooth.

Close-grained woods, metal or hard composite substances, such as ebonite, plastic, ivory, horn and even glass have been used and the choice of material is governed largely by its suitability to stand the process of manufacture, by its weight and durability when in use, and sometimes by its capacity for being bent or coiled into convenient shapes for handling and playing.

Musical sound from a tube cannot be created by merely pushing air through the tube; actually very little air passes through the tube of a wind instrument when it is being played. The tube, in all cases, acts as a resonator which governs the vibrations set up by some form of generator.

Fig. 1.

GENERATORS FOR WOODWIND INSTRUMENTS

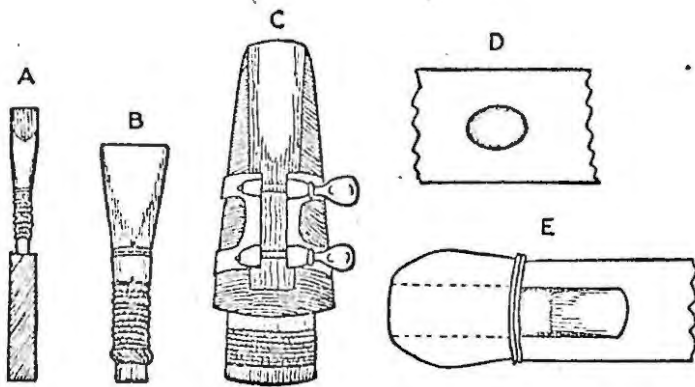


FIG. 1.—A. Oboe reed (double). B. Bassoon reed (double). C. Clarinet reed (single) and mouthpiece. D. Mouth-hole of transverse flute. E. Whistle-mouthpiece.

From ADAM CARSE.

The state of vibration may be initiated in any part of the tube but it is most conveniently done from or near one end. The quality of sound or timbre of a wind instrument is mainly governed by the nature of the means employed to generate vibration. The proportions of the tube, whether wide, narrow, conical or cylindrical, further influence this tone quality.

To the generator and resonator must be added (on all but the simplest form of wind instrument) some means of instantaneously either decreasing or increasing its sounding length which may conveniently be called its mechanism.

The Shortening-Hole Mechanism for finger or key holes applies to woodwind instruments, while the Lengthening-Tube Mechanism applies to brass instruments.

Various methods of generators may be classified as follows:

(i) The Free Air-Reed (All transverse flutes, piccolos and fifes) in which a compressed and flattened stream of air proceeds from a suitable formation of the player's lips (embouchure) and is directed against the edge of the mouth-hole (embouchure-hole) bored in the upper side of the tube. The action of splitting this air-stream against the edge of the mouth-hole sets up a state of vibration which is communicated to the column of air inside the tube or resonator. Although the mouth-hole is conveniently placed at the upper side of the tube, it could be situated actually at the open end as in primitive pan-pipes or pipes similar to the Arab Nay or in the more recent patent of the Giorgi flute (see Flute Family).

Another form of air-reed, the slit-and-block or fipple mouthpiece is found on recorders, flageolets and whistles and is, of course, the principal type of sound-

generator found on the flue-pipes of all windblown pipe organs. The disadvantage of such a mouthpiece applied to the flute is that the tone quality is limited in variation and gradation, as compared to the great flexibility of a player's lips where on the transverse flute the control of volume and tone-quality are spontaneous.

This fact resulted in the disappearance of the fipple-flutes or recorders early in the eighteenth century when the transverse flute (Fr. Traversière: Ital. Traversa) replaced it in the orchestra.

(ii) Cane Reeds, made from the grass "Arundo Donax" which grows around the Mediterranean coasts of Southern France and Northern Spain, are of two sorts - Single Reed and Double Reed.

A single reed is a flat blade of cane, shaved down in part to nearly paper-thinness with flexibility at the shaved end which is placed in the player's mouth. It is fixed over an oblong aperture in the top of a beak-like mouthpiece by means of a ligature (either a binding or a screw device) which clamps the thick end of the reed over a flat table, leaving the thin end free to vibrate when air is forced between it and the mouth-piece.

The end of the mouthpiece is cut away slightly towards its end so that the reed is free to vibrate and this slope which forms the most vital and sensitive part of the generator is called the "Lay" of the mouthpiece.

Double reeds consist of two pieces of cane shaved down to a flexible thinness at the ends placed between the player's lips and bound firmly round a small metal tube or staple so that the shaved ends meet and spread out slightly fan-wise, becoming gradually flatter, leaving a small opening at the extreme end. In the case of the bassoon,

the end of the metal crook takes the place of the staple. Some pressure is applied by the lips of the player to both single and double reeds as the stream of air is forced into the small opening where it sets up a state of vibration which sympathetically communicates itself to the column of air in the tube of the instrument.

The tone-qualities produced by both types of cane-reed have a certain reediness in common which is absent from the whistle-quality of the air-reed yet the two are clearly distinguishable; the single reed produces a rounder and richer tone than the double reed, while the latter is thinner, incisive and penetrating, slightly nasal and without the fullness and body of the single reed.

All single-reed instruments have a certain kinship of tone-quality. Thus clarinet-tone which is the result of a single reed associated with a cylindrical tube, has something in common with saxophone-tone where a single reed is associated with a conical tube. Oboe and bassoon-tone are allied because of their double reeds which differ mainly in size, yet each has an individuality which is due to the different proportions of their respective tubes and note-holes.

In the bassoon, the several obliquely-bored note-holes and thickness of the walls which they penetrate, give a rather veiled or choked quality to the tone which distinguishes it from the open and more direct quality of the oboe.

(iii) Cup-shaped mouthpieces of brass or lip-reed instruments, such as the trumpet, horn, trombone and tuba, are not used on any woodwind instruments of the present time. Such mouthpieces have been associated with the shortening-hole mechanism in obsolete instruments such as the cornett, zinck, serpent, keyed-bugle or ophicleide.

The invention of the valve-mechanism for brass instruments attributed to Heinrich Stölzel around 1815 (G.B. Bierey - "Allgemeine Musikalische Zeitung", Leipzig, May 1815), led eventually to the completely chromatic compass of all brass instruments and thus displaced any shortening-hole system for brass instruments with that of lengthening tubes in all cases.

CHAPTER IIITHE SHORTENING-HOLE SYSTEM OF WOODWIND INSTRUMENTS.

A brass instrument without lengthening apparatus has certain limitations but a woodwind instrument without means of shortening its tube-length would be still more severely handicapped, for its resources would then be confined to playing one fundamental sound and a few of the lower and more widely separated harmonics.

Even in a comparatively primitive state, however, woodwind instruments have been provided with a simple means of shortening the sounding-length of the tube in a moment, and of thus creating several additional fundamentals at the will of the player. This system, which may be called the shortening-hole system, is indeed so much a part of the instrument itself that it is almost impossible to regard any woodwind instrument without it.

Two notable examples of a contradiction to the normal association of lengthening-tube and shortening-hole systems to brass and woodwind respectively, are the now obsolete cornetts (with serpents, ophicleides and keyed-bugles) and the more recently developed "Swanee Whistle" which consisted of a plunger or piston pushed into the resonator-tube of a whistle, the Fundamental of the stopped pipe being adjustable by the player. The appearance in the 1930s of a similar principle applied to a tube with a saxophone mouthpiece seems to have met with little favour. Known as the "Swanee-Sax" it was little more than a toy instrument.

When a lateral hole is opened in the side of a tube, the sounding-length is reduced to that portion of the tube which is above the hole. It is as if the tube were cut off at the point where the open hole is situated. The opening

of a hole, therefore, shortens the tube and creates a new and higher Fundamental. By cutting a series of holes in the upper side of a tube at such intervals as will shorten its sounding-length by diatonic degrees and by then covering the holes with the finger tips, a means of instantaneously creating a new number of Fundamentals is obtained, for a finger need only be raised practically to cut off the end of the tube from the open hole downwards.

A tube pierced by six holes, and held so that the first, second and third fingers of one hand can cover the three lower holes and the same three fingers of the other hand can cover the three upper holes, is thus capable of being shortened by successive degrees so that it will sound a rising diatonic scale when the fingers are raised one by one, beginning at the lowest hole.

Although it is immaterial which hand is used to control the lower three or the upper three holes on such a simple instrument, it is more convenient to associate the Right hand with the lower and the Left hand with the upper part of the instrument, since all woodwind instruments are now held in this manner.

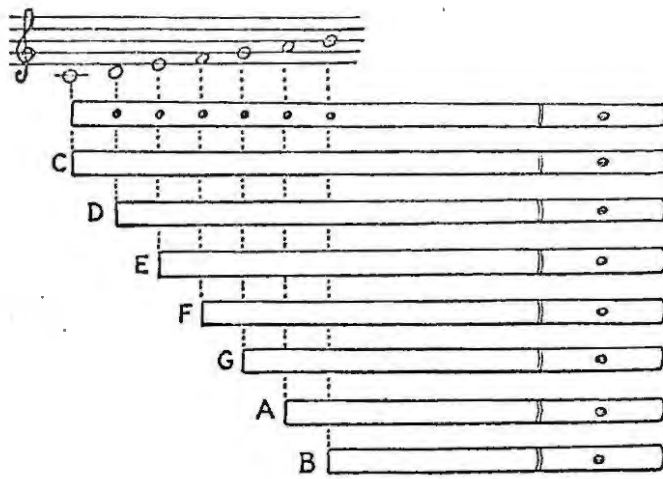
By overblowing, or compressing the lips, the player may sound the octave-harmonics of each fundamental with the same fingering and also extend the scale into the third octave by further compressing the wind-stream so as to sound the third and fourth notes of the harmonic series which will raise the Fundamentals, respectively, a twelfth and a double-octave.

With the aid of modern key-work it is possible to control note holes which are situated well out of reach of the fingers or too wide to be covered by the finger-tips.

On the earliest instruments the semitones between the notes of the diatonic scale were produced by means of "forked" fingerings. These are still a useful asset at the present time but have been to some extent superseded by the addition at a later period of appropriately placed note holes covered by keys. If a finger is raised from a hole (all holes above it being closed), the sound will issue clearly and in tune only when the holes immediately below it are uncovered, but when the hole immediately below the sounding hole is closed by a finger, the pitch of the sounding hole is lowered by approximately a semitone.

Such sounds produced by forked fingerings are not generally so resonant, nor is the intonation so true as when all the lower holes are open but until chromatic note holes and keys were introduced, these "forked" sounds were the player's only means of producing sounds which were not in the primary scale of the instrument.

Fig. 2.



Demonstrating the fact that a tube with six finger-holes provides the equivalent of seven tubes of different lengths.

(Adam Carse)

Fig. 3.

The figure shows four staves of musical notation for the fundamental scale of flute, oboe, clarinet, and bassoon. Below the staves is a fingering chart with two sections: L. (Left hand) and R. (Right hand). Each section has three rows of fingerings (1, 2, 3) and seven columns of notes. Black dots represent closed holes, and rings represent uncovered holes.

L.	1	●	●	●	●	●	●	○
L.	2	○	●	●	●	●	○	○
L.	3	○	○	○	○	○	○	○
R.	1	○	○	○	○	○	○	○
R.	2	○	○	○	○	○	○	○
R.	3	○	○	○	○	○	○	○

Fundamental scale of flute, oboe, clarinet and bassoon. Black dots represent holes closed and rings indicate uncovered holes.

(Adam Carse)

Fig. 4.

The figure shows a musical staff with a treble clef and a chromatic scale. Below the staff is a fingering chart with two sections: L. (Left hand) and R. (Right hand). Each section has three rows of fingerings (1, 2, 3) and ten columns of notes. Black dots represent closed holes, and rings represent uncovered holes. Plus signs (+) are placed above the staff at the beginning of each measure.

L.	1	○	○	○	○	○	○	○	○	○	○
L.	2	○	○	○	○	○	○	○	○	○	○
L.	3	○	○	○	○	○	○	○	○	○	○
R.	1	○	○	○	○	○	○	○	○	○	○
R.	2	○	○	○	○	○	○	○	○	○	○
R.	3	○	○	○	○	○	○	○	○	○	○

Fingering for chromatic scale on an instrument without either keys or downward extension of which the primary scale begins on d'.

(Adam Carse)

CHAPTER IV.SUMMARY OF SHORTENING HOLE SYSTEMS.FREE AIR REED (TRANSVERSE FLUTES).

Cylinder or Boehm Flute. Straight tube of wood or metal, twenty-six and a half inches long. Sounding length - about two feet (from foot to stopper). Cylinder bore of nineteen millimetres from foot to lower end of headjoint. Slight contraction in parabolic curve towards the stopper. Large tone-holes. Primary scale - d' - c' sharp. Sounds Fundamental and a few harmonics. Total compass from c' or b natural (with foot extension) to c'' . Key system, usually Boehm or modifications of that system.

Conical Flute. The same, but with cylindrical headjoint, then tapering gradually towards the foot. Key systems are based on the old eight-key or Simple System.

Alto and Bass Flutes. Usually a fourth and an octave below the Concert Flute. Otherwise the same, but the tube is sometimes bent for convenience in handling the instrument.

Flûte D'Amour. As above but pitched a minor third below concert.

Smaller Flutes. Usually one semitone, minor third or even perfect fifth above the Concert Flute. Chiefly for use in flute bands.

Piccolo: Half the length of an ordinary Concert Flute and sounding one octave higher. Usually with conical bore and without the downward extension of c' found on the flute. Pitched sometimes a semitone or minor third higher and has, rarely, been made a perfect fourth or fifth higher for special work.

Fife. A small cylindrical flute with six finger holes and sometimes with one or more keys. Usually a tone below the Piccolo.

Military drum and fife bands use conical simple flutes of different sizes (usually in B flat or E flat).

CONTINUED AIR-REED (WHISTLE FLUTES).

Recorders, Flûtes-à-Bec, Flageolets and Whistles. Various lengths of tube with conical bore tapering towards the lower end. With or without thumb-hole sounding Fundamentals and only a few harmonics.

Extension, a tone downwards by little-finger hole or key.

Modern Flageolets are sometimes fitted with a key-system.

DOUBLE REED.

Oboe. Straight conical tube of wood expanding at lower end to a small bell. Length, twenty-three inches but sounding length is increased to about twenty-five and a half inches by the reed and staple. The bore is three-sixteenths of an inch at the upper end to five-eighths of an inch at the top of the bell-joint which then expands to about one and a half inches.

Primary scale, d' - c" sharp. Sounding Fundamentals and a few harmonics. Extension down to b flat. Key systems are developments of the original Simple System.

Larger Oboes, Cor Anglais and Oboe D'Amore. Respectively a Fifth and a Minor third below the normal oboe. The same as the oboe but proportionately larger and usually with a bulb-bell. The staple or "crook" is slightly curved for convenience in handling. Downward extension is usually a

semitone less than the oboe.

Heckelphone. An octave below the oboe. Wide conical bore. straight tube with bent metal crook. Globular bell with outlet holes at the side. Key-system similar to the oboe with a downward extension of one semitone more than the oboe.

Sarrusophone. All-metal, wide bored conical tube in a variety of sizes from high soprano to contrabass. Sounding fundamentals and a few harmonics. Primary scale, d' - c" sharp. Downward extension to b flat. The smaller sizes are straight tubes with the reed on a staple, but from the alto downwards, the tube is doubled or redoubled and the reed fits onto a crook.

Bassoon. Wooden or (rarely) metal conical tube about eight feet long with a metal crook at the narrow end, making the full sounding-length.

The tube makes a U-bend about the middle of its length and is jointed in a manner peculiar to the type (Fig. 7).

The Butt (Fr. Culasse, Ger. Stiefelstück, Doppelloch) is an oval piece of wood about seventeen inches long in which are bored two parallel passages which meet at the bottom to form the U-bend. From the narrower end of the passage through the butt, the tube is continued in the wing or tenor-joint (Fr. Petit Corps, Petite Branche, Ger. Flügel) and in the narrower end of that joint is inserted the curved metal crook (Fr. Becal, Ger. S-Rohr, Mundrohr) which continues to taper until the bore is reduced to about one eighth of an inch at the tip where the reed is fixed.

From the wider passage in the butt the tube is continued through an expanding bass or long-joint (Fr. Grand Corps, Grande Branche, Ger. Bass-Röhre, Mittelstück) and further through the bell-joint (Fr. Pavillon, Bonnet, Ger. Kopfstück, Stürze) which may expand or remain cylindrical. The

measurement at the bell end is about one and a half inches. The note-holes are small and those of the primary scale G to f are situated three to the narrower passage through the butt (right hand) and three in the wing-joint (left hand). The wing is a projection from the joint and contains the three note-holes. The downward extension is to B flat, the note-holes for which are all on the widening passage through the butt, bass-joint and bell-joint. Sounding Fundamentals in the primary scale, octaves and a few more harmonics. Two key-systems, respectively, the French and the German, are now in use.

Smaller Bassoons. The same, but proportionately smaller; usually a fifth or an octave above the normal instrument.

Larger Bassoons. The same, but proportionately larger; the double bassoon is usually an octave lower than the ordinary instrument but the downward extension may be only to c. The tube may be metal-jointed and may make one or more additional U-bends.

SINGLE REED:

Clarinet. Straight tubes of wood, plastic or metal, varying in length according to pitch. The B-flat Clarinet is about twenty-six inches long, all of which is the sounding length. The bore is mainly cylindrical, about nine-sixteenths of an inch but contracting in the mouthpiece and expanding at the lower end towards the bell. Medium-sized note-holes are employed. The primary (six finger-hole) scale is from (written) g to f sharp, sounding Fundamentals and harmonics Nos. 3 and 5. Extension Downwards to (written) e and the necessary upward extension to meet the lower end

of the overblown (12th Scale. Key-systems are either based on the Simple (13 keyed) or on the so-called Boehm System.

Smaller Clarinets. The same, but proportionately smaller. Usually in High E flat (about nineteen inches long), C or Piccolo A flat.

Larger Clarinets. Alto or Tenor are usually a fifth or a major sixth below the C Clarinet. Bass Clarinet is usually an octave below the ordinary B-flat instrument, otherwise the same but proportionately larger.

Basset Horns. A fifth down but with an additional extension down to written c.

Contrabass and Contra-Alto Clarinets. Respectively, one octave below the Bass-Clarinet and the E-Flat Alto Clarinet. All larger clarinets are bent either at the mouthpiece or at both ends with an upturned metal bell. The Contrabass and Contra-Alto, a recent design of M. Charles Houvagheneel of Messrs. Leblanc et Cie, Paris, are of coiled metal tube.

Saxophone. All-metal, wide-bored conical tubes in a variety of sizes from high soprano to contrabass. Sounding Fundamentals and all lower harmonics. Primary scale (written) d' to c" sharp with downward extension to b or b flat. The smallest are usually (not not invariably) straight but from the alto downwards, they are bent at both ends and on the largest the tube makes two U-bends near the narrow end.

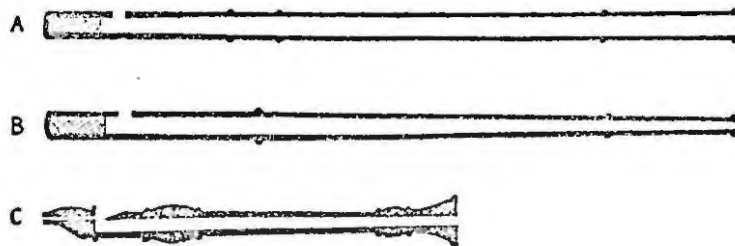
Key system is somewhat similar to the Oboe and Sarrusophone but with Boehm mechanism for F, F sharp and B flat.

Taragato, Octavin etc. Wooden conical tubes with key systems similar to that of the oboe.

After ADAM CARSE -

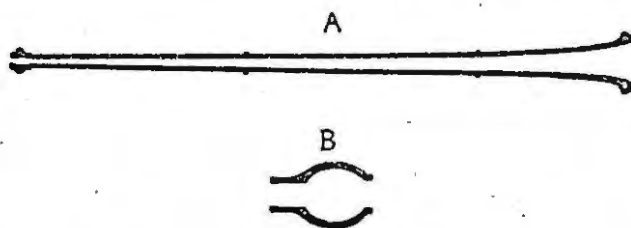
"Musical Wind Instruments".

Fig. 5.



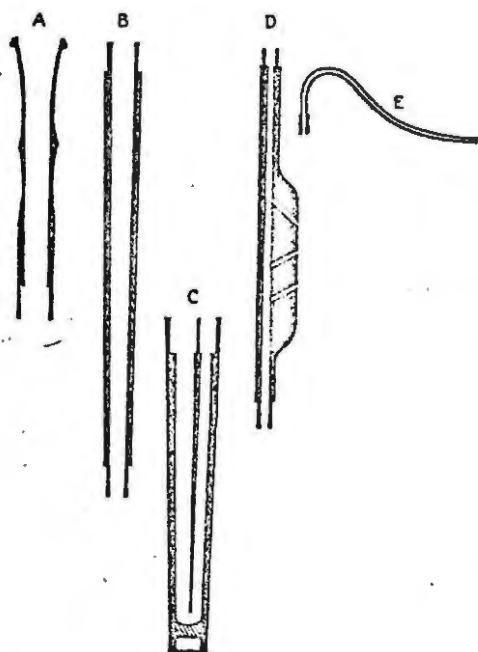
A. Cylinder flute. B. Conical flute. C. Recorder or whistle flute.

Fig. 6.



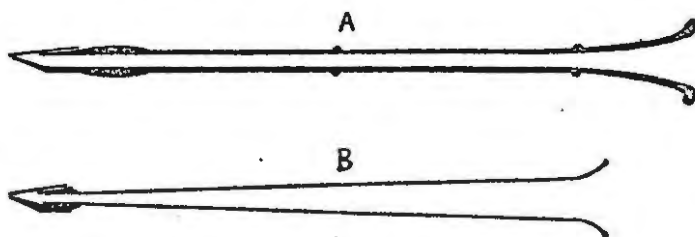
A. Oboe. B. Bulb-bell

Fig. 7.



Bassoon. A. Bell-joint. B. Long-joint. C. Butt
D. Wing-joint with note-holes. E. Crook.

Fig. 8.



A. Clarinet. B. Saxophone.

CHAPTER VTHE MECHANICS OF WOODWIND INSTRUMENTSKEYS.

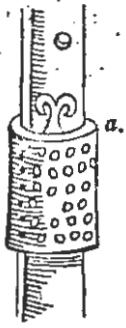
The shortcomings of the human hand, with too few fingers to cover all the necessary tone-holes and insufficient length and breadth of the fingers, have had to be remedied by the use of keys which are used to close the note-holes where fingers are not available.

A simple form of key is a metal lever rocking on a fulcrum or axle, one end called the Touchpiece or Fingerplate, being pressed by the finger, and the other end known as the Key-cover, Cup or Flap which actually closes the note-hole. There are two sorts of key, namely, the Open and Closed Key. Closed keys seal the note-hole until they are uncovered by pressure of the finger on the Touchpiece; Open keys stand open until the weight of the finger on the Touchpiece causes them to close in order to seal the note-hole.

Keys are customarily identified according to the note which sounds when the touchpiece is pressed down. Both Open and Closed keys are kept in their normal position by means of springs which press upward and keep the touchpiece up until pressed by the finger. An open key requires two levers, each pivoting on its own axle and placed end to end so that one acts on the other, thus when the fingerplate is up, the key-cover is also up and the hole is open; conversely, when the fingerplate is pressed down, the key-cover descends on the hole and closes it.

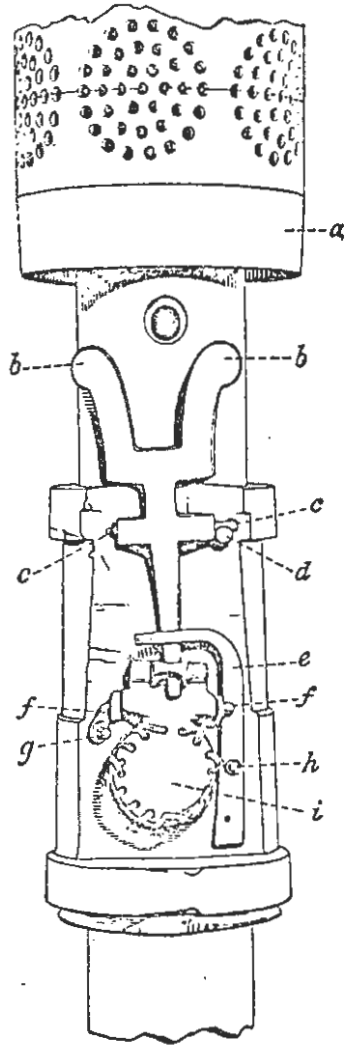
The earliest open keys were used on the larger instruments of the Sixteenth Century for the purpose of controlling note-holes which were situated beyond reach of the little finger and were required to carry the compass of the instrument downwards beyond the Primary or Six-finger-hole Scale. These keys were commonly made of brass and at

Fig. 9.



Fontanelle (Virdung 1511) showing divided touches (a) for both right-handed and left-handed players.
(Adam Carse)

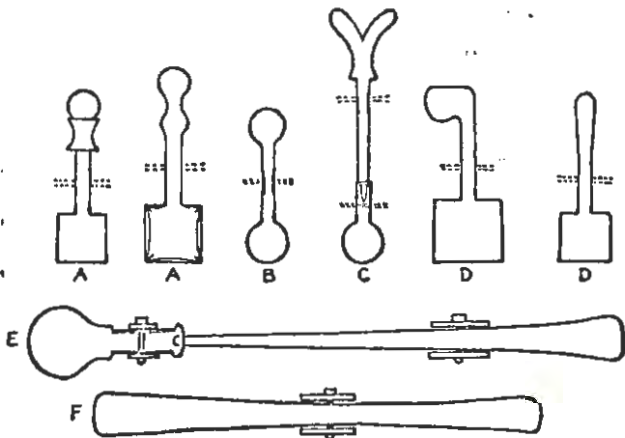
Fig. 10.



a. Box moved upwards to show the mechanism; b. b. cusps of key; c. axle on which the first lever works; d. pin to keep the lever in its place; e. spring to keep the key open; f. axle on which the second lever works; h. pin to fasten the spring to the wood; g. pin to fasten the axle to the wood; i. valve of key.

Mechanism of Open-Standing Key. (From Welch "Six Lectures").

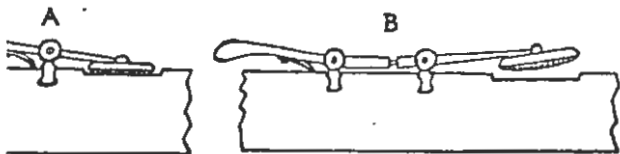
Fig. 11.



-A selection of 18th-century keys. A. Flute. B. Oboe, round closed key. Oboe, open key. D. Short clarinet keys. E. Bassoon, open key. F. Bassoon, closed key.

(Adam Carse)

Fig. 12

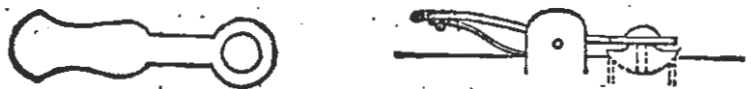


-A. Closed key. B. Open key.

(Adam Carse)

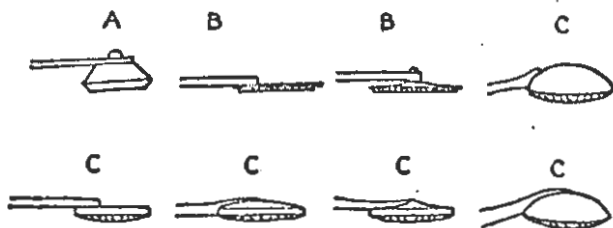
Fig. 13.

Key with metal Valve.



(R.S. Rockstro - "The Flute", 1890).

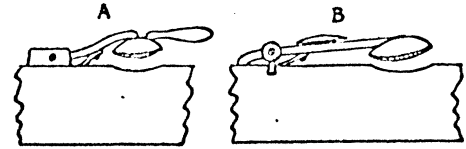
Fig. 14.



-A. Metal plug. B. Flat keys, soldered and riveted. C. Cupped keys with stuffed pads.

(Adam Carse)

Fig. 15.



ged keys. A. Fingerplate at the end. B. Fingerplate in the middle.

(Adam Carse)

Fig. 17.

Cupped Key and Pad.

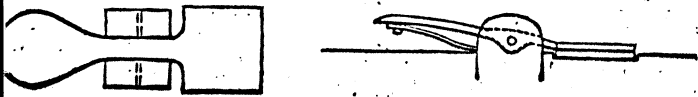


alpha, Touch. beta, Shank, or Stem. gamma, Cup.

(R.S. Rockstro)

Fig. 18.

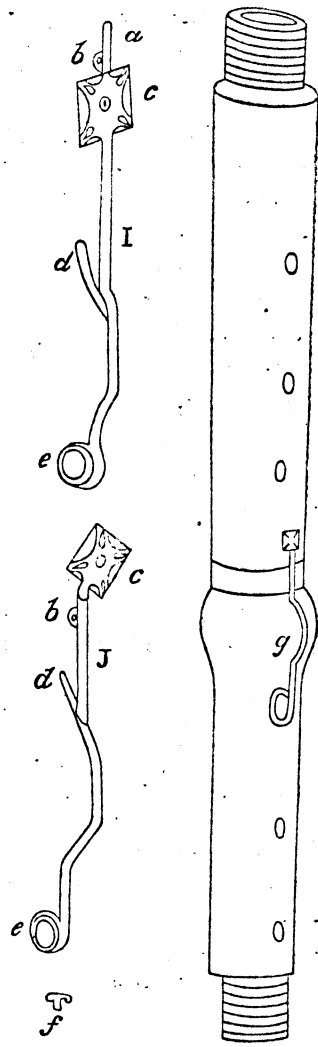
Flute-key working between Knobs.



(R.S. Rockstro)

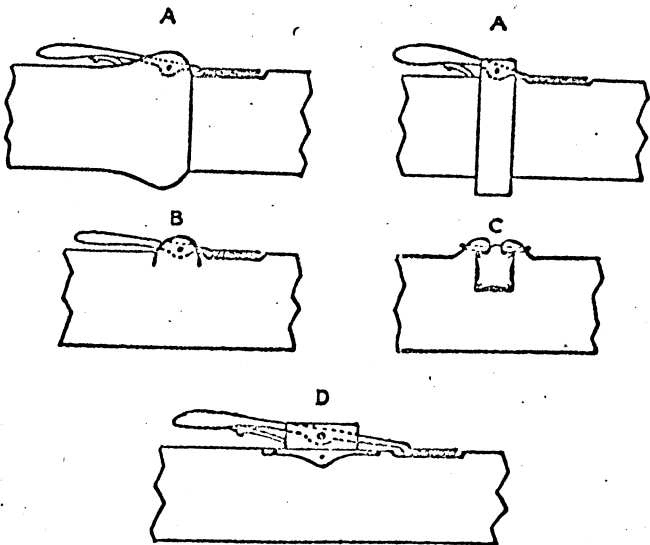
Fig. 16.

Nolan's open G# Key.



Nolan's Ring-key (1808).
(R.S. Rockstro "The Flute").

Fig. 19.

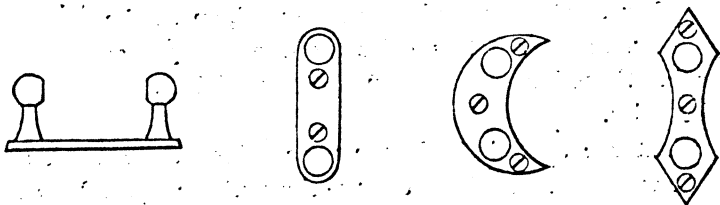


A A. Keys mounted in wooden rings. B. Key in blocks. C. Cross-key in blocks. D. Key in brass saddle.

(Adam Carse)

Fig. 20.

Early Pillars and Plates.



(R.S. Rockstro)

that time were provided with swallowtail or branched double touchpieces which were designed to suit either left or right-handed players. Such keys were consistently made until the end of the Seventeenth Century and survived on oboes and bassoons throughout the Eighteenth Century.

Sixteenth and Seventeenth Century keys were generally covered by a perforated protecting box called a Fontenelle or Poche (Ger. Schutzkapsel), usually in the form of a barrel which covered the whole tube and mechanism, leaving only the touchpiece exposed (Figs. 9 and 10). Sometimes a metal oblong box, covering the keywork without encircling the whole tube, was used on early bassoons, crumhorns or cornets.

Although the closed key was known in the early Seventeenth Century (Mersenne's illustration reproduced by Welch's "History", p.220), it did not come into general use until the second half of that Century, when it was used to control the additional note-hole for d' sharp on the early jointed flutes and oboes.

Three independent lines may be traced in the history of keys from the end of the Seventeenth Century:

- (a) the actual lever or key;
- (b) the Key-mount or axle-support;
- (c) the means of transmitting the movement from fingerplate to key-cover.

Eighteenth Century keys were cut from one piece of metal, commonly brass, occasionally silver, and more rarely from wood or ivory. A flute in the Horniman Museum, London, by T. Lot, Paris, c.1745-80 (see Flute, Fig. 36), has one key, D sharp, made of gold.

The key-covers were either square, round, oval or octagonal in shape (Fig. 11) and a pad of flat leather was fixed to the undersurface of the flap in order to make the

hole airtight when it was closed. The rounded surface of the instrument-tube was usually flattened or recessed to fit the shape of the key-cover.

Many modifications to these simple keys were introduced during the first half of the Nineteenth Century but the square flap gradually gave way to the round key-cover, after having survived longest at the lower end of flutes and clarinets. Early in the Nineteenth Century the flat key-covers were often either soldered, rivetted or screwed onto a shank made of a thicker piece of metal.

Towards the end of the Eighteenth Century a soft grey pewter-like metal was used for key-making instead of brass or silver (Figs. 13 and 14).

Soft metal plugs to replace the usual pads had some popularity between the end of the Eighteenth Century and the middle of the Nineteenth Century. A corresponding recess, countersunk at the top of the note-hole, sometimes lined with metal, received the conical plug to close the hole more securely than a flat key. These plugs are said to have been invented by Boie of Gottingen who made Quantz' flute (Fig. 35) but it was included in the patents of the London flute-maker, Richard Potter, in 1785. The plug does not appear to have been very much in favour on woodwind instruments except the flute, when it was used for the foot-keys by English makers for a considerable period.

The important development in key-making used early in the Nineteenth Century was the Cup-shaped key-cover (Figs. 14 and 17). The invention of the stuffed skin pad, accredited to the clarinettist Ivan Muller in 1809, led to the cup-shaped recess at the end of the keys which securely held the thicker pads and resulted in a more satisfactory covering

of the holes. This form of key is now almost universally used but the exact shape of the cup has varied considerably, the general tendency being to flatten the base of the cup until it assumes the form of a flat-bottomed plate with a low rim. In an earlier form, this cup was sometimes screwed or rivetted to the shank but in all later forms the cup and shank are firmly soldered together.

A "Hinged Key" (Fig. 15) is another form of open key used from about the middle of the Eighteenth Century to the middle of the Nineteenth. It consisted of a single lever attached at one end to the instrument by some sort of hinge or pivot with the key-cover either in the middle of the shank and the fingerplate at the end or with the fingerplate in the middle and the key-cover at the end.

The invention of an English clergyman, Rev. F. Nolan in 1808 of a ring-key to close a hole on the flute which was placed beyond reach of the finger (Fig. 16), gave rise to a series of experiments by Pottgeisser, 1824, Gordon and Boehm (1831), resulting in the design of ring-keys in association with Horizontal Rod Axles. This form of key mechanism was first adopted by Theobald Boehm in his first model conical flute and around 1840 the ring-keys found a place on clarinets and oboes and have since remained an essential part of their key mechanisms.

Almost all the important improvements in key-making were initiated between 1810 - 1850. Among the devices which date from that period are the perforated key-cover used on the oboe, the open-hole finger-plates on French model flutes, rollers on fingerplates designed to reduce friction when one finger passes from one key to an adjacent key (said to have been the invention of a Paris maker named Janssen in 1823).

In the mid-Nineteenth Century German silver (Fr. Maillechort, Ger. Neusilber), an alloy of copper, zinc and nickel, began to replace brass as the common material for key-mechanism and general metalwork on woodwind instruments. For the past sixty or seventy years only German silver, sterling silver or, occasionally, gold, have been used to make keywork.

Fig. 21.

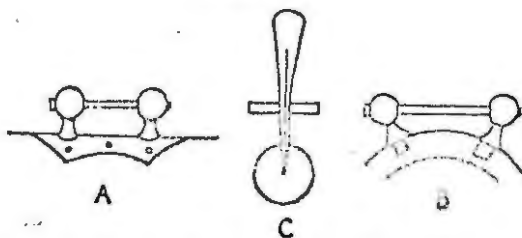


FIG. 20—A. Pillars on footplate. B. Pillars without footplate. C. Key with "sleeve"

(Adam Carse)

Fig. 22.

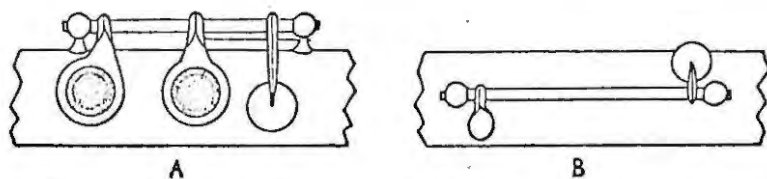


FIG. 21.—A. Rod-axle with open and ring-keys. Pillars and needle-spring. B. Rod-axle with fingerplate and closed key.

(Adam Carse)

Fig. 23.

Modern Pillars and Straps.

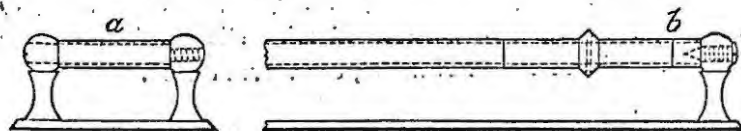


Fig. 24.

Double Spring.

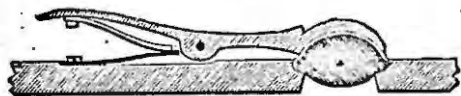
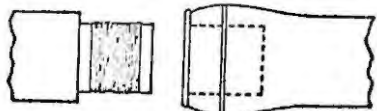


Fig. 26.



-Tenon-and-socket joint with ferrule and thread-lapping.

(Adam Carse)

Fig. 25.

Best form of the Needle-spring.



Fig. 27.

Best form of the Flat Spring.



(Rockstro)

CHAPTER VITHE MECHANICS OF WOODWIND INSTRUMENTSKEY-MOUNTS

The earliest mounts for the open keys on Sixteenth and Seventeenth Century instruments were contrived by running a wire axle through the holes bored in two wings of the key-cover, bent over at right-angles (Fig. 18).

In the late Seventeenth Century this somewhat rickety arrangement was followed by a device in which the keys lie in a channel cut in a raised ring or ridge of wood running right around the outer surface of the body-tube, having been left standing when the instrument was turned on the lathe.

A small metal pin passes through the key, acting as a pivot or axle and its two ends are firmly embedded in the wood of this raised ring. This was the form of key-mount which served almost throughout the Eighteenth Century for the keys of flutes, oboes and clarinets and continued to be used for keys at the upper and lower ends of these instruments early in the Nineteenth Century (Fig. 19).

Near the close of the Eighteenth Century, additional chromatic keys began to be added to woodwind instruments and a reduced form of the wooden ring was adopted in order to avoid the inconvenience of having a number of such rings encircling the tube. Instead of a ring, two blocks were left standing, one on either side of the key-channel. Rings and blocks remained in use well into the Nineteenth Century, in spite of the growing use of metal supports (Fig. 19).

Since the two sides of the channel between the wooden blocks was subject to considerable wear and keys mounted in this way were very liable to develop side-play, some makers lined the inside of the blocks with metal plates in order to obviate this defect.

The method of mounting keys on the Bassoon, probably due to the awkwardness of making wooden rings or projections round a thicker tube, was by metal supports known as saddles. This method was adopted fairly early in the Eighteenth Century and consisted of a brass base or floor with two upstanding walls, between which the key-lever is pivoted (Fig.19.D). The saddle was screwed to the instrument. A similar form of saddle, rather lighter and more neatly finished, appears on oboes and clarinets of the second quarter of the Nineteenth Century and is often found on these instruments in that period, in company with blocks and rings.

All the foregoing key-mounts were destined to be superseded by Metal Pillars which are now in general use on all woodwind instruments. Laurent of Paris, with his glass flutes of 1806 (Fig. 20) seems to have been the first maker to use this method. Theobald Boehm had already used pillars in 1828 but only after his flute of 1832 had become fairly well known did pillars come into general use on other instruments. The pillars are small uprights provided with round heads, into which the axle is firmly screwed after passing through a small tube or sleeve which is fixed across the key-lever. Some of the early pillars stood in pairs on a metal footplate which was screwed down onto the instrument but it has generally been found more satisfactory to screw the pillars into the wood (Fig. 21). On all metal instruments the pillars are fixed in a metal footplate or strap which is soldered to the body of the instrument.

The axle on which a single key pivots, lies at right-angles to the key-lever and the movement is communicated from one side of the axle to the other. The horizontal rod-axle is one which lies parallel to the axis of the tube, while the fingerplates and key-covers project at right angles

from it. This important form of key-movement was first made practicable on the Boehm Flute of 1832, and by mid-century was being applied wherever it was of service to the mechanism of other woodwind instruments. Both methods of transmitting key-movement, the older rocking lever and the rod-axle have remained in use ever since that time.

The earliest rod-axes were solid metal rods pivoted at both ends on the points of small screws which were driven through the round heads of the supporting pillars and could convey only one sort of movement from finger to key-cover. Thus, any keys, rings or fingerplates attached to the same rod axle were either all raised together or depressed together, although a note-hole fitted with a ring-key could be opened by raising a finger without letting the ring rise, provided another ring or fingerplate attached to the same axle was pressed down. A later type of rod axle was that which appears to have been introduced by Buffet (Jeune), Paris, about 1838 and which enabled two sorts of movement to take place on the same axle. This was accomplished by making the axle hollow (tubular) and by passing a second solid rod through the tubular rod (Fig. 23). By this means, the outer or tubular rod might be made to move independently of the inner rod, or the two might be coupled together by means of a connecting pin or a "clutch".

The rod-axle can be made to operate both open and closed keys; in the former case, the fingerplate and key-cover project on the same side of the rod but, for closed keys, they project on opposite sides. The rod-axle can communicate movement over any distance within reason and several keys with independent movement may be attached to the same axle when regulated by stops, clutches or interlocking devices controlled by separate springs. There is a saving of weight in the rod-axle

mechanism and side-play is practically eliminated.

SPRINGS.

Early Sixteenth and Seventeenth Century open keys were provided with springs, of which one end was fixed to the instrument, while the free end pressed downwards on the further end of the first lever, keeping that end down and the fingerplate up. Near the end of the Seventeenth Century, when keys were mounted in wooden rings, and later in blocks, a flat brass spring was rivetted to the underside of the key-lever, pressing upwards, thus keeping that end up when the key was not touched. Steel springs began to be used before the middle of the Nineteenth Century and eventually superseded the brass springs. The first keys mounted on rod-axles were regulated by flat springs but in 1837, Buffet of Paris introduced the steel needle-springs which are now always associated with rod-axles. Cornelius Ward, a London flute-maker, first used them in England in 1842 (Fig. 25).

JOINTS.

The woodwind instruments of the Sixteenth and Seventeenth Centuries were made, as far as possible, from one piece of wood without detachable joints. The first signs of jointed instruments occur early in the Seventeenth Century but it was not until the close of that century that instruments were made in several detachable pieces. These joints were united with tenons and sockets.

The tenon was made by thinning the end of one piece to about half of its normal thickness and a corresponding amount removed from inside the piece which received the tenon, thus

forming a socket (Fig. 26). The wood around the socket was turned rather thicker than the rest of the tube and the end was generally protected against strain and consequent splitting by a ring or ferrule of ivory, bone or metal. This extra thickness sometimes served as the ring or swelling which was used to mount the key or keys at the lower end of the instrument. Lapping or waxed thread was wrapped around the tenon in order to make the joint airtight. This type of joint was used throughout the Eighteenth Century and were still made after the middle of the Nineteenth Century, although by that time the ivory ferrule was beginning to be replaced by a narrow band of metal which served the same purpose, and it was no longer considered necessary to thicken the joint round the socket. After 1800 improved joints began to appear, with the inside of the socket lined with metal. The tip of the tenon was strengthened and protected by a ring of metal. The cork-covered tenon also made its appearance at this time with a metal inner tube in place of the wooden tenon.

Joints have varied considerably since that time and although the wooden tenon is by no means obsolete today, most good-class instruments are provided with metal-lined sockets and either cork-covered or thread-wrapped tenons and a protective ring of metal on the tip.

TUNING DEVICES.

Devices for tuning or slightly modifying the pitch of woodwind instruments were known soon after the middle of the Seventeenth Century, if not earlier. Before pitch became stabilised during the course of the last century, these devices (which took the form of alternative middle-pieces of varying lengths or of sliding tenon-and-socket joints) were very necessary.

Many flutes, oboes and clarinets exist in collections, dating from the Eighteenth to the mid-Nineteenth Century, for which two or more alternative middle pieces were provided. The pieces were generally numbered or marked to distinguish them from one another. Alternative headjoints for flutes and short detachable pieces at the upper end of oboes occur on instruments made in the 1850s. Alternative wing-joints or crooks or a movable upper part of the wing are amongst the devices for tuning bassoons. In the second half of the Eighteenth Century a short extra piece, inserted between the mouthpiece and the upper middle-piece, appeared on clarinets. This was called the "Barrel" (Fr. Baril, Ger. Birne) through its shape. Barrels of varying lengths could accommodate varying pitches. Telescopic tuning-slides appeared on some flutes of the Eighteenth Century but were not efficient since the wooden tenon left a cavity inside the tube when the slide was drawn out. Sometimes the cavity was filled with little rings of wood specially made for this purpose as late as the time of Boehm.

Late in the Eighteenth Century a thinner metal tube sliding into a metal socket began to replace the thick wooden slide on flutes. Such tuning-slides also occur on clarinets, rather less commonly on oboes and still more rarely on bassoons. The sliding joints were sometimes graduated and numbered.

After Adam Carse -
 "Musical Wind instruments".

CHAPTER VIITHE DEVELOPMENT OF MANUFACTURING PROCESSES

The earliest days of making woodwind instruments involved no operations which were not the common skill of any master turner. Joints were shaped externally on a reciprocating pole lathe and the boring was accomplished with long "shell" bits and reamers or D-bits of suitable shape, while the free end of the work was supported by a perforated steady or "spectacle" plate attached to the lathe bed.

These methods continued after the advent of the fully rotary lathe and still remain the essential basis of the much more complex modern techniques.

The special tools used by early makers are illustrated in some of the classic works on Turnery (Charles Plumier, Religieux Minime, "L'Art de Tourner en Perfection", Lyons, 1701 and L.E. Bergeron "Manuel du Tourneur", Paris, 1792 and 1816). Four plates of Diderot's Encyclopedie of 1747 show the tools and methods of working.

C. Holtzapffel "Turning and Mechanical Manipulation", London, 1843, illustrates two special tools, one for boring finger-holes and the other designed to form the rims or seatings for the key-pads.

The risk of splitting, while piercing the side-holes of wood tubes had always been great before the use of power tools and some early makers avoided this danger by burning out the finger-holes with hot irons. A Spear-point bit driven by the Drill-bow gave fast clean-cutting action together with a sensitive control of direction.

The undercutting of holes, according to Holtzapffel

was done with a stout knife but Bergeron depicts a tool which is still in use today, the "Fraise". This was made in two parts, a fluted conical cutter and a stem with a wooden handle like that of an awl. The stem has a screw thread at its end and the cutter is pierced down the centre and tapped to correspond. In use the cutter is slid into the bore of the instrument and the stem passes through the hole to be treated. A turn or two serves to pick up the cutter which can then be drawn up until its apex enters the hole. The stem has a right-hand thread and since the teeth of the cutter slope to the right, the resistance encountered in cutting only serves to screw the separate parts more firmly together. Certain refinements have been made in the modern versions and the stem has even been used in the lathe chuck. A similar process is used in constructing metal saxophone and flute-tubes where the tone-hole saddles are drawn up from underneath the surface of the tube.

From 1690 to 1830 the favourite woods used in the construction of woodwind instruments were pear, cherry, maple and box. Box (*Buxus Sempervirens*) of the Turkish variety is very suitable wood from the point of view of appearance and yields a handsome finish when polished. The English variety of Box was softer and rather tougher and was formerly held in high esteem by the older turners. Its preparation is said to have included burial underground for periods of up to twenty-five years as part of the seasoning process. Large stocks of seasoned wood were handed down from one generation of craftsmen to the next but today the supplies are exhausted and Box has not been used extensively since the Mid-Nineteenth Century.

Box is an extremely absorbent wood and very liable

to change its shape during the course of use as an instrument tube. This and the tendency to crack or split easily probably contributed to the makers discarding it in favour of more durable materials.

Messrs. Louis of Chelsea made two modern oboes in Boxwood during the 1930s and one of these is in use at the present time by a member of the Philadelphia Orchestra who brought it to London during their first post-war visit, where its beautiful tonal qualities attracted the attention of London oboists.

Cedar has sometimes been used and Ivory, particularly for flutes, was a popular material early in the Nineteenth Century. Ivory is not notable for its tonal qualities and is very apt to crack and split. The glass flutes of Laurent, Paris (c.1815) are worthy of mention since they showed an ingenious method of mounting the key-pillars. Often richly decorated with semi-precious stones, these flutes were particularly handsome in appearance but their tonal quality is reported as being very poor.

One was owned by Joseph Buonaparte (brother of Napoléon and King of Spain) some time after his flight to America following Waterloo, where he settled in Bordentown as "Le Comte de Survilliers". H.M. Norris of Cincinnati reports that his grandfather, Thomas Fitch Bunnell gave Buonaparte his own treasured flute in admiration of his fine playing and received Buonaparte's glass flute in exchange which has been handed down to Mr. Norris. (Ref. "The Etude", Vol. XXXIX, No. 1 p.22, Jan. 1921, Philadelphia, U.S.A.).

Violet wood, Ebony, Rosewood, Maple, Sycamore and Cocus (Brya Ebene D.C.) appear after the first quarter of the Nineteenth Century. Cocus has always been a popular wood with leading British makers of flutes. Before 1946 Messrs. Rudall Carte, then of 23, Berners Street, London, W.1., had almost the monopoly of the Cocus-wood imported into

Britain and their reputation as leading makers of flutes rested mainly on the beautiful hand-made cocus-wood flutes which were turned out in their workshop by a handful of elderly workmen whose craftsmanship has been handed on to just two or three makers and repairers of the present day. The amalgamation of the firm with Messrs. Boosey and Hawkes, the rising trend of mass-production techniques and the growing popularity of the metal flute in England has brought this era of fine craftsmanship to almost a close in Britain today.

Messrs. Rudall Carte continue to make fine instruments but they are chiefly notable for their silver flutes, made either in fourteen-thousandth of an inch thickness of tube or, in the case of these particular instruments, eighteen-thousandth of an inch thickness, which appears to give better results. Thicknesses of tube, whether in wood, silver or vulcanite (termed as "Ebonite") for flutes has always remained a controversy among players and makers. The "Thinned" Headjoint, for instance, became popular among players on the cocus-wood flute in Britain from 1930 onwards, following the lead of certain eminent professionals who claimed that it made for easier response and more evenly distributed balance. The Headjoint, in this process, is turned down to a mere shell of wood outside the metal lining, leaving the lip-plate at the original thickness. Some players gain satisfactory results with a silver or gold headjoint fitted to the standard cocus-wood body.

Cocus-wood flutes thinned throughout were favoured by some British players but the process of thinning down the exterior of the tube by hand was costly and the risk of cracking was increased.

Ebonite (Vulcanite) was favoured by service bands

for all woodwind tubes for its durability, especially in foreign climates where wood was liable to crack at any change in temperature. Ebonite has the additional advantage of lightness in both tone and weight but tended to exude the odour of rubber in heated atmospheres and had the disadvantage of staining or discolouring over several years of use. Few present-day instruments are made entirely in Ebonite, but the material is used extensively in the making of clarinet and saxophone mouthpieces and is, of course, normally used in lining the Wing-joint and narrow channel of the Butt-joint on bassoons. Today, Resin Plastics have virtually replaced Ebonite in the making of entire woodwind bodies where cheapness and non-risk of cracking are desirable qualities.

Metal has never been accepted by orchestral woodwind players except for the Flute. Much has been argued for and against metal flutes ever since Theobald Boehm first began to manufacture them. It would seem that the important feature in a woodwind tube is the density which effects the resistance and free vibration of the air-column.

The finely-drawn flute-tubes of Louis Lot of Paris, although thinner than fourteen-thousandth of an inch, were so tempered in the process of drawing on a mandrel that they gave a remarkable sonority combined with lightness in weight. Lot's models have been copied, particularly by the famous American makers, Wm. S. Haynes and Verne Q. Powell, both of Boston, Mass., who have re-scaled the tone-holes to bring their flutes to modern pitch requirements. Other firms who have made good instruments have failed to obtain the same results from tubes of the same thickness (fourteen-thousandth of an inch) as these makers. I am convinced that the reason for this has been carelessness during the soldering of the Key-work, when overheating has reduced the temper of the fine-drawn

tubes.

My own experiments in the burnishing, with an agate burnisher, of brass and silver tubes, have proved that this process results in a greatly improved tonal quality which is quickly destroyed upon the application of a hot flame such as a blow-torch or Bunsen Burner.

Most flute-makers are well aware of these facts and for this reason all the essential parts of the key-work are assembled with hard silver solder and afterwards the complete unit (pillars and bearings, less the assembled keys) is attached to the main body tube by means of straps which are soft soldered at a lower temperature. Saddles too are soft-soldered onto the body tube in more expensive flutes, while mass-produced instruments have these turned up out of the main tube. It is claimed that these tone-holes are trouble-free, compared to soldered saddles which are apt to become porous as the solder tends to corrode over some years of use. A valid argument against drawn tone-holes is that the process tends to stretch the metal of the body tube irregularly. However, it is now an accepted practice in the process of mass-production and makes for a cheaper instrument compared to the high price of a hand-made instrument.

Woods such as Cocus and African Blackwood (*Dalbergia Melanoxylon*) give the accepted weight and resistance which has become standard after more than a century of experiments and design. The density of tubes made from these woods will be more or less uniform and these standards have been accepted by the players. *Dalbergia Melanoxylon* is the usual wood used in making oboes and the more expensive clarinets. The few metal oboes and clarinets made in the 1930s were, apart from the prejudice of players, doomed to general failure since insufficient experiments had been carried out regarding the behaviour of metals under intense heat. The close examination of any

metal oboe or clarinet of this period will reveal hard soldering applied to or near the tube which had almost certainly not been "tempered" in the manner previously described before assembly.

This, of course, is merely a personal opinion but the fact remains that much experiment in this direction has been long overdue.

Blackwood (Amer. Grenadilla) or Dalbergia Melanoxylon was, according to Moltzapffel, first imported into Europe over a century ago as "Black Botany Bay Wood", although it is uncertain whether it did actually come from that part of the world. The present-day sources are Tanganyika, Uganda and Portuguese East Africa. It is nearly the hardest and most dense of all timbers and there is much wastage owing to its irregular growth. A high polish inside the bore of a woodwind tube is desirable and this wood turns and bores very well, besides taking a natural polish from the tools. German bassoons are made of either Maple or Sycamore, while the French still use Rosewood.

The rough timber is seasoned for over three years in the open air, and is first cross-cut into billets slightly longer than finally required for the joints. They are then cleft, a less economical procedure than sawing, but which brings to light any incipient cracks or flaws which might open up later in the finally finished joints. After cleaving, the joints are roughly chopped to shape by hand, rough-turned and bored through with a small hole so that the air may circulate during a further long period of seasoning. When ready, the joints are turned to their final shape (reamed and tapered in the case of oboes) and then follows another prolonged seasoning in an oil-bath.

"Setting-out" is the process of drilling the holes

for the various key pillars together with the tone-holes. Different makers have their individual ideas of working but the "setting-out machine" is basically the same design for all wood instruments.

A short lathe-bed carries two poppet-heads, between which the work may be mounted. One head carries a centre inserted into the bore of the turned tube, while the other has a plain spindle fitted with a self-centering chuck to grip the other end of the tube. A sensitive drill-press is mounted exactly over the axis of the two poppet-heads and by means of rotary motion between the heads and longitudinal motion along the main bed, any point on the surface of the blank joint may be brought accurately beneath the drill and retained there by the locks. The combined readings of the two indices provide a formula which gives the precise position of every hole drilled and enables the most perfect repetition work to be done.

Oboes and wooden flutes are usually made by hand in this manner but in the case of clarinets, some makers replace the longitudinal index with a "Master-bar". This is a metal cylinder drilled with holes so placed that when one of them engages with a small bolt attached to the travelling bed, the bed is held rigid and the workpiece is automatically positioned at the same time.

Near each hole in the master the corresponding reading for the dividing plate on the chuck-spindle and size number of the required drill is stamped. This arrangement greatly speeds up the work and each "master-bar" represents the maker's own specification for a particular joint.

Bassoon-makers use a movable drill-press working in an arc so that holes may be drilled at any angle to the work besides perpendicular.

The double-edged fly-cutters used nowadays in this

work are made from flat steel and are merely a development of the early spear-point drill. Certain cutters are made with a stop to prevent them from penetrating the full thickness of the wood. These are used to make the blind holes which are subsequently tapped with a coarse thread to take the key pillars. A further improvement on standard key-pillars is the addition of retaining screws fitted to either side of the pillar for greater strength, which are known as "Anchored Pillars". (Fig. 21).

When the tube leaves the setting-out machine it is ready to receive its pillars and keys. The actual fitting of these must necessarily be done by hand.

Perspex (Ger. Plexiglas, Amer. Lucite) appears to be the best of the synthetic resins as a substitute for wood since it possesses a degree of sound conductivity approaching that of wood. Several good flutes, oboes and bassoons have been made in this material but its highly unusual appearance has not made it popular among players.

An Acrylic saxophone was produced by the London firm of "Grafton" in the 1940s. The body tube was moulded in two halves and the mechanism, partly covered by an external layer of perspex (acting as a dust-shield), relied on long spiral springs which were remarkably efficient and reliable. This is the only recorded instance of such springs being used in woodwind key mechanisms.

The springs used in early instruments were made of hammered brass and the end of the flat spring was attached by a rivet to the underneath part of the touch or the key-shank, the free end being retained in position by a groove or stop carved into the wood of the joint. Such springs are found on all examples of woodwind until the use of the rod and axle mechanism associated with the appearance of the

Boehm System Flute of 1832. The tempered needle-spring was found to be more suitable for keys mounted on rods and tubes and consists of a tapered needle, tempered and curved to the required strength and drawn through a small hole in one of the pillars. Fixed in this position the free end engages with a clutch or lug soldered onto the key-tube.

These needle springs may last for many years but they are liable to corrosion or, occasionally, sudden snapping in changes of temperature. Rustless materials, such as phosphor-bronze or gold are now used, particularly in the construction of flutes.

Key-rods are usually made of mild steel and tapped at one end so that they may pass through one or more pillars and be threaded into another supporting pillar. Keys or cups which are required to be fixed, while other parts of the mechanism work freely, are secured to the rod by a small hole drilled through both key and rod and held by means of a tapered steel cotter-pin (often a piece of tempered needle-spring). These pins often cause some hazard when emergency repairs are needed and a very recent development has been to replace them with small screws threaded through key and rod which are easier to remove by the unskilled amateur repairer where skilled workers are not available.

The commonest cause of trouble in rod mechanisms, necessitating removal of these retaining pins, is dirt or rust on the rods through insufficient lubrication or through the chemical action of perspiration from the player's fingertips. This has been recently overcome, notably by the London flute-making firms, A. Cooper and Messrs. Rudall Carte & Company, by substituting stainless steel rods in place of mild steel.

Point-screws are used to support a key-barrel at either end between two supporting pillars. They are tapered

to fit into a recess at the end of the key-barrel and counter-sunk so that the end-play on the barrel, caused by normal wear, may easily be taken up by giving the screw a few extra turns (Fig. 23.B.).

A more recent development of the Point-screw is the Pivot-screw which is a short parallel rod fitting into a recess of the same shape at the end of the barrel. This development is too recent for comparison with the Point-screw but those instruments fitted with it seem to have been found quite satisfactory.

Adjustment screws are sometimes found, mainly on cheaply-made instruments and their purpose is to take up any extra play between keys and clutches. In precision-made instruments of good quality all that is necessary in most cases are thin plates of cork shellacked into position beneath the clutches or key-stops which give perfect regulation lasting for several years. In the case of wider gaps in mechanism, undue key-noise is adequately silenced by the use of felt cut to shape and fitted into place.

The earliest keys were hammered into shape from a solid piece of brass or of silver in more costly instruments. At the end of the Nineteenth Century in France, the cheap woodwind industry was highly organised. Key-making was farmed out to workers in their own homes and in some districts this business became almost a domestic industry as had chain-making in the Midlands of Victorian England. With this system, the French were able to make keys more cheaply than any other nation and many thousands of sets were exported, made to foreign specifications. At the present day, an effort to approach the cheapness of the French product has been made in casting keys in soft metal.

In high-class key-making, hand-forging has recently

given place to power forging or hammering by machinery. The metal so treated becomes "work-hardened".

A modern manufacturing technique is to fit the corresponding pairs of pillars in the form of blanks with solid globular heads. A jig is then applied which supports both pillars firmly and the drill passed through both heads together. The heads of the pillars are then faced off flat where the key-tube will bear against them.

Pads are made from woven felt and covered with skin (kid, leather or gold-beaters skin). Pad-making is also an industry in itself and each of the woodwind instruments requires a certain type of pad and special sizes and thicknesses are manufactured to each instrument-maker's specification.

Wooden flutes, for instance, require a somewhat resilient pad, while metal flutes require a thin hard pad for the best results. The older technique of fitting pads into their respective cups with an adhesive such as shellac or white wax still applies today in the case of the smaller keys on oboes, clarinets and bassoons but in the case of flutes and saxophones, where the overall surface of the pad must be wide, in order to cover the large tone-holes, the risk of bulging or mis-shaping of the pad through moisture during use is obviated by securing the centre of the pad with a wide washer threaded to screw onto a central pin soldered in the centre of the cup.

In the case of French model flutes, with five perforated finger-plates, the pad is pierced through its centre, fitted over the central tube and retained by a circular snap-fastener. Certain saxophone pads, often made in soft brown waterproof leather, are fitted with a similar snap-fastener although not cut out in the centre in the same manner.

The re-padding of woodwind instruments, especially flutes and saxophones, is a highly skilled operation, since the regulation of the keys plays a most important part in the performance of the instrument and the pads must close their holes perfectly. Professional flautists need to have their instruments repadded every two or three years and it can be a very expensive business.

In the early 1950s, experiments were made with plastic pads and these have been found sufficiently satisfactory to be fitted nowadays to nearly all mass-produced flutes although they have not, as yet, been applied to the other woodwinds. They have the slight disadvantage of becoming sticky at changes of temperature but otherwise would seem an ideal solution to padding problems among young instrumentalists who may perhaps be careless in the matter of packing their instruments without wiping them dry after playing.

In France, where the demand for the fine instruments of Rigoutat, Marigaux, Robert and other makers would be likely to outstrip the supply, the mass-production methods, with their attendant evils, have been avoided by reversion to the old-established French custom of "farming-out" the work of making keys and pillars to individual workmen.

In Eastern Europe and the Republic of China, very good and inexpensive woodwind instruments are being made under advanced methods of mass-production, mainly under the supervision of German technicians.

A revival of early instruments in Europe has taken place in the last few years. Modern reproductions of Baroque oboes, one-keyed flutes and even cornetts are on sale in some London music shops. The revival of the Recorder seems to have given the lead in this new trend. Perhaps for some amateurs and enthusiasts the development of woodwind instruments has made the business of music-making a little tame and either



this desire for simplicity or purism leads them to seek the original medium on which to play the original music.

Sources.

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Messrs. Rosey and Hawkes, 295, Regent St., London, W.1.

Messrs. Rudall Carte & Co., London,

Wm. S. Haynes Co., Boston, Mass., U.S.A.

The Leblanc Corporation.

CHAPTER VIIIPITCH IN RELATION TO WOODWIND DEVELOPMENTS

Throughout the history of orchestral music the actual pitch, or number of vibrations per second in regard to a given note (usually a' or c^{''}), has varied widely between different countries and musical communities according to geographical, sociological, cultural or even political barriers or distances. Less than a century ago it was difficult for the different nations to arrive at an accepted standard. Probably it could be argued that an exact common standard had been unnecessary until the progress in travel and international exchanges of culture made it essential that an acceptable common meeting ground be agreed between artists and manufacturers of musical instruments.

R.S. Rockstro in "The Flute", 1890, quotes from a paper by A.J. Ellis, "The History of Musical Pitch" which shows the enormous variation between the pitches of a' or c^{''} over periods of history (e.g. Praetorius' "Chamber Pitch" in 1619 - a' = 370.7 against the pitch of the organ in the Jacobkirche, Hamburg, in 1688 where a' = 489.2, or again the official pitch of the "Inventions" Exhibition of 1865 where a' = 452. and Continental or "French Pitch" where a' = 435). Where String instruments and, in some measure, the Brass were concerned, a variation between accepted pitches was adjusted without undue difficulty, since all that was involved was the lengthening or shortening of strings or tubes to meet the required pitch. With Woodwind instruments, however, the problem was much more complex. Shortening or lengthening the tube might very well accommodate a few of the finger holes to play in tune with the required pitch, but the overall readjustment of the tube-length could not compensate for the fixed positioning of such finger holes as were consequently misplaced in

their new ratio.

One of the saddest changes for the British woodwind instrumentalist of the early part of the Twentieth Century was the change of the official "Sharp Pitch" or "Old Philharmonic Pitch" ($a' = 452$) to the "New Philharmonic Pitch" of $a' = 439$. Many cherished and beautifully made instruments had to be discarded and replaced by expensive new ones. Again, in 1939, following a conference in London, the British Standard of Concert Pitch was established at $a' = 440$. The tendency on the part of instrument makers in France, Germany and U.S.A. has been to make their instruments still sharper than this. The Boston Symphony Orchestra is reputed to play at $a' = 444$ and my own Boston-made concert flute is made at $a' = 442$. It undoubtedly is some advantage to the woodwind-player to have some "Reserve of Sharpness" which he keeps by retracting the upper-joint or tuning-slide of his instrument. Patently nothing is worse nor more embarrassing for the instrumentalist than to be physically incapable of playing up to the prevailing pitch of an orchestra or band.

During the lengthy transition period from "High" to "Low" (or from "Old Philharmonic" to "New Philharmonic") pitch in Britain, the professional woodwind player was obliged to carry both instruments. By 1929 the "New Philharmonic" pitch was adopted officially by the British Army. The old "High" Pitch is still to be occasionally met with today, especially in church organs where re-tuning would be a costly business. My own particular trick in meeting this problem in oratories etc., is to retract the headjoint slightly in order to compensate for the difference in pitch of one-third of a semitone (the rough difference between "High" and "Low" pitch being two-thirds) and transposing the part one semitone higher - a simple matter for the experienced flautist!

Pitch will always remain a vexatious problem for the woodwind instrumentalist unless international standards are rigidly maintained. A heated atmosphere will cause the pitch of any wind instrument to rise, while the pitch of the stringed instruments becomes flatter. The reverse applies in a cold atmosphere. All these points must be carefully watched by the players in order to maintain good intonation. The design of instruments and choice of materials by players and manufacturers during recent years has undoubtedly influenced the rising general standard of woodwind-playing throughout the world. Intonation is the foremost consideration wherever musicians perform together.

CHAPTER IXREEDS

The reeds of the rivers and streams are indubitably the source and origin of every woodwind instrument, whether they were used to make primitive flutes such as the Arab Nay blown across the end of a single hollow reed or like the Syrinx or Pan-pipes fixed collectively to form a series or scale of single notes or by splitting the end of the stem to form a primitive double reed where each section could vibrate between the player's lips. The words "Reed" and "Pipe" are used indiscriminately by all writers from classical times. Possibly the first true "reed" was formed by cutting or splitting the end of a hollow plant-stem and blowing it between the compressed lips. The addition of finger-holes cut or burned in the hollow tube would form the primitive shepherd's pipe mentioned by Milton and others.

The Greek Aulos was such a reed-pipe and Theophrastus in his "Enquiry into Plants" (Trans. Sir Arthur Hort, Heinemann, London, 1916) mentions the reeds used for pipes and detailed conditions of their growth and preparation for use. Theophrastus, born in Lesbos in 370 B.C. studied in Athens under Plato from whom he derived his thorough method of classification of subjects. He wrote over 200 treatises on a wide variety of subjects and was a famed lecturer.

Pindar in his Twelfth Pythian Ode, celebrates the victory in a public competition of Midas of Agrigentum who, having accidentally broken the reed-tongue of his Aulos, played upon the instrument in the manner of the Arab Nay and so delighted the audience that he won the victory. (Ref. K. Schlesinger, p.285 "The Green Aulos", Methven, 1939). The accidental cracking of a primitive double reed might easily have led to the idea of using the cane separated

into two blades.

Modern reeds for oboes, clarinets and bassoons are invariably made from a grass named "Arundo Donax" which grows mainly in the Mediterranean coasts of France and Northern Spain.

After maturing, the selected canes are split into suitable strips, gouged and shaped to suitable proportions for the instruments. Double reeds are invariably made by doubling over the same strip of cane (bark outwards) and, in the case of the oboe, tying the shaped strip to a metal tube or staple before separating the blades.

Processes of making reeds for oboe and bassoon are given in Figs. 30 and 31.

Clarinet reeds are planed to shape on a special machine before sale to the player. Adjustments to the reed may be made by the player and consist briefly of scraping the reed length-wise in order to soften its response to the player's requirements or by cutting a minute fraction cross-wise across the tip in order to harden the response. Double reeds require the insertion of a flat metal tongue between the blades during scraping. Single reeds are less vulnerable to splitting during the scraping process but are best cut for hardening by means of a reed-cutter or small flat guillotine made to special size for each instrument (Clarinet, Alto-Saxophone, Bass-Clarinet etc.)

During the 1939-45 War, a serious shortage of "Arundo Donax" in Britain caused several firms to produce an "everlasting" plastic reed for clarinets and saxophones. Double reeds presented a greater problem. The plastic reeds were seldom satisfactory.

Antoine Joseph Sax combined the "beak" or Clarinet

mouthpiece with a wide conical bore resulting in the invention of the successful instrument known as the Saxophone. According to Philip Bate (*The Oboe*) a Scottish Bandmaster, William Melkle, applied such a mouthpiece in 1830 to his newly-invented "Caledonica", a name subsequently altered to "Alto-Fagotto". This instrument was improved by George Wood, of London, and well-preserved specimens show it to have been both simple and practical.

Single-reed mouthpieces have been successfully used in association with the Bassoon on a number of occasions. They were used in church gallery orchestras in England in the early Nineteenth Century. A Belgian patent granted to the elder Sax in 1842 illustrates, in addition to other improvements to the bassoon of his day, a small apparatus of this type. Another idea which did not progress beyond the drawing board was patented in France in 1856 by a certain Mons. Bernibus, together with the manufacturer, Gustave Besson. It consisted of a beak mouthpiece with two opposed tables of 'lays' for flat reeds, one on either side of it communicating with a central sound chamber. Called the "Neorgane", this generator was designed to be applied not only to normal reed instruments but was expected to replace the cup mouthpieces of brass instruments as well. (P. Bate - *The Oboe*).

Some time before 1890, Heckel, the celebrated bassoon-maker of Diebrich-am-Rhein, devised a mouthpiece for the bassoon which was to be made of ebonite or silver with either a cane or metal blade. Its form and materials were chosen so as to be as stable as possible, thus providing the player with a 'standard' generator to which he could adjust and tune the body of his instrument since the wayward behaviour of double reeds made for less accuracy in such an operation. Modern American firms are offering beautifully made metal mouthpieces for both oboe and bassoon, with claims that well-known instrumentalists are

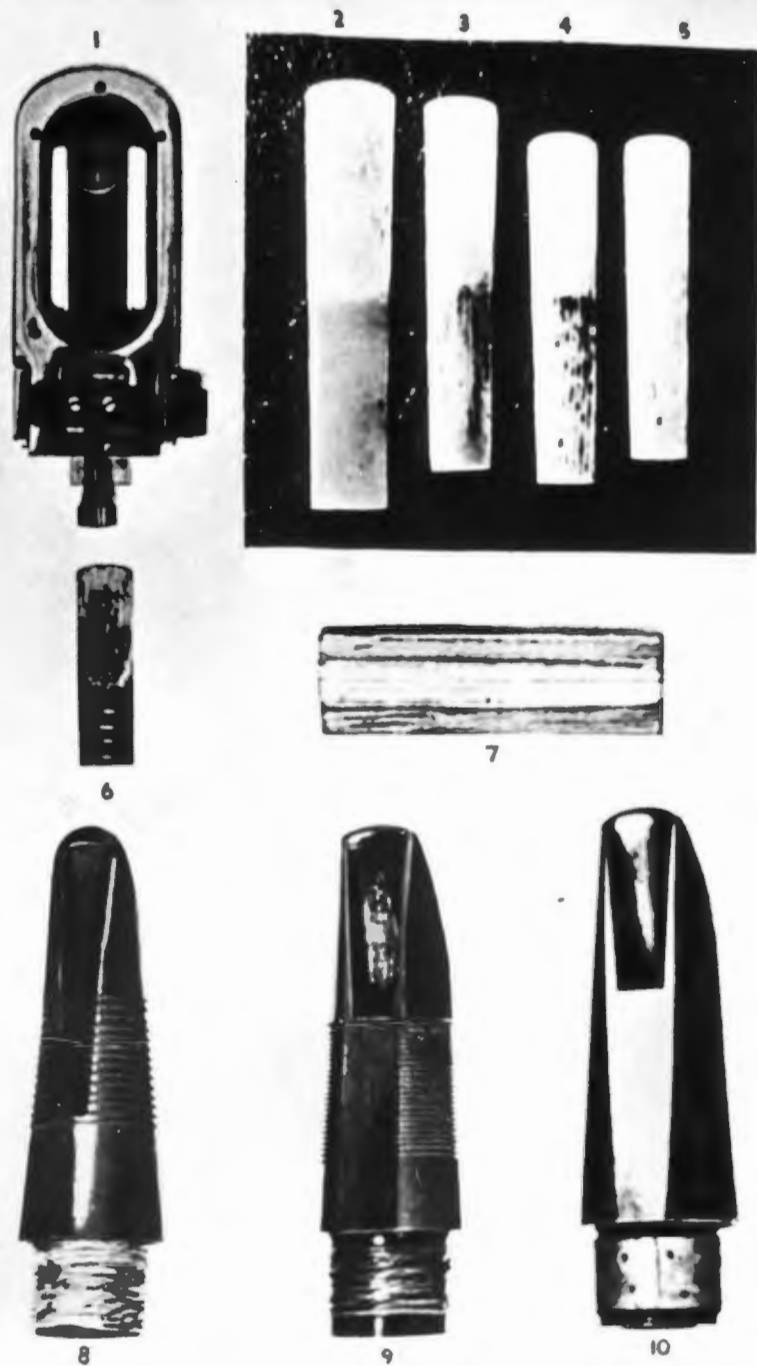
using them without appreciable loss of characteristic tone.

At present it is too soon to speak of the success of otherwise of this venture - comparative tone analyses would be interesting - but it seems likely that the majority of oboe-players will adhere for a long time to the traditional reed in which they are convinced the true character of their instrument lies. (P. Rite - "The Oboe").

One of my bassoon-playing colleagues in a London orchestra told me of an attempt by some London professional players to design and construct a bassoon reed made of metal alloy with silver or gold ribs to simulate the springy behaviour of the fibres of Arundo Donax. The reed was an unqualified success but on approaching a business man with the view to manufacturing and marketing the product, it was pointed out that the relative number of players wishing to purchase what really amounted to an "everlasting reed" did not offset the overhead costs of production and the idea was permanently shelved.

According to Prof. P.R. Kirby the primitive Double Reed was not split but simply compressed at one end in the form to be found in the Japanese Hichi-Riki or in the Nagaswaram of India, and he suggests that the accidental splitting of a reed must have led to the discovery of the improved quality of a split reed compared to one which was simply compressed in the original form.

Fig. 28



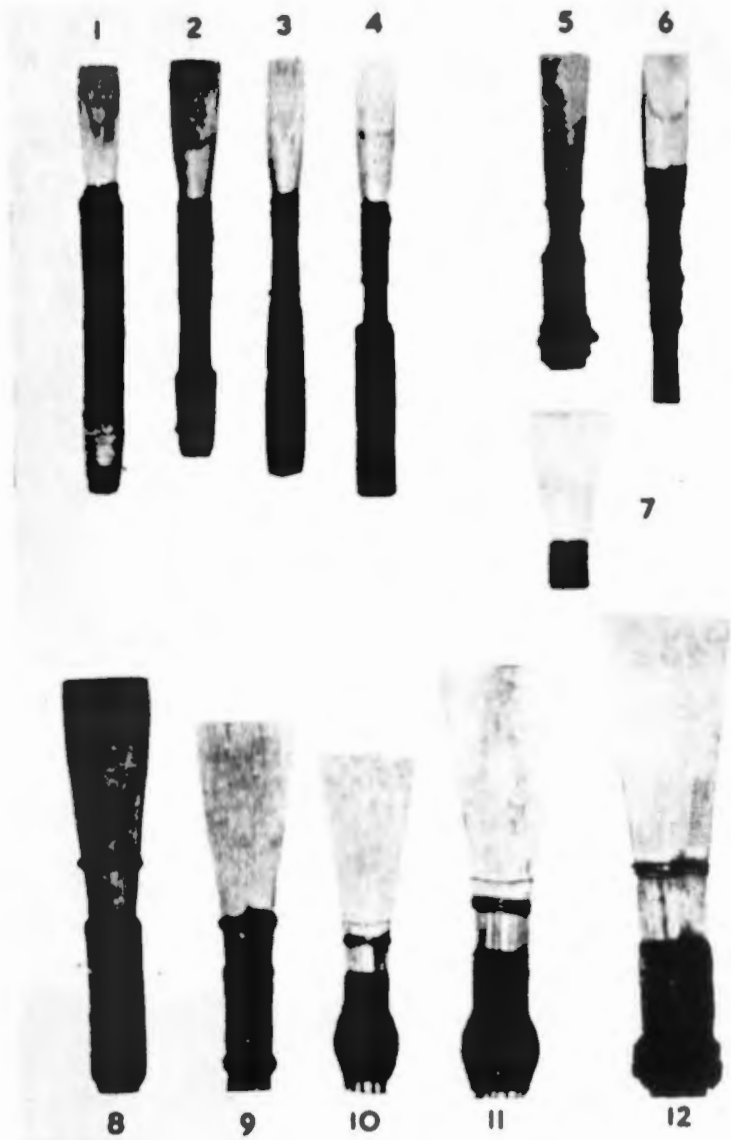
CLARINET REEDS AND MOUTHPIECES.

Top Row, left to right: 1. Reed-cutter. 2. Tenor Saxophone Reed (Bass clarinet). 3. German Bass Clarinet Reed. 4. Standard Clarinet Reed. 5. German type. 6. An English Reed, c.1810 (probably for small F Clarinet). 7. Strip of Cane from which Clarinet Reeds are made.

Bottom Row: Mouthpieces - 8. French (c.1780). 9. Modern German. 10. Modern English or French.

From A. Baines.

FIG. 29.



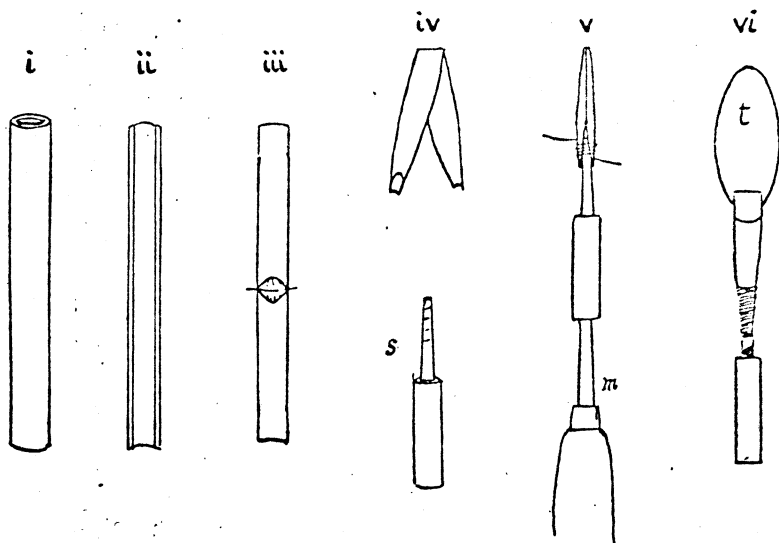
DOUBLE REEDS

Top Row, left to right: 1. and 2. English Oboe Reeds, c.1780-1820.
3. French Oboe Reed, c.1870 (Triébert), showing French V-Scrape.
4. Modern English Oboe Reed. 5. Nineteenth Century Cor Anglais
Reed made without staple. 6. Modern Cor Anglais Reed.
7. Modern Shawm Reed (Catalan Tenora).

Bottom Row, left to right: 8. English Bassoon Reed, c.1810, 9. Ditto,
c.1890. 10. Modern Bassoon Reed. 11. Contrabassoon Reed.
12. Contrabass Sarrusophone Reed.

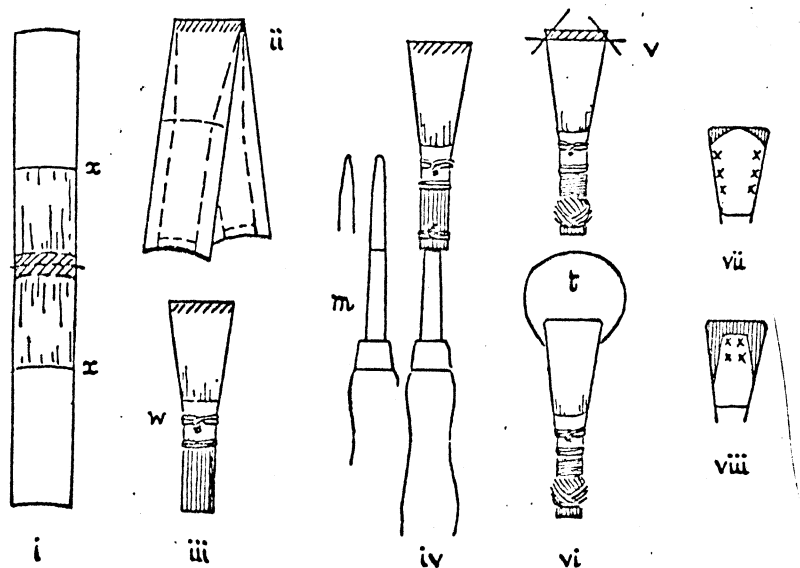
From A. Baines.

Fig. 30



Stages in oboe reed-making.

Fig. 31.



Stages in bassoon reed-making.

The principal stages in making double reeds, beginning with the plain stick of cane (Arando Donax) are:

1. Splitting the stick into three strips, followed by cutting a strip to length (a fraction over twice the length of the finished reed) and trimming its sides.
2. Gouging the thin strip on the inside.
3. Marking and nicking the centre of the strip and bending over, bark outwards. The joined end of the bent-over cane will eventually become the tip of reed.
4. Shaping the sides of bent-over cane to the desired outline.

From this point the oboe and bassoon differ:

OBOE:

5. Tying on, to the metal staple.
6. Separating the tip and scraping blades.

BASSOON:

5. Putting on the wires and working in the mandrel to form stem and throat of reed.
6. Binding the stem.
7. Separating tip and scraping.

Albert Cooper, the London Flute-maker (see "Murray-Cooper Flute" chapter) demonstrated this breathing technique to me with his jeweller's blowpipe. His father, Ernest Cooper, has used this breathing method over many years of his life as a professional flautist.

CHAPTER X

THE AEROPHOR (OR AEROPHON)

An instrument, or rather instrumental accessory, invented in Germany by Bernhard Samuel who patented it in 1912. It enables players of wind instruments to sustain notes indefinitely, as on an organ. Although Richard Strauss made use of it, as a novelty in his "Alpensinfonie" and "Festliche Praeludium", it never found acceptance. The objection to it, artistically speaking, is that it makes instruments perform feats against their nature.

(Eric Blom - Groves Dictionary of Music,
Fifth Edition)

A small bellows, worked by one foot, communicates by means of a tube with the corner of the mouth of the player, leaving him free to carry on his normal breathing processes through his nose whilst his mouth is supplied with the air required for his instrument by means of the bellows.

(Percy Scholes - Oxford Companion to Music,
1936.)

The first essential in playing a wind instrument, as in singing, is controlled and unlaboured breathing and it is evident that the natural and unconscious rhythm of breathing must be more or less disturbed by the demands of musical phrasing. Oboe playing presents the Oboist with the problem of having to retain breath in his lungs while only a small volume of air is able to pass outward through the narrow aperture of the reed. Flute-playing presents just the opposite problem. Charles Reynolds, a respected Oboist of Covent Garden, aroused the admiration of Richter by playing the long solo for Cor Anglais in the Third Act of "Tristan" without any apparent pause for breath. The technique he used was that employed by jewellers and glass-blowers - a form of nose-breathing allowing the cheeks to relax without altering the set of the lips, thus forming a sort of elastic reservoir. (Ref. P. Bate - "The Oboe").

CHAPTER XITHE FLUTE

Although it is often asserted that the flute is the oldest of all musical instruments, this is not strictly true. A pipe of some sort has been used all over the world from earliest times and must have preceded the invention of any kind of stringed instrument, but the instrument now called the flute - a tube held parallel to the lips and blown across a hole at the upper side - is probably of comparatively modern origin.

The name "Flute" has been applied to all instruments of the pipe or whistle class with or without reeds. According to Hawkins and Grassineau, the name was derived from the "Fluta", a Lamprey or small Sicilian eel which has seven breathing holes on each side of its body and therefore resembled the early pipes in appearance.

The words "Aulos" and "Tibia" are used indefinitely by Classical writers to signify various kinds of pipes. The original form of the whistle-pipe was a simple vertical pipe blown across the open top. The first step in advance was the cutting of a V-shaped notch in the open top of the pipe which facilitated the production of sound. (Ref. P.R. Kirby "The Musical Instruments of the Native Races of South Africa". The Amagemfe are probably the earliest examples of Notch Mouthpieces).

Finger-holes were added gradually from two, three or four and were later increased to six with a thumb-hole at the back. Some specimens found in Pompeii (now in the Naples Museum) have no less than fifteen holes. A gap in the history of the flute occurs with the extinction of the Ancient Egyptians, Greeks and Romans and for several centuries nothing was heard of it until it appears in the form of the *Fistula*, *Flûte Douce* or *Flûte-à-Bec*, with a developed Slit and Block mouthpiece known later in Germany as the *Blockflöte* and in England as the

Recorder (from the obsolete use of the verb "to record", as applied to the singing of birds (Browne's "Shepherd's Pipe" ii75). The Recorders or Fipple-Flutes, like all instruments of the Sixteenth and Seventeenth Centuries, were made in sets ranging downwards in sizes pitched at one fifth apart. Praetorius (1620) states that a complete set consists of eight instruments. Two "Chests" of Recorders still exist - The "Nuremberg" set of eight, dating from the Sixteenth Century, and the "Chester" set of four (descant, treble, tenor and bass) which dates from the Eighteenth Century.

Although the Recorder's tone was soft and pleasing, it was practically impossible to increase its volume or to vary its quality. Little variety of expression was possible and the second octave was difficult to produce besides being defective in intonation. Giovanni B. Doni ("De Proestantia Musicae Veteris", 1647) mentions the English as excelling in performance on the instrument.

Guillaume de Machaut (1300 - 1337), in his "Prise d'Alexandrie" gives a long list of instruments used in his day and includes "Flafstes Traversiennes" which would appear to be the earliest mention of the Transverse Flute and Rabelais describes Gargantua as playing on the Allman (i.e. German) Flute with nine holes (Book I, Ch.23).

An engraving of the Schweitzerpfeiff or Zwerchpfeiff appears in Sebastian Virdung's *Musica Getuscht und Ausgezogen* (Basle, 1511). Martin Agricola in 1545, who enlarged and compiled a later edition of "*Musica Instrumentalis Deudsch*" of Georg Rhaw (Wittenburg, 1529), gives engravings of Schweitzerpfeiffs of different lengths and similar to the instrument portrayed by Virdung. Michael Praetorius (1620)

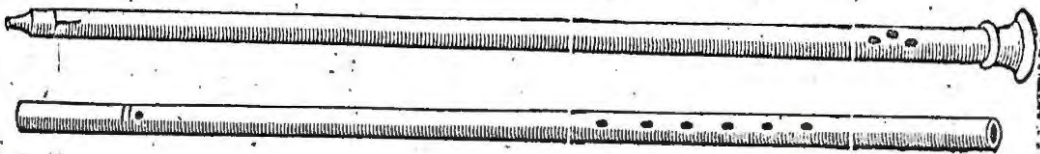
in "Syntagma Musicum" gives the earliest illustration of a jointed flute but the fullest descriptions are given by Marin Mersenne in "Harmonie Universelle", Vol. II, Part V (Paris 1636-7), and he names the Transverse Flute (*Fistula Germanica*) (Fig. 33, No. 4, reproduced from the Library of Dublin University), while calling the Flûte-à-Dec "*Fistula Anglicis*". Mersenne gives the earliest detailed account of the Transverse Flute and the method of playing it. The tube was 23.45 inches long, cylindrical throughout, with a cork in the head, the embouchure being 3.2 inches from the top end. This instrument was probably used solely as a diatonic instrument and must have been imperfect even as such: the holes, as in all these early flutes, were placed to suit the position of the fingers rather than in their proper acoustical positions. Mersenne suggested additional holes for the semitones.

Salomon de Caus ("*Institution Harmonique*", Frankfurt, 1615) explains that semitones were produced by partial opening or closing of the holes. This was an unsatisfactory system which prevailed at a very much later date.

Of the French families of wind instrument makers and players in the Grande Ecurie of Louis XIV, the Hotteterre family is mainly associated with the development of the Transverse Flute with an added key for D sharp. The first complete book of instructions is by Jacques Hotteterre ("*Principes de la Flute Traversière*", 1707) and an account of the family is given by Ernest Thoinan ("*Les Hotteterres et les Chedevilles*", Paris, Sagot, 1894). Hotteterre's scale extends from d' to g''', including all semitones (excepting top f) obtained by "forked" or cross fingerings. His flute consisted of three pieces - a cylinder headjoint with the rest of the tube tapering towards its end. This was to remain the standard pattern for all succeeding concert flutes until the radical improvements of Theobald Boehm in 1831-2.

Fig. 32.

Facsimile of a wood-cut from Virdung's work. (1511.)



Schwegel.

Zwerchpfeiff.

R.S. Rockstro ("The Flute").

Fig. 33.



FIG. 1.—VIRDUNG'S ZWERCHPFEIFF, 1511.

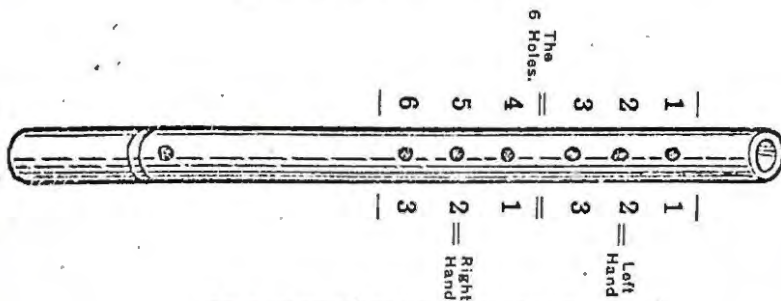


FIG. 2.—AGRICOLA'S SCHWEITZERPFEIFF, 1545.



FIG. 3.—PRAETORIUS' BASS QUERFLOTE, 1620.



Fig. 34.



FIG. 1.—HOTTESTERRE'S FLUTE, 1707.



FIG. 2.—QUANTZ' FLUTE, 1726.

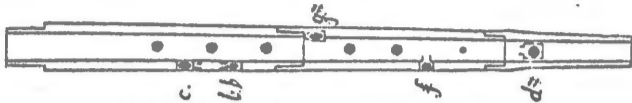


FIG. 3.—TROMLITZ' FIVE-KEYED FLUTE, c. 1803.

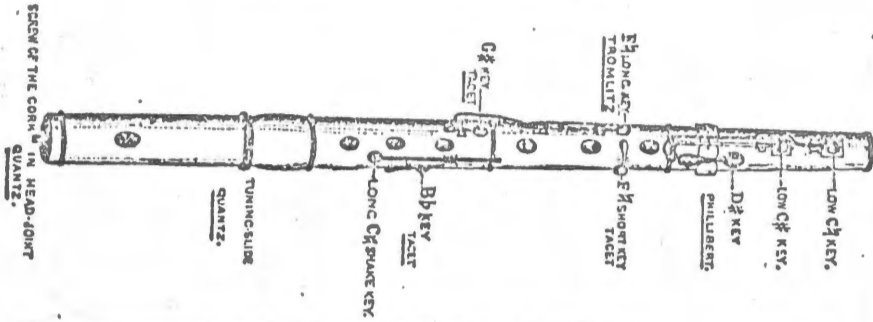


FIG. 4.—EIGHT-KEYED FLUTE, c. 1806, WITH THE NAMES OF THE ALLEGED INVENTORS OF THE VARIOUS KEYS, ETC.

FLUTES WITH KEYS.

R. Macaulay Fitzgibbon
("Story of the Flute").

Fig. 35.



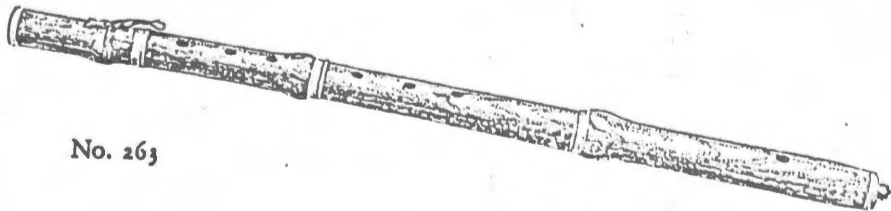
Quantz' Flute, showing separate keys for D sharp and E flat.
C. Welch ("Six Lectures").

Fig. 36.

263. PAIR OF FLUTES

T. Lot (Thomas Lot, Paris).

The upper flute has a gold key bearing a crown and a cipher said to be that of Louis XV of France. A golden ornament on the stopper. Five alternative upper middle joints, covering various pitches within



No. 263

about a semitone. The lower flute, presumably for the tutor, is similar, but has a silver key. The whole is in a handsome sharkskin case with silver fittings. Paris, c. 1745-1780.

Horniman Museum, London,
(Catalogue - Adam Carse Collection)

Jacques Hotteterre, known as "Le Romain" through having spent part of his early life in Rome, is said to have been the first to play the Transverse Flute in the Opera at Paris, c.1697.

The effects of a conical bore, tapering inwards towards the lower end of a flute, are to improve the intonation of some of the upper notes and to render certain notes easier to produce, but the tone of the lowest notes is weakened.

Intonation and the indefinite production of some chromatic notes by means of forked fingerings remained one of the gravest disadvantages of the early Transverse Flutes and prompted several attempts to improve the instrument almost as soon as it had been adopted into the orchestra.

Johann Joachim Quantz (1697 - 1773) was the originator of music for the Transverse Flute in Germany. Originally an oboist in the Polish Chapel Royal in 1718, he devoted himself to the Flute, studying under the French flautist Buffardin, a member of the King of Poland's band. He visited Italy (1724-6), where he met Scarlatti, Vivaldi and Porpora, then Paris and London (1727), returning to Dresden. In 1728 he began to give lessons in Berlin to the Crown Prince who played the flute when only eight years old. In 1741 when Frederick the Great succeeded to the Throne of Prussia, Quantz spent the remainder of his life as Court Composer, playing duets daily with the King and writing flute concertos for the Royal dilettante to perform at the evening concerts in the Palace of Sans Souci. Quantz' famous method of instruction "Versuch einer Anweisung die Flute Traversière zu Spielen", 1752, 1789, has recently been translated into English.

Quantz used interchangeable middle sections of various lengths to alter the pitch of his instruments and is credited

with making the first tuning slide, using wooden rings of various widths to slip into the cavity left inside the socket when the wooden tenon was retracted. The later adoption of a thin metal slide, leaving little or no cavity, has practically remedied this defect on wood instruments.

In 1726 Quantz added a second hole and closed key (Fig. 35) which, he claimed, produced E flat more correctly than the existing D sharp key. This key never became generally adopted. Evidently Quantz must have taken more trouble over Just Intonation and playing in the Pure Scale by "humouring" certain fingerings than most players of his time. Alessandro Scarlatti had declared to his pupil Hasse that he could not abide wind instruments because they were never in tune. When Scarlatti was persuaded by Hasse to hear Quantz's flute-playing he was sufficiently impressed to write him "a couple of solos". (Ref. "Alessandro Scarlatti", E.J. Dent Arnold, 1905, p.192, and "The Story of the Flute", H. Macaulay Fitzgibbon, 1913, p.186).

Tromlitz credits Quantz with the invention of the Screw-stopper at the head of the flute, by means of which the position of the cork in the head-joint could be adjusted. Quantz, however, does not himself lay any claim to this invention which appeared before 1752, as also did the brass lining of the head-joint.

Additional keys for the low C sharp and C were known about 1722 but Quantz objected to this innovation (as did also Wendling, his successor) as detrimental to tone and intonation.

Joseph Tacot (mentioned in Fanny Burney's Diary, May 5th, 1772) is credited with the invention of keys for F, G sharp and B flat, while J.G. Tromlitz (c.1730-1805) is credited with the addition of the "Long F" key (making a smooth passage from D in performance). Ribock claims to have invented before 1782 a Short C key placed across the tube but this key was altered some time before 1806 into a long key (inventor unknown) running along the side of the tube and opened by the first finger of the right hand.

Dr. Samuel Arnold in his "New Instructions for the German Flute" (Harrison & Co., 18 Paternoster Row, 1787), gives an account of the additional keys and a description of the flute patented in 1785 (Fig. 37) by Potter, the celebrated London flute-maker.

The introduction of closed keys is further discussed by Victor Balillon in his article on the Transverse Flute in the Ninth Edition of "Encyclopaedia Britannica".

Andrew Ashe, the Flautist who later played for Haydn's London Concerts (1791), had been greatly impressed with the additional keys used in 1774 by "Le Sieur Vanhall" (brother of the celebrated composer). Vanhall performed in Holland on a flute with six keys, this being the first of these improved instruments to reach Holland. Ashe acquired this flute and was told by his teacher, Wendling (Quantz' successor) that the long keys on the bottom joint spoiled the instrument, and that the small keys were of no use, particularly in quick passages. "After a few years of incessant application, Ashe became the admiration of Holland, chiefly from the uncommon fullness of his tone in those more abstruse keys in music which could not be produced on the flutes then in general use and which perfection was, erroneously in a great measure, ascribed to the Performer, without allowing a participation in the honour to be due to the great improvement in the construction of the instrument". ("Dictionary of Musicians", 1824).

With the extension to low C sharp and C, the eight-keyed or Simple System Flute was standard throughout Europe at the time of Theobald Boehm's first visit to London in 1831. where the playing of the English Virtuoso, Charles Nicholson, prompted Boehm to embark on his experiments in re-designing the flute which, in turn, brought a tremendous impact to bear on other makers' improvements to the other woodwind.

It is an interesting reflection that all attempts to improve the flute have given the lead to the improvement of

the other woodwinds since the orchestra first took its shape in the late Seventeenth Century.

Sources:

"The Story of the Flute", H. Macaulay-Fitzgibbon,
(London, 1913),

"The Flute", R.S. Rockstro (London, 1890),

"Essay on the Construction of Flutes", Theobald
Boehm (Trans. London, R.C. 1882).



The Four Closed Keys, from the specification of Potter's patent.

555. The annexed diagram is a representation of a large-holed eight-keyed flute, made by Rudall and Rose about the year 1827.

Explanation of Diagram.

Open holes.

I., II., III. The c^{\sharp} , b and a holes, closed by 1 L, 2 L, and 3 L.

IV., V., VI. The g , f^{\sharp} and e holes, closed by 1 R, 2 R, and 3 R.

Open keys.

1. Key for making c' by the closing of the c^{\sharp} hole.

2. Key for making c^{\sharp} by the closing of the d hole.

These two keys are used by 4 R.

Closed keys.

3. The d^{\sharp} key, opened by 4 R.

4. The short f key, opened by 3 R.

5. The long f key, opened by 4 L.

6. The g^{\sharp} key, opened by 4 L.

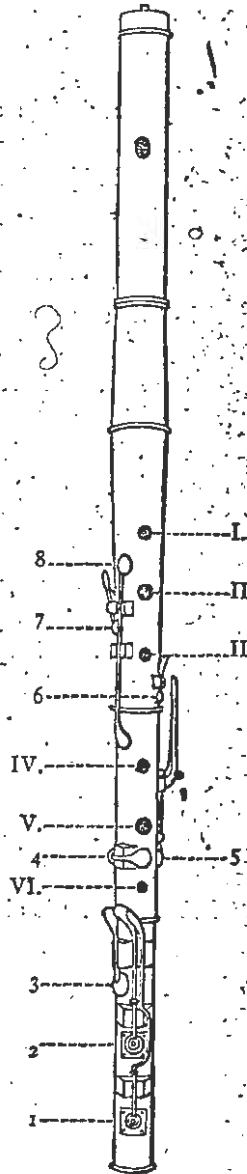
7. The b^{\flat} key, opened by 1 L.

8. The long c'' key, opened by 1 R.

The keys 4 and 5 are, of course, interchangeable.

The keys are indicated, in the table, only when they are to be used.

FIG. 51.



556.

556. This section contains musical notation and fingering charts for the eight-keyed flute. It includes three staves of music with corresponding fingering diagrams below each staff. The diagrams use dots and numbers to indicate which keys and holes are used for each note.

The first staff shows a sequence of notes with fingering diagrams below. The second staff shows a sequence of notes with a note that is marked as a trill (tr) and a fingering diagram below. The third staff shows a sequence of notes with fingering diagrams below. A note in the second staff is marked with a trill and a note that is marked as a trill (tr) and a note that is marked as a trill (tr).

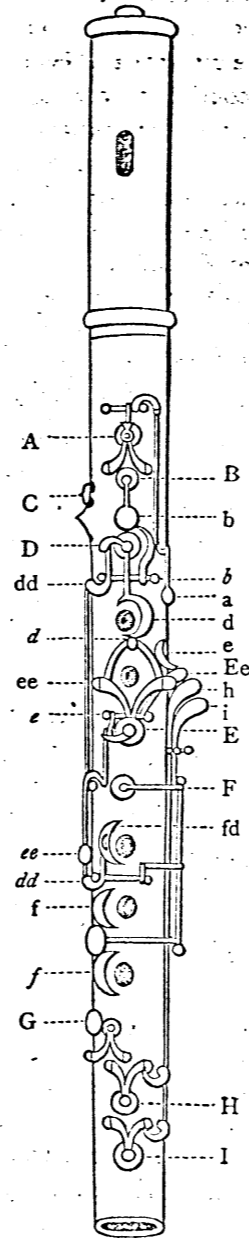
The notes from c' to c'' inclusive are fingered in the same way as those from c' to b' .

The Eight-Keyed or Simple System Flute (From R.S. Rockstro "The Flute", 1890)

invented by James C.G. Gordon.
(Reproduced from "The Flute", 1890)

569. Fig. 53 is a reduced copy of an engraving given by Còche in his splendid *Méthode*, published in 1839. There is a wood-cut, similar to it but not so well executed, in his pamphlet of 1838. The original drawing was sent, in 1838, to Còche from Lausanne by the wife of Gordon (see her letter in §§618-620). There can be no reasonable doubt as to its authenticity, though it is probably a representation, not of the flute made for Gordon in 1831, but of one afterwards constructed by him on the same principles. Ward asserted emphatically that the engraving of Gordon's flute, as given by Còche, very closely resembled the instrument that he made under Gordon's direction "about the year 1831."

The diagram is obviously incomplete as well as inaccurate, part of the accompanying explanation is therefore conjectural: Còche gives none, but it is evident, from certain dotted lines, still remaining in his engraving, that letters of reference were once affixed to eleven of the keys and to the perforations for



the left hand thumb, which, being used together, formed the *c'* hole. See §572. The proportions of the tube are certainly incorrectly shown. Had these been as indicated, the tone of the flute could not have been "thin," as Tulou states it to have been. See his remarks in §572.

570. *Gordon's Flute*. A. Closed key of the *a'* hole, opened by *2L* at *a*.
B. Open key of the *c''* hole, closed by *1L* at *b*. The axle is at *b*.
C. Divided *c''* hole, closed by *1L*. The adjacent projection was intended as a guide for the thumb. See §572.

D. Open key of the *b''* hole, closed by the action of *2L* on the crescent *d* when closing the adjacent *b''* hole. The axle must have been at or near *d*, perhaps under the crescent, and the shank must have passed over *b*. The note *b''* was fingered by the pressure of *1R* on the crescent *fd*, which by means of the two levers *dd*, *dd* and their connecting wire, closed *D*, leaving the *b''* hole open. *D* might also have been closed by *1L*, acting on *b* and *D* at the same time, or by *2L* acting on *d* without closing the *b''* hole.

E. Open key of the *g''* hole. The axle was at *d*, and this must have been the only attachment of the key to the flute. In closing the adjacent *a* hole *3L* pressed one of the arms *e*, thus closing *E*. There were of course two springs, one to keep up the entire piece of mechanism, the other to close the *g''* key. The crescent attached to *e* may have been used for closing *E* while leaving the *a* hole open. The axle *e* must have been underneath, and free from, the shank of the key. At *ee* there was a joint. When the arms were pressed down, *E* was opened by the action of *4L* on the lever *Ee*. Thus *g* and *g''* were fingered as on the ordinary flute and at the same time the *a* was left unveiled.

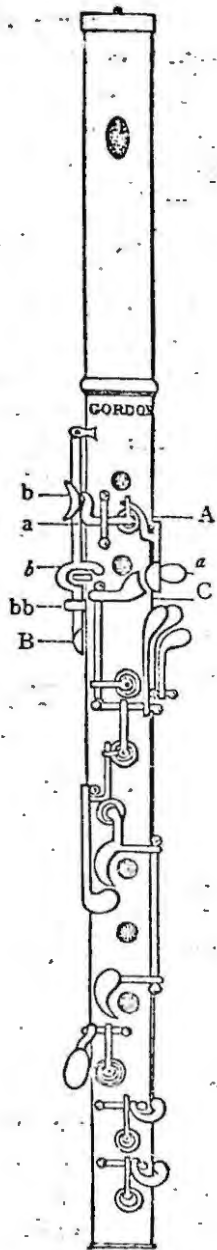
ee. Lever for making the shake *g-a'*, or *f''-g''*, with *1R*.

F. Open key of the *g* hole, connected with the crescents, *fd*, *f* and *f*. The key *F* was closed by pressure on either of these crescents, and the *e*, *f* and *f''* holes could be closed, in using the crescents near them, or left open if necessary. The note *f* was fingered by the action of *1R* on the crescent *fd* while closing the adjacent *f''* hole. The *f''* might have been fingered by pressure on *fd* while the hole was left open, or by the action of *2R* or *3R* on *f* or *f*. The invention of the mechanism connected with the key *F* is discussed in §§606-7.

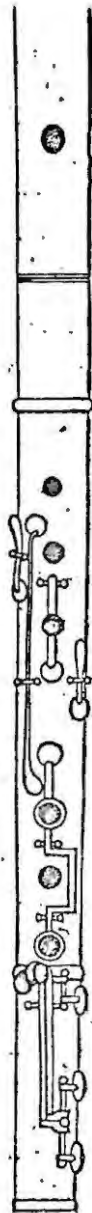
G. Open key of the *a''* hole, closed by *4R*.

H. I. Open keys of the *a'* and *c''* holes. The touches of these keys are at *h*, *i*; *c''* and *c''* were therefore fingered by *4L*.

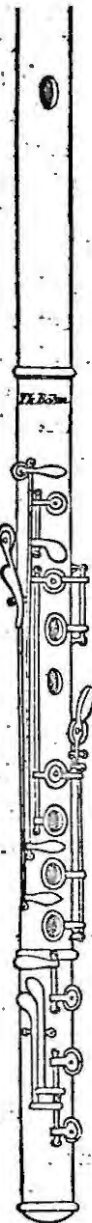
The friendly co-operation between Gordon and Boehm before Boehm's first model of 1832 led to a controversy following Gordon's mental illness in 1838. R.S. Rockstro was the main champion of Gordon's cause, declaring that Boehm had stolen the invention. The controversy raged for many years after Boehm's death in 1881 but Boehm is now generally accepted as the true inventor.



Flute made by Boehm under Gordon's direction. From Clinton's Flute School 1846.



Boehm's model of 1831.



Boehm's model of 1832



Rockstro's model of 1877
Identical with standard "Boehm System" but with some additional improvements.

ENGRAVINGS FROM ROCKSTRO "THE FLUTE" (1890).

CHAPTER XIIFLUTE FINGERING SYSTEMS FROM THE BOEHM SYSTEM ONWARDSThe Boehm System.

Theobald Boehm's invention of 1832 revolutionised the construction of flutes in France and Britain, although the Boehm system was not generally accepted in Germany until very many years after French and British manufacturers had firmly established their reputation throughout the musical world as the leading makers of Boehm-system flutes. Following a long series of experiments and with the help of the scientist, Dr. Carl von Schafhäütl, Boehm designed a further model with a cylinder bore and assigned the right of manufacture to two firms outside Germany. The two firms concerned were Messrs. Rudall and Rose (later Rudall, Carte and Company) of London, to whom Boehm sold the patent on 6th September, 1847, and Messrs. Godfroy and Lot (later Louis Lot) of Paris, by arrangement with Mr. George Rudall acting in Boehm's interest.

Boehm's most important contribution to the flute was not, as is generally supposed, the key mechanism, although this was to have a great effect on the later design of other woodwinds, such as the clarinet and saxophone. The chief step forward by Boehm was in his adoption of a cylinder bore for the flute-tube, instead of the conical bore tapering away from a cylinder headjoint. Considering that the earlier flutes were the only existing musical instrument in which the cone taper proceeded downwards (i.e., away from the player), Boehm set out to design the headjoint in such a manner as to begin the cone at the point of the embouchure or blowing hole and to increase the width toward the limit of the general bore of the body-tube of 19 mm or .748" (diameter at Embouchure-hole was .669").

This conical shaped head-joint became known to flautists and flute-makers as the "Parabola". Various flute designers and manufacturers have attempted to improve on the original measurements and since the technique of making flutes by hand must result in no two instruments ever being made identical, particularly in regard to the making of head-joints which requires a skilled craftsman to draw the metal tube on a special steel mandrel, through templates, to locate the position of the embouchure-hole, to design and cut a special collar and lip plate which is soldered onto the tube and, finally, to cut by hand the embouchure-hole whose size, shape and angle of undercut have so profound an effect on the response and tone-quality of a flute that many craftsmen guard their methods jealously.

Today we are in the age of machines and mass-production instruments, like other products, exceed their supply by their demand, although the quality of the mass-produced instrument can but rarely equal the results of a devoted craftsman's work. This same philosophy holds good for the individual qualities of reeds and handlaid mouthpieces, in that no two products can ever be identical. The personal tastes and foibles of the individual artists have the most important bearing upon what is, or what is not, acceptable to the player. Without exception, flautists have adopted the "parabola" headjoint of Theobald Boehm but after this their tastes regarding embouchure-shapes, sizes, material (whether of gold, silver, wood or plastic), key-systems (whether Boehm or otherwise) and style or school of playing are more numerous and varied than all the headjoints ever made!

The only attempt at designing a headjoint differently from the standard parabola which is on record, is a German design comprising a cylinder head with a long tapered spike fixed at the stopper end of the headjoint, tapering towards

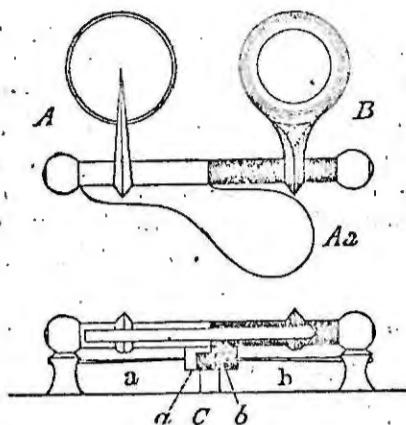
the body tube. This would undoubtedly cause a similar volume of the air-column to vibrate as in the conventional Parabola headjoint but after trying this instrument personally, I feel that the only real advantage in its design is to save the mass-producing manufacturer the time and trouble of making parabola heads!

In his key-mechanism, Boehm finally decided on making all the keys on his flute as open keys (i.e., held closed by each finger until required by the player to be opened). For the first time in history a flute was designed on rational principles and, finally, could be said to have its notes placed where they could reasonably be expected to sound in tune. Since no woodwind instrument may be designed having its tone-holes "perfectly in tune", these are placed so as to be adjusted by the pressure of the player's lips to compensate for the slight sharpness or flatness required in playing with good intonation. A good flautist will always play perfectly in tune, provided that his instrument has been reasonably constructed along Boehm's scheme.

The open-key idea of Boehm's was not practically applicable to every key governed by the fingers. The standard D sharp key (familiar to the early flautists of the Baroque) had to remain a closed-key, in order that the right-hand little finger could operate the foot-joint keys for C sharp' and C'. Two trill-keys for D'' and D sharp'' were also kept closed. The G sharp key now became an open-key kept closed by the little finger of the left hand and since this was the chief difference between Boehm's new flute and the old Simple System, much opposition arose from flute-players who were unwilling to adopt a system with such a radical change. The first customers of Rudall and Rose in London accepted Boehm's instrument without

Fig. 44.

G sharp Mechanism by Vincent Joseph DeFus (1838)



A. The g^{\sharp} key, with its shank and tube, the latter working on a steel rod supported by pointed screws which pass through the two pillars.

a. A weak spring, acting on the stop a and thus tending to close the key.

B. A ring surrounding the a hole, connected by the tube with the clutch b . This tube works likewise on the rod.

b. A strong spring, acting on the clutch b and overpowering the weaker spring a .

The key and the ring are kept in a raised position by the preponderance of the strength of b over that of a . When the ring B is pressed down by $3L$, a , being no longer overpowered by b , causes the closing of A .

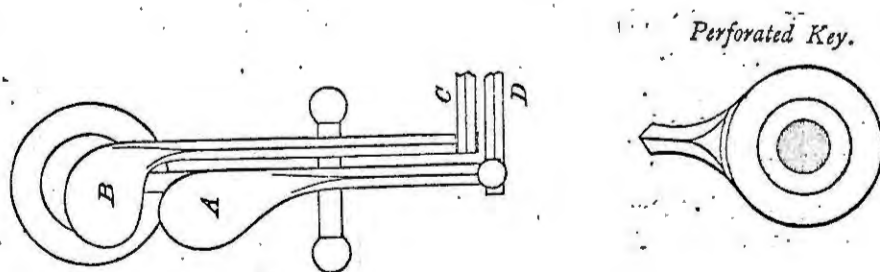
Aa . Touch of the g^{\sharp} key, by means of which the key is opened by $4L$ when B is pressed down.

C. A projection, from the flute, which serves as a stop for the clutches. Various contrivances were employed for this purpose.

This arrangement is a great improvement on that of Gordon, but it is open to objection on account of the unavoidable strength of the spring b , when freed from the modifying influence of a , which renders the shake $g^{\sharp}a$ difficult to most persons.

Reproduced from R.S. Rockstro - "The Flute".

Fig. 45.



The Briccialdi Thumb-Lever (1849).

- A: Thumb-Plate for B natural. Sometimes connected through
- D: Lever to Trill-Key, making easy B' - C' trill.
- B: "Briccialdi" Thumb-Lever for B flat, connected through
- C: Clutch controlling the B flat cup.

Diagram from R.S. Rockstro - "The Flute".

question and there are still some eminent London players today using the open G sharp flute, having learned through the traditions of these earlier teachers.

In France, the situation was very different and even the champions of the Boehm flute were not in favour of this key. Vincent Joseph Dorus invented a split-key mechanism which held the cup of the G sharp down until released by the little finger (Fig. 44). The mechanism was cumbersome and Messrs. Godfroy and Lot began to make closed G keys which worked more efficiently by controlling an extra G hole, pierced in the body-tube at a similar point to the original G tone-hole.

This was violently opposed by Theobald Boehm for the very good and valid reason that the upper note E was now rendered very unsafe in production, by reason of the over-venting on the G sharp tone-hole. This remained a vexed problem for flautists, most of whom played the closed G model Boehm system until the invention by an obscure German flute-maker of the "Split G" mechanism, sometimes erroneously called the "Split E". This simply means the cutting through of the fixed rod holding the finger plate and cup which simultaneously close two holes (G and G sharp) for G, and giving both the finger-plate and cup a separate spring to hold them open. On pressing the finger-plate, a clutch ensures that the cup is closed but on fingering to E where the finger-plate is raised, the cup is closed either by the finger or some mechanical means, usually a lug, attached to the middle finger plate of the right hand.

The objections to this mechanism are that it makes the high trill G^{III} - A^{III} impossible. This has been overcome by two methods:

- (a) A spring bolt or swivel button to disengage the

lug from the split cup;

- (b) The addition of extra holes in the body-tube, controlled by keys to give a good G^{'''} - A^{'''} trill.

The first device is used by Messrs. Rudall Carte of London, while the spring bolt (rather a clumsy device) is, I am told by M. Caratgé of L'Opéra Comique, Paris, an idea of a French flute-maker who did not patent it.

The second device is found on most flutes of modern German make or design. The best method is a long rod controlling two closed vent-holes, one placed just above the closed G sharp key and the other just below the lower D trill-key. Used in conjunction with this trill-key, the two vents give a perfect G^{'''} - A^{'''} trill. The idea is probably derived from R.S. Rockstro's model of 1877 which has "a large hole with a closed key, connected inseparably with the ordinary key of the D^{''} hole. This renders easy and good all alternations of D^{''}, D sharp^{''} or D sharp^{'''} with the A sharp, B, C or C sharp below them. Several shakes are also improved by this hold, particularly C^{'''} - D^{'''} and G^{'''} - A^{'''} ".

Rockstro carried the size of diameter of his tone-holes somewhat too far. The result is an increase in the volume of tone of the flute at close quarters but a decrease in carrying power in a large concert hall.

Another deficiency in the Boehm flute - which, incidentally, has been ascribed by Rockstro and a few of his contemporaries as the invention of Captain James Carel Gerhard Gordon, born 22nd May, 1791 in Cape Town, Ref. P.R.Kirby "Captain Gordon, The Flute Maker" (Music and Letters, pp.250-259, Vol.38, No. 3, July, 1957) and stolen by Boehm, a controversy which raged in Europe for over fifty years although the accepted belief today is that Boehm should be credited with the invention since Welch, in his "History of the Boehm Flute", 1896, effectively counters Rockstro's attack in "The Flute", 1890 - is the second or middle C sharp'. This note, governed

by the first finger of the left hand, cannot be made the same size as its adjacent notes since the same tone-hole must serve as a vent-hole for D^{''} and D sharp^{''}, A^{'''}, G sharp^{'''} and B flat^{'''}, besides being a note-hole for C sharp and C.

One serious deficiency in the Boehm system which must be mentioned is the quality of top F sharp^{'''} and the tendency for the note to split. This may be remedied by a separate mechanism which closes the pad-cup of the A key which under the standard design of the Boehm system allows too much venting of the over-blown note by one hole (a parallel situation to the E^{'''} on the closed G sharp model). Various methods have been devised for rectifying this faulty top F but the principle remains the same in all mechanisms in that the A finger-plate rests with a weak spring on top of the A natural cup and pad which is taken down during the fingering of top F sharp^{'''}, leaving the B flat cup open.

Objections to this 'Split F sharp' mechanism are that it makes for more complications in an already complex finger-mechanism but undoubtedly the craftsmen and designers of keys will always strive to meet the requirements of players and quite probably the flute of the future will have these or similar devices incorporated into its mechanism with minimum complications.

The "Briccialdi" key (Fig. 45), added to Boehm's system by his pupil Guilio Briccialdi in 1849, allowed the B flat to be played with the left thumb. This important key is so much a part of the standard Boehm system familiar to orchestral players, that one could hardly imagine the Boehm-system flute without it. It raises, however, a serious hazard for those players who rely on it overmuch and unless constant practice renders the players equally accustomed to use either this or the original Boehm B flat taken with the first finger of the right hand, a sudden upward skip to top F sharp in the flute part could be very awkward,

since...../74

since this upper F sharp^m will not speak with the B flat cup closed.

Briccialdi's lever, while making life much easier for the Boehm-playing flautist, tends to fix the balance of the instrument in the most comfortable playing position which may be easily upset when the melodic progression of the flute-part demands the interval from B flatⁿ to F sharp^m. In U.S.A., the open G sharp Boehm system is usually made with "reversed thumb keys" (i.e., either the thumb-lever is set on the opposite side of the thumb-plate or, better, two separate thumb-holes for B and for B flat are placed in accordance with the scalar sequence of these two notes and not, as on the majority of Boehm-system flutes with Briccialdi levers, in the reverse position. The righthand middle finger key used in Boehm's system regarding the fundamental F sharp and its overblown octaves, works very well in theory and, strangely enough, on the clarinet, saxophone and any reed instrument to which it has been adapted but in practice, on the flute, it veils the note since only one clear tone-hole is left below the sounding tone-hole.

A clearer F sharp may be played by using the lower plate but this makes for an awkward transition of the fingers, demanding much practice in order to accomplish the movement smoothly and clearly. Saxophone and clarinet players wishing to take up flute-playing through the commercial demands of the modern profession find this fingering of F sharp extremely awkward to use. Two devices with variants have been designed to assist this F sharp fingering, namely:

- (a) The "Brossa" F sharp (a small lug placed over the key for the fourth finger of the right hand which operates the F sharp cup by itself, allowing a perfect E and F sharp with smooth transition to either note);
- (b) The "Rockstro" F sharp (a large lever for the same function, displacing the lower D trill-key which is transferred to a

position between the F and G cups). A rather awkward arrangement, since it upsets the standard fingering for some of the notes in the upper register.

Some players are content to close the F sharp with the first finger of the right hand for sustained notes while others have fixed various pieces of metal to the F sharp cup to facilitate the playing of the purer note. Perforated keys (Fig. 45) for all the open finger plates except the C' key were originally recommended by the earlier French professors to the makers, Coche and Buffet, Godfroy and Lot, and have since become a standard feature in the design now known as "The French Model" from the instruments of Louis Lot (1855-1878) and his successors up to the most reputable French, English and American makers of the present day. This model is usually the most expensive to manufacture by reason of the extra work in forging the perforated key-cups together with the French design of building the entire key mechanism of the main joint on two rods instead of having the off-set G keys standard on all other Boehm-system flutes. Since most players trained in the French tradition appear to be conservative regarding the design of their instruments, the French pattern flute has changed very little in outward appearance since the days of the original Louis Lot model.

Perforated plates (also advocated by R.S. Rockstro) allow a variety of refined fingerings and tend to benefit the serious flute student by ensuring that his fingers during practice and performance are always placed in the same position upon their respective keys, resulting in better finger technique.

Many flautists are unable or unwilling to adjust a somewhat lazy hand-position to the perforated plates of the French model and this is, therefore, in shorter supply and less readily available as the covered key model which is usually mass-produced.

The French Model flute is, with few exceptions, made in metal - usually silver, gold, German silver, plated brass and, very occasionally, of platinum.

The Covered-key model which is more generally popular, especially with players accustomed to playing the saxophone, has followed a standard design with off-set G keys (making for a stronger, less delicate mechanism than the French Model but tending to render the entire instrument heavier in weight). Covered-key models have been brought to a high standard in East and West Germany and Italy, where extra keys and gadgets seem to be popular among Italian players. A small lug attached to the G mechanism allows the trill G - A in lower and middle octaves to be made with the first finger of the right hand instead of the weaker fourth finger of the left hand.

Such devices and "gadgets" may hardly come under the category of improvements to an existing key-system, since many players object to them and their presence on an instrument depends upon the tastes and personal requirements of each player.

An extended foot-joint to low B' is popular among American makers, by reason of the improved tuning of the highest C''' which is a very sharp and wild note (unless played with a special fingering of which I have found many American players and some manufacturers quite ignorant), while the closing of the B with the C and C sharp keys on the foot-joint greatly assist this top C''' in flattening the pitch. Better results are obtained by a specially designed lug which closes only the low B cap. This device is known in the U.S.A. as "The Gizmo Key".

Carte and Boehm's Patent of 1867:

Objections to the pure Boehm system of 1832, followed

by.....77.

Fig. 46.

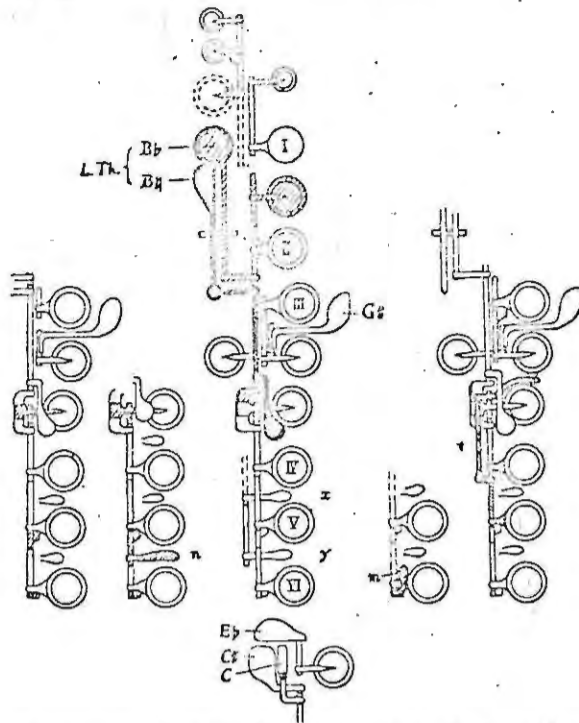
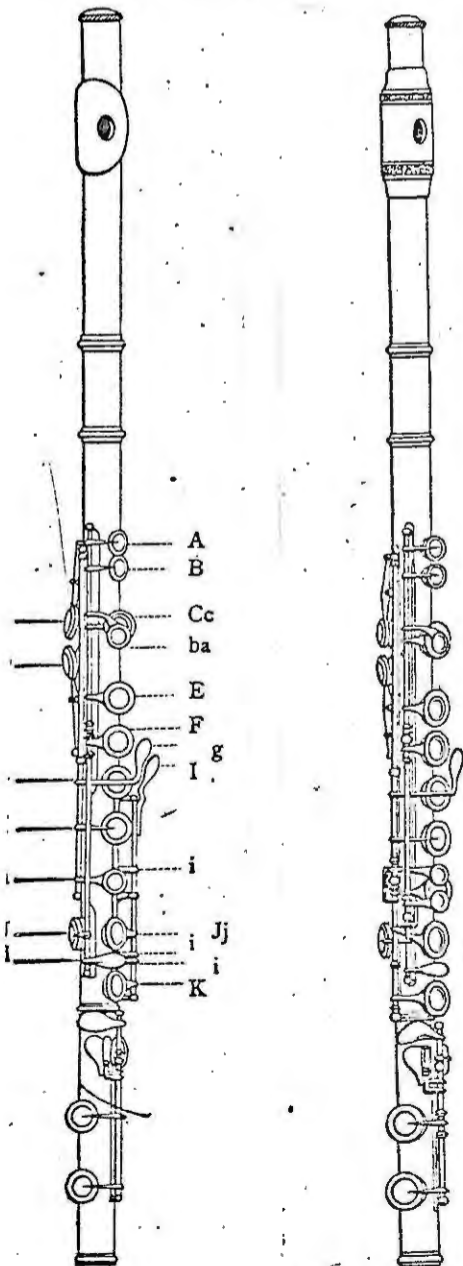


Diagram of Boehm flute mechanisms. Left: with open G#; centre: with closed G#; right: the same, with 'split E'. n and m Rockstro and Brossa F# keys.

From A. Baines "Woodwind Instruments and their History".

Fig. 47.

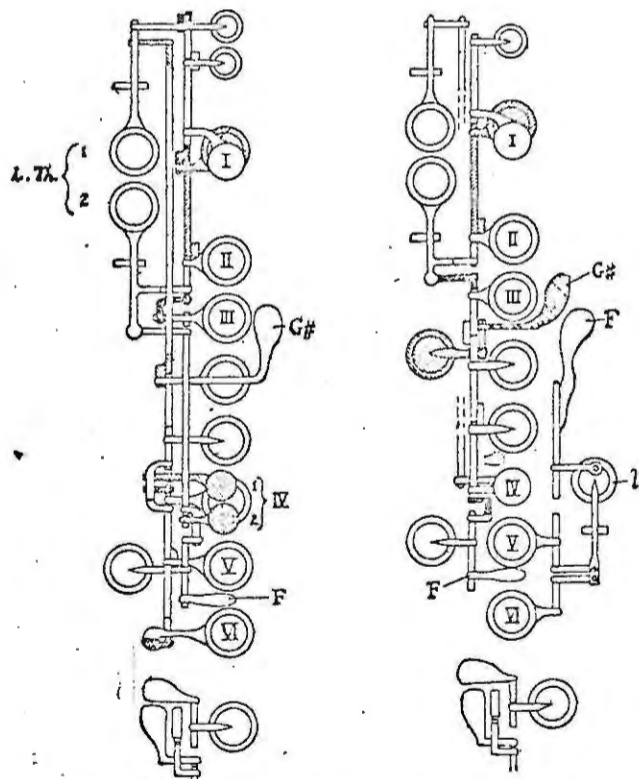


1851

1867

R.S. Rockstro

Fig. 48.



Diagrams of Rudall Carte 1867 system (left), and of Radcliff system (right).

Richard Carte's patent of 1851 derived from the Simple System, was combined into "Carte and Boehm's System of 1867" by the addition of the double touches for first finger, right hand, giving either Boehm F or Simple System F sharp as alternatives. The "Long F" key could thus be discarded on the 1867 model.

by its improvements and modifications, were probably the natural reaction to any radical change in the design of an accepted standard. While many of the objections sprang from prejudice or simple stubbornness in refusing to change a finger technique built up probably after years of arduous practice, one design stands out as a remarkable attempt to reconcile the better points of the new system with those of the original simple 8-keyed flute. This was the design of Richard Carte, combining the features of his patent of 1851 with the main advantages of Boehm's system and patented in 1867 under the name of "Carte and Boehm's system" or "1867 System". It is still used in England by some eminent flautists and it is claimed as the perfect system of fingering for the soloist since it affords so many alternative fingerings together with many extra ones.

Opponents to this system, while admitting that many difficult passages are rendered simpler to play on this than on the Boehm, have suggested that since there are so many alternative fingerings available to the player, he is less able to sight-read a difficult passage through possible indecision as to which alternative fingerings he should select. I find little evidence of technical deficiency or sight-reading inability among those "1867 System" professional flautists with whom it has been my privilege to work in British orchestras.

Above all, the system makes for strength and robust construction in its key-mechanism. Apart from routine maintenance, the mechanism appears to be trouble-free, albeit rather a complicated one for extensive overhaul and reassembly by repairers.

Its biggest difference from the Boehm system is the open D which is obtained by raising all fingers (on the Boehm this fingering gives C sharp). Boehm's original open G sharp is retained and governed further by the first finger of the right

hand, allowing an easy trill from F sharp to G sharp (difficult on other systems). The B flat hole is controlled at the back of the instrument by the left thumb which now controls two plates, B and B flat in chromatic order (unlike the standard Briccialdi mechanism) with B flat obtainable in the same manner as the Boehm-system (first finger of the right hand) if required. Two small plates rest above the F key cup, giving alternative F sharp (i.e., Simple System first finger F sharp on the upper plate and Boehm F on the lower plate). Using the lower plate the right hand action is fingered as Boehm and using the upper plate the right hand action becomes similar to the old Simple System.

There is another version of the 1867 system called the "Guards Model" which has a closed G sharp.

The 1867 system, admirable in design and theory and thoroughly practical in performance, will probably become obsolete through the fact that it is expensive to manufacture and fewer players are using it at the present time. A new system has been designed which incorporates many of the excellent features of the 1867 system which is described in detail at a later stage.

Radcliff's System of 1870:

Like the 1867 system flute, all the acoustic principles, diameter of bore, parabola head and other measurements with Boehm's scaling, were retained in this design which was again an attempt to use the better points of each system incorporated into one. The finger movement on the pure Boehm F sharp which involves the middle finger or else the fourth finger of the right hand, makes for a somewhat clumsy sequence in certain passages which had been relatively simple in execution on the earlier Simple System.

The well-known finale of Mozart's Second Flute Concerto in D major

(k.285) is far more awkward to play on the Boehm system flute than on the instrument of Mozart's day.

The simple fingering for F[#] is available on both the 1867 and Radcliff Models, together with that of the Boehm, while the latter model is restricted to either the Boehm F sharp (further complicated by the necessity to play this with the third finger on the flute instead of the second finger - see Boehm System) or to one of the F sharp improvements added by Rockstro (1852) or Brossa (c.1900). Radcliff's system of 1870 is based upon the original simple eight-keyed system and includes full venting, plus the double thumb-plates of the 1867 model, plus an ingenious alternative arrangement for playing F.

Having a closed G sharp, this flute is fitted with a device similar to that of the "Split-G" mechanism added to many closed-G sharp Boehm models.

The "Long F" key, characteristic of the Radcliff model, closes the F hole which has been moved away from beneath the F finger plate and placed to the front of the body-tube. Since this key need not be released by the little finger, left hand, for E and notes below, all the movements and trills between F, E flat or D are rendered quite easily.

Radcliff's system is an excellent design, leaving no

impossible fingerings and, in fact, rendering the execution of some high passages much simpler than could be possible on the Boehm.

Sources - A. Baines "Woodwind Instruments and their History".

Otto Langey Flute Tutor (Boosey & Hawkes),

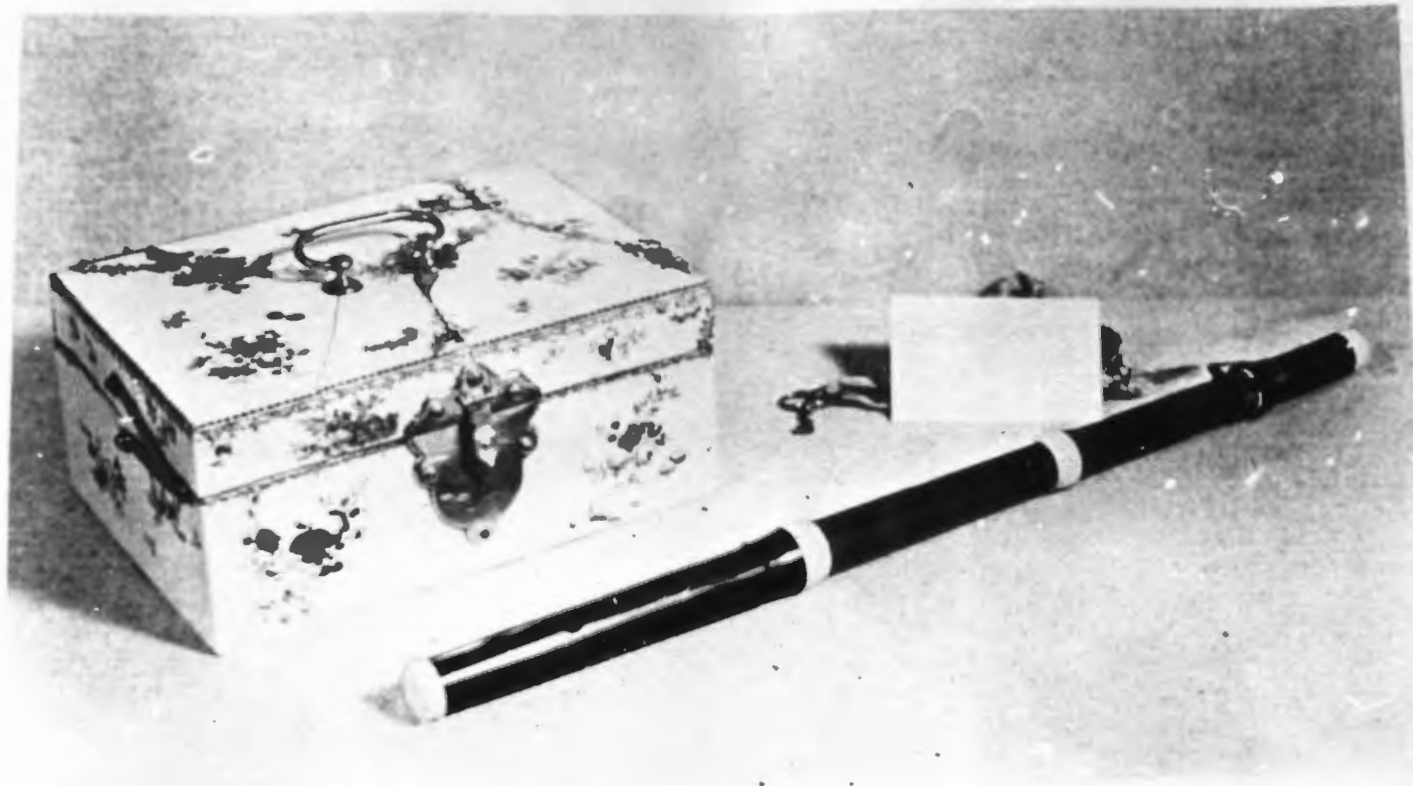
Rudall Carte Catalogue, 1930-39.

Mönnig's Reform Flute of 1912.

The "Old School" of German flautists who scorned the Boehm model throughout the period of Brahms and Wagner (whose personal objection to Boehm flutes is well-known to musical historians) continued to use the classical conical Simple System flutes with very slight improvements added, such as superior keywork and extra trill-keys. The Schwedler model of 1885 actually employs the Boehm design for the keys of the footjoint. Schwedler also designed a new form of embouchure hole, consisting of raised shoulders either side of the blowing-hole to act as a windtrap for the airstream. This is known as "Schwedler's Reform Mouthpiece" and is invariably found in most modern flutes (even Boehm models) which are manufactured in Germany at the present time.

The Mönnig Reform Flute of 1912 represents the last word in Simple System conical flutes. Details sometimes vary with different manufacturers but the standard model includes plates or rings throughout, an F sharp correcting device (on the Simple System it is necessary to correct the flat F sharp with the F key) together with a roller for fourth finger, right hand, to cancel this for C sharp" (being the harmonic of this note which otherwise would be too sharp). A thumb trill for A flat - B flat and a "Brille" (two rings resembling a pair of spectacles) for improving C" and C sharp".

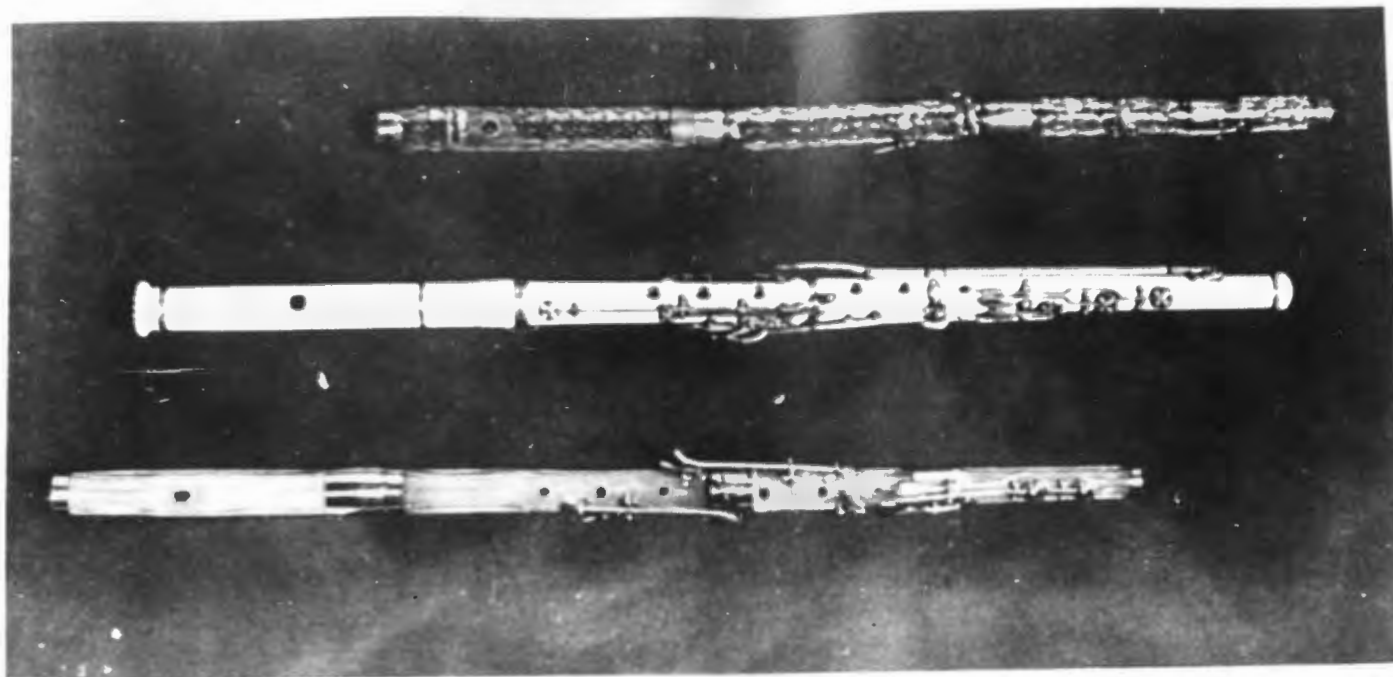
These flutes blow remarkably easily and this fact tempts



No. 916

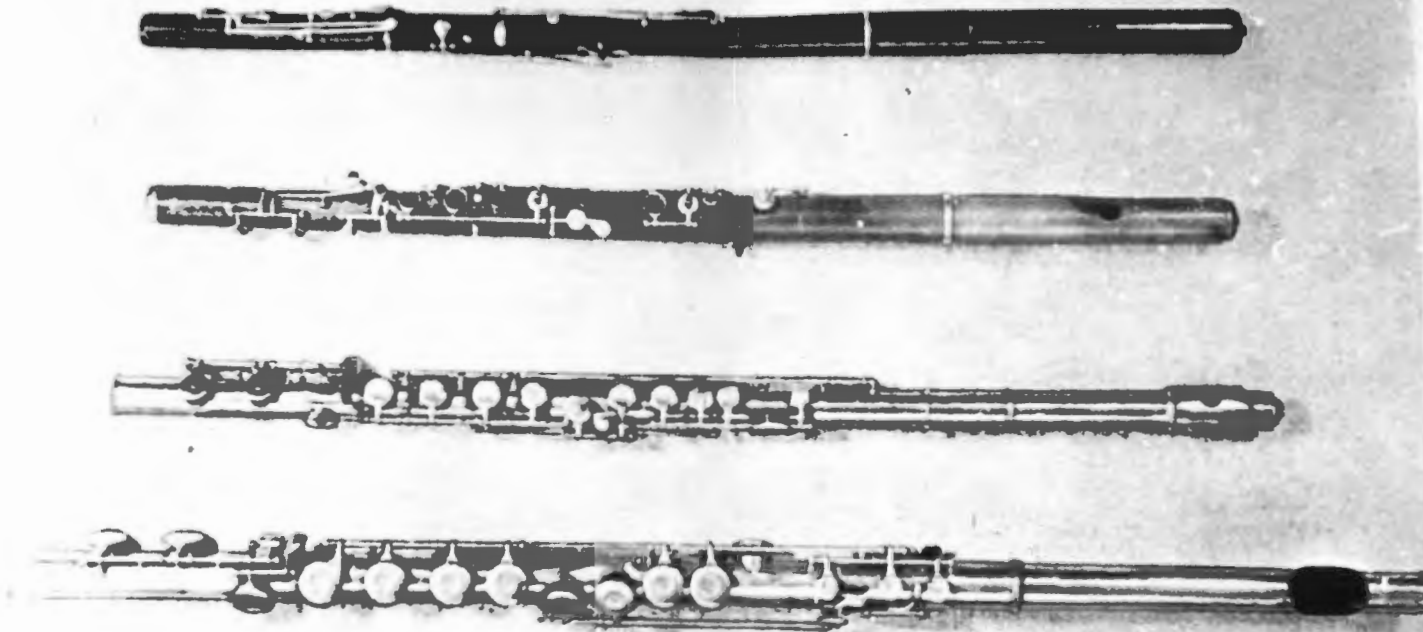
Flute by Quantz, Potsdam, c.1750 in the Dayton Miller Collection, Library of Congress, Washington, No. 916. Two keys (E flat and D sharp). Six upper body joints. Ebony with silver keys and ivory rings. Quantz' tuning slide. Decorated casket of porcelain. This flute belonged to Frederick the Great.

Plate from Catalogue of Dayton Miller Collection.
Reproduced from "La Flute" Girard, 1953.



- Top - 378. Glass Flute by Claude Laurent, Paris, 1813. 4 keys.
Presented to President James Madison by Lafayette.
- Middle - 307. Ivory Flute by Ziegler, Vienna. 14 keys, foot to B.
Formerly property of Count Zstvan Szechenyi (1791 - 1860).
- Bottom - 717. Glass Flute by Claude Laurent, Paris, 1815. 6 or 8 keys.
(Two foot joints, C and D).

Plate from Catalogue of Dayton Miller Collection.
Reproduced from "La Flute". Girard, 1953.



No. | top to bottom | 975, 654, 1237, 305.

EARLY BOEHM FLUTES

- Top - 975. Flute in C. Th. Boehm, Munich, c.1829. 9 keys. Cocus with silver fittings.
- 654. Boxwood flute, Boehm and Greve, Munich, before 1838. Boehm's 1832 system. Silver keys.
- 1237. Flute in C. Th. Boehm, Munich, 1848. Silver. Boehm's No. 14, sold to Richard Carte, 8.12.1848.
- 305. Alto-Flute in G. Th. Boehm, Munich, 1847 - 62. Boehm's No. 4.

Plate from Catalogue of Dayton Miller Collection.
Reproduced from "La Flute", Girard, 1953.

Fig. 52.



Silver Boehm System Flutes by Rudall Carte, London.

Left: Covered Fingerplates, off-set G-Keys.

Middle: Open Fingerplates, off-set G-Keys.
Foot Joint Extension to Low B.

Right: French Model (Open Fingerplates, Straight-line Mechanism).

Presented by Norman Maloney, Manager of Messrs. Rudall Carte
and reproduced with his kind permission.

one to speculate as to whether the conical bore discarded by Boehm might not after all be incorporated in a new design of flute-tube, in conjunction with the better features of Boehm's key mechanism.

After A. Baines "Woodwind Instruments and
their History".

The Alto-Flute in G.

Once called the "Bass Flute", this beautiful instrument was first constructed by Theobald Boehm who preferred to play it instead of the Concert Flute in C.

Fitted with standard Boehm mechanism, or occasionally 1867 or Radcliff system, the G-Flute has become a regular part of the equipment of the Professional Flautist. While employed only occasionally in the symphonic repertoire (notably Ravel's "Daphnis et Chloë", Holst's "The Planets", R. Vaughan Williams' "Job" and Stravinsky's "Sacré de Printemps"), it is widely employed in all commercial recordings for films and television.

The Flûte D'Amour, pitched a tone higher in A, is somewhat rarer and this is unfortunate, since its general use would simplify the transposition directly from a concert flute part by any flautist able to read and play in the bass clef.

The Bass Flute in C.

For many years an unsatisfactory instrument of varied design, this instrument has now been redesigned by Messrs. Rudall Carte & Co. of London, England (RC/18) and is very successfully used in many fields of commercial music in England, although it has, so far, not appeared in the Symphony Orchestra. The Rudall Carte Model, pitched an octave below the Concert Flute, has a most beautiful tone, broad and rich in character, yet extremely delicate and easily produced.

The headjoint and body are of 925 sterling silver and the mechanism of high-grade nickel silver, heavily silverplated. The headjoint is joined to the body tube by a double U-bend.

G-Treble Flutes.

Messrs. Rudall Carte & Co. have recently instigated a new instrumentation for Flute Bands (popular in Ireland) and several prize-winning bands have adopted this new arrangement:

C Piccolo, G Treble Flutes, C Concert Flutes, G Alto Flutes and, if required, C Bass.

The G Treble is made in sterling silver, sounding one octave above the G-Alto Flute with full three octave range.

E-Flat Treble Flute.

Made by G.C. Conn, this instrument is designed mainly for young students with fingers too short to comfortably handle a larger flute. Tonally it lacks the sweetness of the Concert Piccolo in its lower register or the brilliance of the upper register of the Concert Flute.

Sources.

Rudall Carte & Co., London, Current Catalogue.

The Giorgi Flute.

Carlo Tommaso Giorgi in 1888 received the Grand Prix at the Bologna International Music Exposition and in 1889 at the Paris Exposition for a new and improved flute. In 1893 he received a medal for this flute at the Chicago Exposition and since the flute was stolen from the showcase under extraordinary circumstances which were later found to be the work of practical jokers, Giorgi constructed his model which could be manufactured so cheaply and simply as to provide little temptation to either

thieves...../83.

thieves or practical jokers.

This flute was made of ebonite with the curved mouthpiece and embouchure hole fitted at the top end of the tube. There were eleven finger holes, one for each semitone in the octave $d' - d''$. No keys or mechanism were used and each finger and thumb controlled one hole, with the upper-joint of the left first finger stopping the eleventh hole. Later these flutes were also made with open keys over every note-hole.

"The Scientific American" (December 18th, 1897), gives a description of the Giorgi keyless flute, together with the story of Giorgi's experiences in America.

The Albisiphone.

A metal bass flute sounding one octave below the Concert Flute and played vertically (like the Giorgi Flute), was invented in 1910 by Abelardo Albisi (1872 - 1939). The Boehm system was used on this instrument called "Albisiphone" after its inventor. Few flautists were able to play the instrument satisfactorily, possibly because of its great weight and difficult angle of blowing, although Albisi is said to have performed on the instrument very creditably.

Only a few specimens are in existence.

CHAPTER XIIITHE MURRAY-COOPER FLUTE, 1966.

In 1946 I was privileged to meet an extremely talented young flute student who was studying at the Royal College of Music in London. His name was Alexander Murray and during many years of our firm friendship, I have watched the progress of his career with the greatest interest. Following some years as Principal Flute at the Royal Opera House, Covent Garden, he became Principal Flute of the London Symphony Orchestra which position he held for twelve years before taking up his present post as lecturer at the Michigan State University.

While playing with the London Symphony Orchestra he conceived a new and rational system for redesigning the existing Boehm System and has kindly furnished me with details of this instrument.

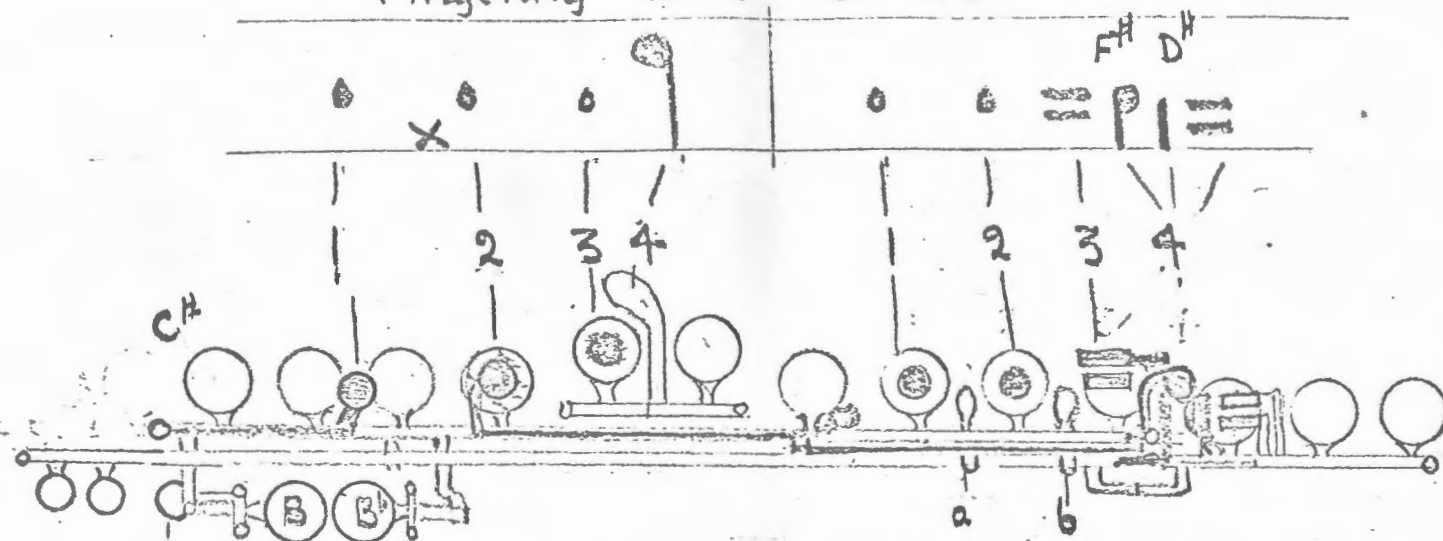
Mr. Murray's earliest tuition on the flute began in South Africa when he studied under my colleague, David Sandeman, (now with the Royal Philharmonic Orchestra) during the war, while still a schoolboy. His talent even at this early age was such as to attract the attention of Professor P.R. Kirby (then Professor of Music at Witwatersrand) who recommended him to the Royal College of Music for his studies on his return to England.

This connection between two such esteemed friends and colleagues is, for me, a happy coincidence and I am proud to have the privilege of coupling their names in this work.

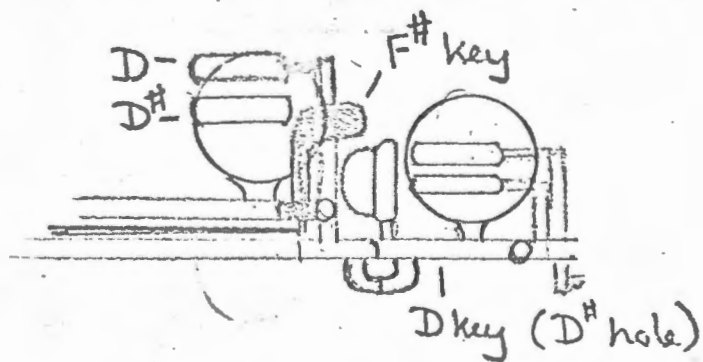
Mr. Murray's flute has been an unqualified success, in that all the technical and acoustical shortcomings of the standard Boehm system have now been rectified. Like all new and revolutionary designs in woodwinds, it has been but slowly adopted by established flautists, most of whom were reluctant to change their

present.....85.

Fingering Chart Schema



C#
 Dvent
 Thumb keys
 (reversed)
 X

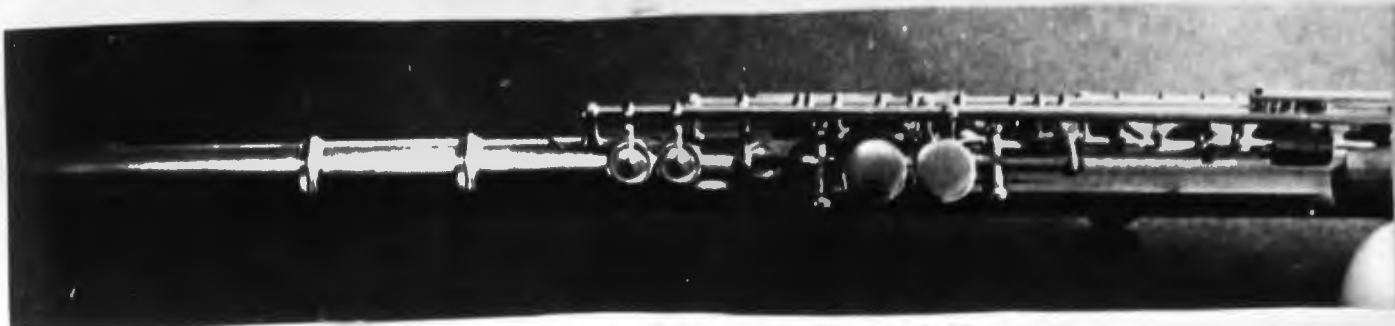


Detail of open d#
 mechanism.

DETAILS OF FLUTE MADE BY A.K. COOPER (LONDON) 1966
 TO DESIGN BY ALEXANDER MURRAY (MICHIGAN STATE UNIVERSITY)
 (BY COURTESY OF MR A. MURRAY.)

Fig. 54.

THE MURRAY-COOPER FLUTE.



Left-hand mechanism, showing thumb-keys and d'' vent.

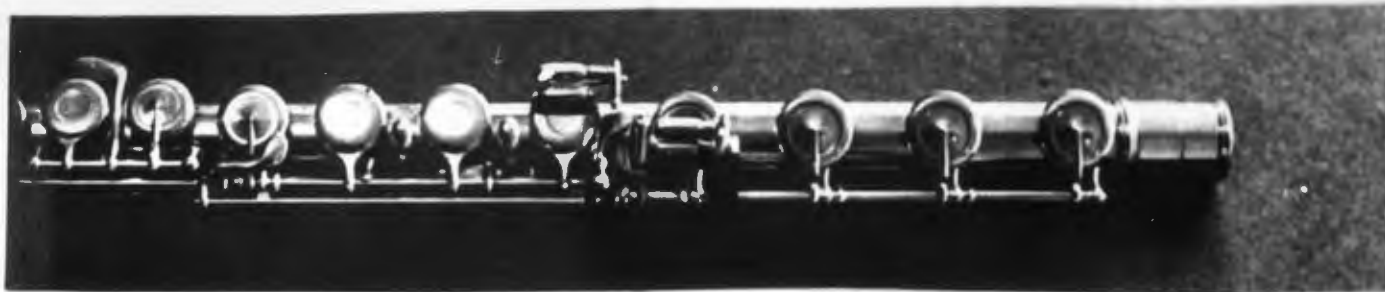
Fig. 55.



Front view, showing special F sharp mechanism, and C sharp - d'' automatic device for second finger, right hand.

Note that C sharp is now produced by a correct size tone-hole, while the function of vent-hole for d'' etc. is now carried out by the smaller d'' vent hole seen in Fig. 53.

Fig. 56.



Right-hand mechanism showing control key for open D sharp held by third finger. All tremolos hitherto impossible are now rendered easily by this mechanism.

present finger-systems for so radical a design as this. The merits of the new model have been recognised by most leading players and the Murray Flute is gaining in popularity in the United States of America, where young beginners are able to use the system without the prejudice of the professional flautists toward new and radical changes.

—oo0oo—

A MODIFIED BOEHM FLUTE.

By Alexander Murray.

Theobald Boehm made such a complete rationalisation of the mechanics and acoustics of the flute that I put forward with some reticence a description of my own efforts to add to his work. After many years of experimenting, I have arrived at an instrument which is possibly, in two or three respects, an improvement.

My first Boehm flute was the standard American-style Closed-G sharp and was, in fact, a very good instrument by William S. Haynes. Dayton Miller's translation of Boehm, read during my R.A.F. Service, stimulated me to change to an Open-G sharp for the reasons given by Boehm and Miller. In 1958 I met Albert Cooper, a virtuoso flute-maker, and joined his waiting list for a new instrument. I set to thinking about the possibilities of Open and Closed D sharp. The Closed D sharp was the only inconsistency in Boehm's flute to my mind, although I could appreciate its necessity. The other two changes I was interested in attempting were:

- (1) A method of venting F sharp" with one b hole and not two, and
- (2) An additional tone-hole for C sharp', enabling the d' vent to be placed in a sharper position.

My...../86

My first Cooper flute was modified in this way but the hole positions were placed according to Cooper's then standard design and the additional holes, although improving the quality of the notes, were not placed in the best acoustical positions. Suffice it to say that with eight experimental instruments, the mechanical genius of Cooper and the mathematical know-how of another flautist friend, Elmer Cole, we succeeded in producing last year - 1966 - my present instrument, the Mark 8.

The differences between this flute and the original Boehm, described in his essay, may be summarised thus:

Acoustic:

e' is properly vented, even in rapid passages (d - e trills);

f sharp is properly vented in all registers;

The large C sharpⁿ improves C sharpⁿ, C sharp^m, C sharpⁱⁱⁱ and G sharpⁱⁱⁱ.

The small dⁿ vent improves dⁿ, d^m, d sharpⁿ, d sharp^m, aⁱⁱⁱ and b flatⁱⁱⁱ.

Fingering:

d may be fingered : (1) $\begin{matrix} \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \times & & & & & & & \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \end{matrix} | \cdot \cdot \cdot = |$
 (2) $\begin{matrix} \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \times & & & & & & & \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \end{matrix} | \cdot \cdot \cdot - |$

(1) d - e trill simplified (proper venting for e);

dⁿ fingering for c - d trill;

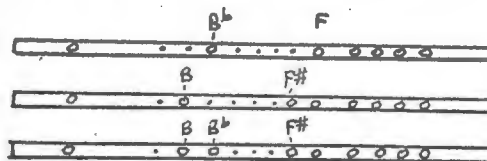
(2) In chromatics and for d - d sharp trill.

d sharpⁿ $\begin{matrix} \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \times & & & & & & & \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \end{matrix} | \cdot \cdot \cdot - |$ the little finger is then free and may depress f sharp key.

c sharpⁿ - d sharpⁿ trill, or c' - e flatⁿ tremolo are both simplified.

$\begin{matrix} \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \times & & & & & & & \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \end{matrix} | \cdot \cdot \cdot | e - f^{\#} \text{ TRILL} : | \cdot \cdot \cdot | \phi \phi \phi |$

"As 4th HARMONIC OF f AND 3rd OF b^b
 NEW f^{##}ⁱⁱⁱ
 BOEHM f^{##}ⁱⁱⁱ



c sharpⁿ and c sharp^m are properly vented by a hole only .05 cm smaller than the c sharpⁿ hole. g sharpⁱⁱⁱ is produced as a

harmonic...../87.

harmonic of C sharp".

a^{'''}, b flat^{'''} and d^{'''} use the small d vent. This C sharp^{''} - dⁿ mechanism is automatic; there is no difference in the fingering as compared with an original Boehm (the thumb keys are b - b flat and not b flat - b as with Briccialdi).

LARGE AND SMALL FLUTES BY RUDALL CARTE.



RC 14

Alto G Flute



RC 15

Bass Flute in C



RC 11A

Metal Concert Piccolo
and G-treble Flute.



RC 46S

(Photo by courtesy of Messrs. Rudall Carte & Co.)

Fig. 58.



—SIGNOR GIORGI AND HIS KEYLESS FLUTE.

Fig. 59.

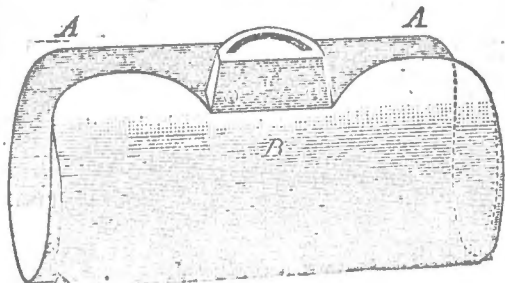


—GIORGI'S KEYLESS FLUTE.

From H. Macaulay Fitzgibbon, "The Story of the Flute", 1913.

Fig. 60.

Wheatstone's Mouth-piece.



A A. Curved plate for fitting on to the head-joint.
B. Curved spring-plate for holding the mouth-piece.
C. Ivory mouth-piece with curved aperture for the passage of the breath.

An attempt to convert the standard Concert Flute to a whistle-type instrument by means of a detachable mouthpiece was made in 1820 and patented by W. Wheatstone, 128, Pall Mall. Constructed chiefly of copper, silver-plated and lined with leather, this contrivance has never been successfully used in flute-playing.

From R.S. Rockstro, "The Flute", 1890.

Fig. 58.



—SIGNOR GIORGI AND HIS KEYLESS FLUTE.

Fig. 59.

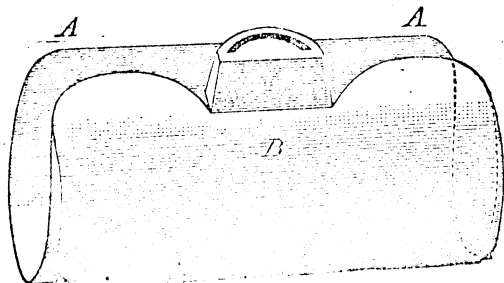


—GIORGI'S KEYLESS FLUTE.

From H. Macaulay
Fitzgibbon, "The
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1913.

Fig. 60.

Wheatstone's Mouth-piece.



- A A.* Curved plate for fitting on to the head-joint.
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From R.S. Rockstro, "The Flute", 1890.

CHAPTER XIV
THE PICCOLO.

The small octave-flute, which is usually carried by every professional flautist, is a special study on its own and since excellence in its performance is so essential in the modern orchestra, many flautists make a speciality in playing Piccolo whilst filling the capacity for the subsidiary flute parts (third and fourth) demanded in more recent orchestral scores since Wagner. Hence the Third Flautist in most symphony orchestras is today regarded as a sub-principal ranking above the Second Flautist in the flute section. The same situation has developed in all the other woodwind sections of the orchestra in regard to Third Oboe (doubling Cor Anglais), Third Clarinet (doubling Bass Clarinet) and Third Bassoon (doubling Contra-Bassoon).

Every Piccolo which has been manufactured varies from the others in its individual qualities and characteristics and each performer manifests his own peculiar taste or requirements when assessing the qualities of one particular instrument.

Best Piccolos, unlike the standard modern flutes, have conical bores, as opposed to the cylinder-bore of the flute tube. The Boehm system was applied to the Piccolo many years after the Boehm flute was established and even to the present day, some professional flautists still use the Simple-System 6-keyed Piccolo along with their standard Boehm-system flutes. It has been claimed that the conical bore makes for a sweeter and less harsh tone than may be obtained from a piccolo with a cylinder bore. Many makers in Italy and the United States of America have produced piccolos which are, in effect, miniature Boehm flutes playing at the upper octave. Best of the instruments designed in Italy by Bartoli, Araighi and others, and in the United States of America

by Wm. Haynes & Co. and Verne G. Powell, have the low C and C sharp while the standard Concert Piccolo used in British orchestras is almost invariably the Boehm system applied to conical-bore with cylindrical headjoint but without the low C and C sharp (C¹ being the lowest note).

If one examines the hazards facing manufacturers of conical bore instruments, it becomes apparent that absolutely identical measurements within such a small conical area are virtually impossible to duplicate in a hand-made wooden instrument. Even with the metal tubes favoured by the American makers, no two tubes are exactly alike and to date the use of plastic tubes on flutes and piccolos has not been accepted by professional players since ebonite instruments ceased to be made (after 1946 when there was little demand for them).

If it is difficult to duplicate the precise dimensions of a small conical tube, it may easily be seen that a parabola headjoint of the size required to fit a cylinder-bore piccolo presents an even greater hazard for the manufacturer. Good cylinder piccolos have been made which satisfy some players but in general the design is not so acceptable to the majority of professional players who prefer the conical instrument with the cylinder bore headjoint. Some years ago, I was asked by the manager of Messrs. Rudall, Carte & Co., of Rosilly Street, London, to investigate a newly-made batch of five conical-bore piccolos which were unsatisfactory in response and intonation. Each piccolo had been fitted with the standard cocus-wood cylinder head, cut with the conventional oval embouchure-hole customary in all Rudall, Carte flutes and piccolos. Upon fitting a cylinder-bore, sterling silver headjoint made by an American firm, every one of these faulty wood piccolos was transferred into a beautifully responsive and sweet-toned

instrument...../90.

instrument. For the past twenty years I have used this precise combination (the same silver headjoint on a Rudall Carte piccolo) and still possess what is accepted in London as one of the best piccolos in the profession.

All this is, of course, contrary to the theories of Theobald Boehm (letter to W.S. Broadwood, Munich, April 28th, 1866).

The mystery, if any, may probably be explained by the rectangular shape of the embouchure hole which is found on nearly all flutes and piccolos of recent manufacture (since 1950 in Britain) and invariably on all traditional French-pattern metal flutes by the leading American and Paris makers. The rectangular shape makes for free mass-production and is, therefore, preferable to the oval shape favoured by the original firm of Rudall Carte before their amalgamation in 1943.

While Rudall Carte have always retained the traditional thumb-plate design, as may be seen on all flutes of reputable manufacture (see Fig. 46), they seem to be the only makers of piccolos which incorporate this design. All other makers use the two lateral plates of German design which, although less elegant in appearance, make for less weight in the mechanism and are very much easier to adjust and dismantle for routine overhaul.

Every design and improvement in flute mechanism has been adapted with varying success to the piccolo but the general preference among flautists all over the world appears to be the Boehm system (with either closed G sharp or open G sharp).

Like the flute, the mechanism is usually of German silver, silver-plated or of sterling silver and the tubes are made from cocus, blackwood, ebonite, resin plastic (favoured by "Lignatone" of Czechoslovakia), brass silver-plated (as in cheaper Italian instruments) or entirely of sterling silver.

While...../91.

Sullivan, in his one serious opera, "Ivanhoe" (1891), calls for a Piccolo in G (Ref. "English Music" 1604 - 1904, London, 1911. p.155, John Finn). This would enable the player to reach the upper register without the shrillness associated with the Concert Piccolo. Since the instrument cannot be traced in any collection, it is assumed that it was constructed on the Simple or Six-keyed System. The Boehm system becomes very complicated when applied to such a short tube.

While the majority of Piccolos are made in C, the florid parts written for military bands are made simpler for the player on a Piccolo pitched in D flat (one semitone higher and often erroneously called "E flat Piccolo"). The average player in British Army bands prefers to transpose all such music written for D flat flutes and piccolos at sight on his concert instruments.

CHAPTER XV.

RECORDERS AND WHISTLE-FLUTES

The general adoption of the Transverse Flute into the orchestra resulted in the rapid decline of the Fipple-Flutes from concerted music-making, although the Recorder and Flageolet maintained a certain amount of popularity among amateurs and dilettante since they presented little or not problems of embouchure or tone-production. The "Tin Whistle", often erroneously named "Flageolet", has remained popular with the younger generations right up to the present time and whistles of various types have been offered for sale to the enthusiast with limited money or time to spend on mastering the technique of a more complicated instrument.

The name "Recorder" is derived from a verb in use in the Sixteenth Century, applied to the singing of birds:

"She sung, and made the night-bird mute,
That still records with moan".

Shakespeare "Pericles" iv. Prolog. 25.

"To hear the lark
Record her hymns and chant her carols blest".

Fairfax, "Tasso".

"Hark, hark! Oh, sweet, sweet!
How the birds record too!"

Beaumont & Fletcher "The Pilgrim" v.4.

Primitive whistles which represent the ancestors of our modern flutes and whistles have been known to man since palaeolithic times but musicologists have not yet reached complete agreement about the evolutionary order of these various sounding principles. The addition of finger holes is an early development, since they are found on bone flutes discovered in European Prehistoric sites. Egypt, Sumeria and China too had open-ended flutes with three or four finger-holes.

At the commencement of the Sixteenth Century, Virdung tells us that there were Fipple Flutes with three, four, five, six, seven and eight finger-holes. Only such of them as were pierced with not less than eight holes - seven for the fingers and one at the back for the thumb - could with propriety be termed "Recorders".

In France the instrument was styled "La Flûte à Neuf Trous" (the Nine-Holed Flute), a misnomer which arose from the Lowest hole, placed at the side of the instrument and out of line with the other holes in order to reach it conveniently with the little finger, which was duplicated on its opposite side. Either hole could be stopped with wax so that the Recorder could be played with either Right hand or Left hand uppermost (Fig. 61).

Virdung also explains that a set of such flutes consisted of four (Discant, Two Tenor and Bass) or of six (Two Discants, Two Tenors and Two Bass). The Bass, on account of its larger size, was fitted with an open-standing key with touches at either side to accommodate left or right-handed players. The key was protected by a perforated covering box called a Montanelle (Fig. 62).

Martin Agricola in "Musica Instrumentalis", 1528, shows engravings which differ but little from those of Virdung (Figs. 64 and 65) and includes the Buspfeif and Geusen Horn which do not appear in the later edition bearing the date 1545. Michael Praetorius in "Theatrum Instrumentorum" (Wolfenbüttel, 1620) shows the complete set of Fipple Flutes then in use (Fig. 66). From Mersenne ("Harmonie Universelle", 1636), we learn that in his time the Recorder was known in France by three appellations:

English Flute ("La Fluste D'Angleterre"),

Flûte à Neuf Trous" and

The Sweet Flute ("La Fluste Douce").

Early...../94.

Early in the Eighteenth Century, the Recorder gradually gave place to the Transverse Flute and became almost obsolete as a musical instrument until in 1919 Arnold Dolmetsch began to manufacture instruments on the early Bressan design. This was the type of Recorder which had been remodelled by the Hotteterre family and is generally known as the "Baroque" model. The headjoint with Fipple mouthpiece is cylindrical with a contracting body in which the angle of taper is approximately double that of the earlier types.

The Dolmetsch Concerts resulted in a popular revival of Recorder-playing in the Twentieth Century and many makers, particularly in Germany, were soon manufacturing the instruments in large quantities. The F sharp fingering with First Finger, Right Hand (as on the Simple Flute or Oboe) is too flat and German makers changed the position of the finger-hole in question, giving rise to a variation in fingering known as "German Fingering".

The Octave Register on all Recorders is produced by flexing the thumb and applying the thumb-nail to the aperture of the Thumb-hole. Some Recorder soloists have fitted an "Echo" device to their instruments. This is an idea borrowed from the Flageolet and consists of a small hole pierced at approximately one inch below the voicing (i.e., the Slot and Sharp edge).

When the Recorder is blown very softly, the pitch of the notes is very much flattened. The opening of this small hole compensates for this, since it has a sharpening effect. It is usually controlled by means of an ingenious mechanism working from the mouthpiece and controlled by the pressure of the player's jaw.

Another sound-strengthening device was introduced by Carl Dolmetsch which enables the Recorder-player to blow much harder without sharpening the pitch. It consists of a small

wheelbarrow-shaped baffle, made of wood or cardboard which clips over the voicing of the Recorder.

High F sharp on the Treble-Recorder (C sharp on the Descant) has always been considered an impossible note to produce. By accident it was discovered that the stopping of the extreme ("Bell") end of the Recorder while playing G (D on the descant) this note could easily be obtained and some players have fitted a special device worked by a key or lever in order to obtain the "missing" semitone.

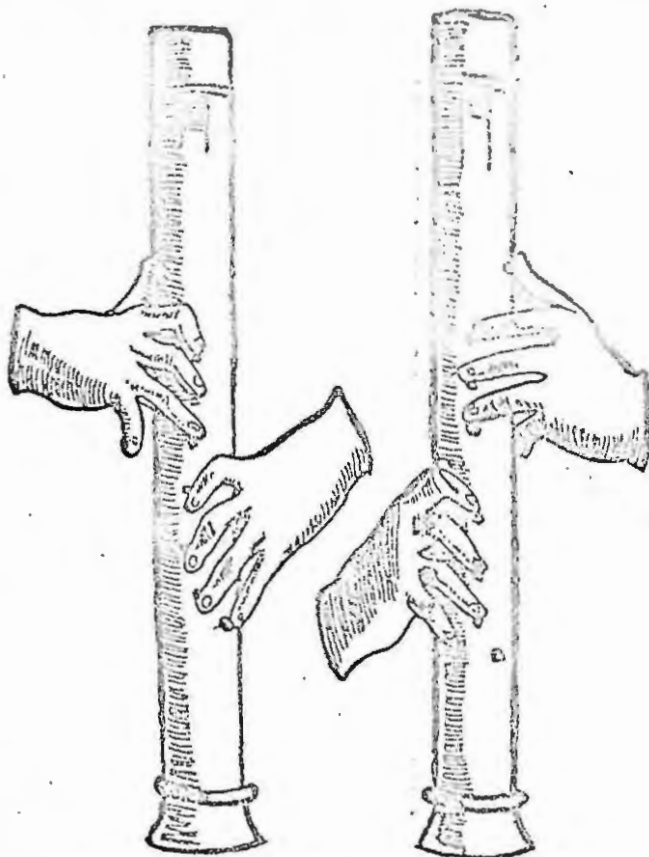
Apart from these relatively small developments, the Recorders have remained almost identical in structure and design ever since Arnold Dolmetsch made the first Modern Reconstruction in 1919.

The growing popularity of the Recorder, especially for use in schools, due to its cheapness and robust design (with no expensive mechanism to go wrong), have led the larger firms to manufacture instruments in plastic. This is a very suitable medium since it is less liable to crack or distort like wood, although the well-known soloists still prefer to use wood, the favourite being pear and maple.

Sources: C. Welch - "Six Lectures on the Recorder".

Current Catalogues - Schott & Sons,
Dolmetsch.

Fig. 61



—RIGHT- AND LEFT-HANDED WAY OF PLAYING THE RECORDER, AFTER VIRDUNG

Fig. 62.



—RECORDERS FOR A QUARTET, REDUCED, AFTER VIRDUNG

Fig. 63



Spießpfeif and Gamsenhorn, Virdung.



Fig. 64.



Ruspfeif and Gamsenhorn, Agricola.



Vier Discantus Flöten.

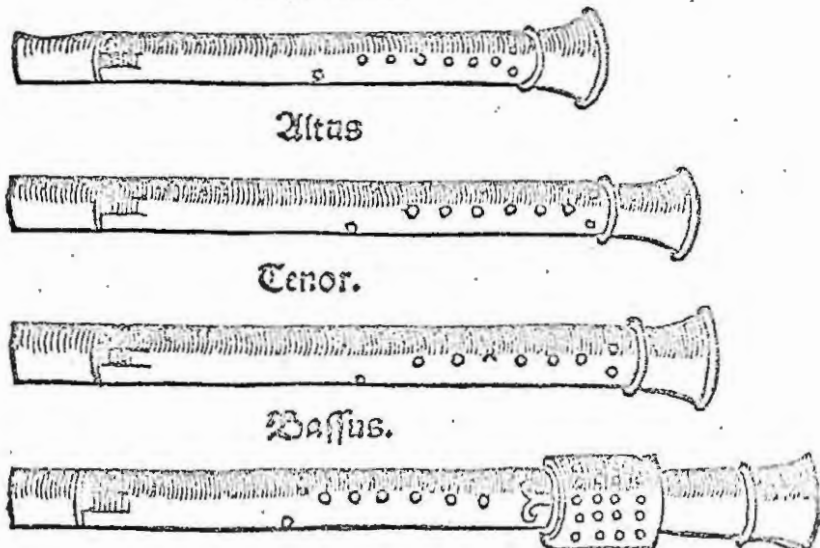
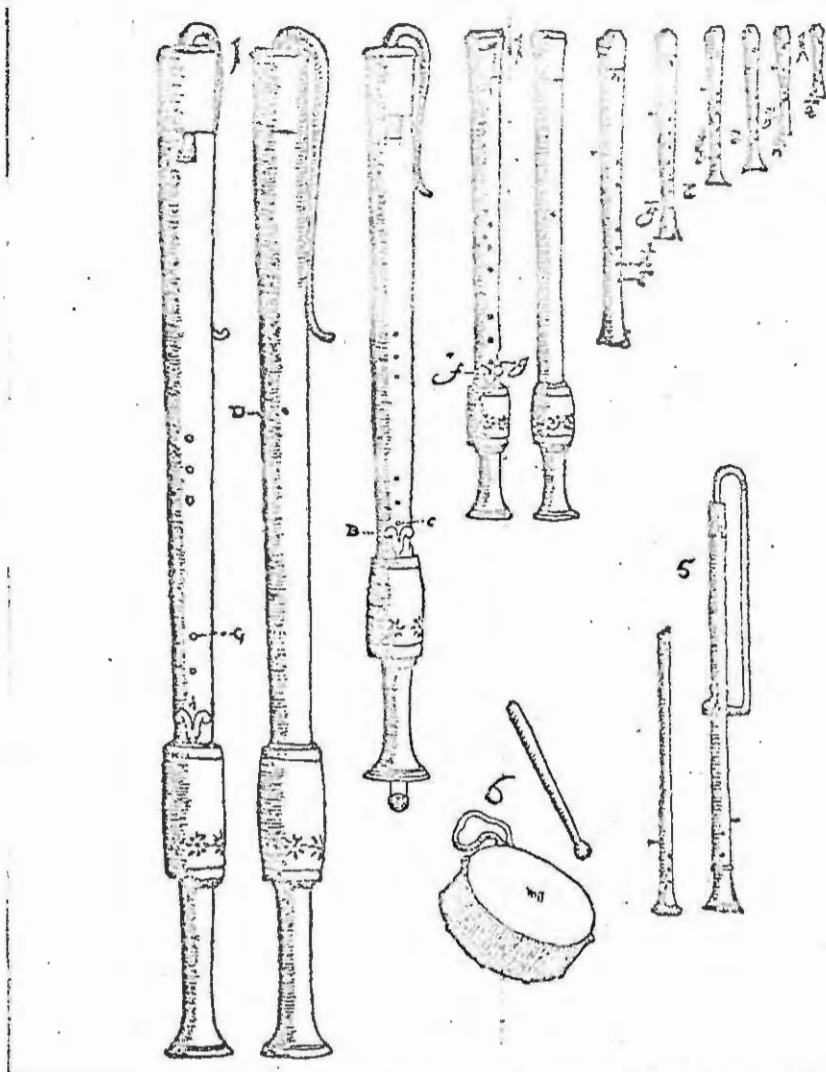


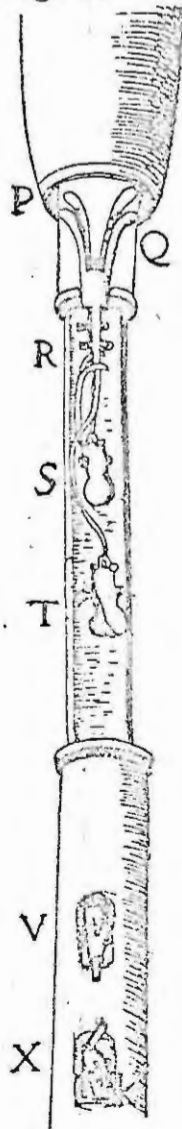
Fig. 65. Quartet of Recorders after Agricola.

Fig. 66.



FIPPLE FLUTES, COMPLETE COMPASS; 5, G. PIPES AND TABOUR.
FROM PLATE IX OF PRAETORIUS

Fig. 67



MECHANISM OF KEYS
OF CONTRABASS FLUTE, AFTER MER-
SENNE

P. Box shifted upwards to show
mechanism; Q. cusps of keys played
with the little finger; R. ends of
springs; S. T. valves of keys; V.
X. pedal keys.

From C. Welch - "Six Lectures"

CHAPTER XVITHE FLAGEOLET

The term "Flageolet" is now constantly applied to any Fipple-Flute, especially if it be of small size and, according to Christopher Welch in "Six Lectures on the Recorder" (1911), this is a misapplication of the name, the difference between a Flute (Recorder) and a Flageolet lying in the number and position of the finger-holes. The holes of the Flageolet are six in number but two of the six must be at the back of the tube where they are closed by the thumbs of the player.

The Tin Whistle (Fig.69) is often called a Flageolet and this instrument is cited in Grove's Dictionary as an example of the Flageolet in its simplest form. However, all six of its holes are in front: it is, therefore, not a Flageolet but a Six-Holed Flute.

Mersenne describes the Flageolet and gives both a drawing (Fig. 68) and a table of fingering of the instrument. He gives the fingering of the six-holed Flute (*La Flûte à Six Trous*), explaining that it differs from the Flageolet in having its six holes at the front, whereas in the Flageolet four are in front and two at the back.

The origin of the Recorder is obscure but we know the approximate date of the invention of the Flageolet and the name of its inventor, *Sieur Jivigny*, who is recorded as having played it in the Ballet "*Avec Une Grande Musique*", given at the Louvre in 1581 by Louise de Lorraine on the occasion of the marriage of her sister with the Duc de Joyeuse.

Welch states (1911): "The Flageolet is not yet quite extinct: it still sometimes finds a place in Quadrille Bands, to which it is a more refined adjunct than the comparatively coarse and noisy cornet which has taken its place." A modern Flageolet is represented in Fig. 70 and it will be observed that it differs

from the Seventeenth and Eighteenth Century Flageolets (Fig. 68) in being furnished with holes closed with keys. The beak of the earlier instruments has given place to an enlarged head-joint, which admits the formation of a chamber for the reception of a sponge to absorb the moisture of the breath. Early in the Nineteenth Century Bainbridge made Double-Fipple-Flutes with cutting-off blades worked by thumb-keys to silence the voicing of either pipe at will. A "Triple Flageolet" made by Bainbridge consisted of a closed boxwood cylinder with keys to be operated by the wrists, giving various bass notes on the principle of the Ocarina or Globular Flute.

TABOR PIPES

Used with a Tabor or small drum, this Flageolet was played with the left hand only and had three holes. It is first heard of in the days of the Troubadours in Southern France and Northern Spain and has survived as a Folk Instrument in various forms in this area.

The Oxfordshire Whitsun Morris Dances were played on Pipe and Tabor and much valuable information about these has been preserved in the note-books of Dr. Percy Manning and other pioneer English folk-music collectors, now kept in the Library of the English Folk Dance and Song Society in London.

Up to the 1860s every district had its piper - a shepherd or labourer who played for his own and the surrounding villages. After 1880, the Fiddle and Concertina began to supersede the Pipe and Tabor and by 1900 there were only a few aged players still living.

Several of their instruments are preserved and since the revival of English Folk Dancing in the 1920s, Dolmetsch and Louis have manufactured some pipes modelled on them.

Spanish Tabor Pipes generally have a wider bore and

perhaps more closely preserve the form of the ubiquitous Mediaeval instrument. Especially interesting are perfected pipes played in Basque cities (Fig. 71 - 2 and 3) for these most closely resemble the large pipes of the Renaissance and of Tudor England.

The Principal size, "Chistu", is in G, 16.5 inches long, 13 mm. wide with a compass a fifth below that of the French pipe. A metal mouthpiece projects at the top and the voicing edge is a long plate of German silver let into the wood (a common feature in Spanish Tabor Pipes). A vibrato is made possible by shaking Finger II. In Municipal Pipe and Tabor Bands, such as that of San Sebastian, this Pipe is accompanied by a fat-toned Bass Pipe, "Silbote" in C, a fifth below (Fig. 71 - 3). It is made in two joints, totalling 24.5 inches and has a 16.5 mm bore.

The Fluvial (Fig. 71 - 4) is used in the Catalan Sardana Bands. It is barely seven inches long, with three finger-holes in front and two behind. Of the latter, one is for the upper surface of the little finger. Unlike the normal Tabor Pipe, the fundamentals are used, augmented by three keys. The instrument is really a species of French Flageolet, though this in turn may be derived from the true Tabor Pipe: it employs both hands, each hand being provided with a complete set of Tabor-Pipe holes, thus:

Two holes and thumb-hole plus two holes and thumb hole =
four holes and two thumb-holes (cf. the holes of the ancient Monaulos). In this event the Fluvial would represent a reversion to Tabor-Pipe use.

Sources: C. Welch "Six Lectures on the Recorder",

A. Baines "Woodwind Instruments and their History".

CHAPTER XVIIMODERN DEVELOPMENTS IN THE RECORDER.

Arnold Dolmetsch (1858 - 1940) had used an original Bressan Recorder for his lecture recitals since 1903. When the family Ensemble had begun to give recitals in 1919, the temporary loss of this Recorder when a bag was left forgotten at a railway terminus, caused Arnold Dolmetsch to make a replacement instrument. Eventually the lost Recorder was returned and Dolmetsch began to manufacture Recorders based on the Bressan pattern. Following the Dolmetsch Haslemere Festival of 1925, Peter Harlan, a German instrument maker, began making Recorders and soon many other German manufacturers began to turn out many recorders in order to meet the increasing demands as the instrument gained popularity.

Unfortunately the positioning of the finger holdes which is common to the original Baroque Recorder was changed in the German models in order that B Flat could be made with the first finger of the Right Hand instead of using the traditional "forked" fingering. The result was a treble Recorder with a perfect B Flat but with an impossibly sharp B Natural.

The Recorder today falls into two classifications of fingering, namely, "German" or "English" (Baroque) and now that the instrument has become popular for School Music since it is relatively cheap to purchase and simple to play, a serious problem faces the School Music Teacher in choosing instruments of a standard pattern and manufacture.

The Descant Recorder in C is most popular in schools. The Treble in F which is the true Baroque Flute of J.S.Bach and Handel is usually studied by the serious Recorder-player. A return to the early Consorts of the Sixteenth and Seventeenth Centuries is shown in the popular revival of Ensemble music for Recorders of all sizes from the tiny Sopranino in F to the Descant in C, and the Treble in F to the Tenor in C (each member of the group pitched, like all consort instruments, one fifth or one fourth apart). The Bass in F

and the Great Bass in C complete the ensemble.

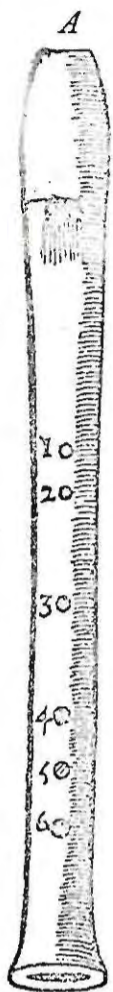
Plastic is widely used in the mass-production of Recorders for schools and this is a very good material since it is impervious to moisture and resistant to cracking due to temperature or climatic changes, although most soloists prefer to play on wood instruments.

The best-known makers beside Dolmetsch are Schott, Steiber and Moeck (West Germany), Adler, Herwig, Heinrich and Heransdorf (East Germany) and König (Switzerland).

The revival of early consort-music together with special arrangements and transcriptions for the Recorder with other instruments or keyboard accompaniment appears to be growing popular in Europe and U.S.A. Modern Composers such as Lennox Berkeley and Hans Gál have published excellent works for the instrument. Specialist Professors of the Recorder have been appointed at Trinity College of Music and the London College of Music, while Master Classes have long been established in the Adult Education Departments of London University and many L.C.C. Evening-Class Institutes.

The Recorder will never oust the modern Flute from the Professional Orchestra but may it long enjoy the present revival of its palmy days when music was made "in consort" for the pure joy and delight of those who enjoy "piping together".

Fig. 68



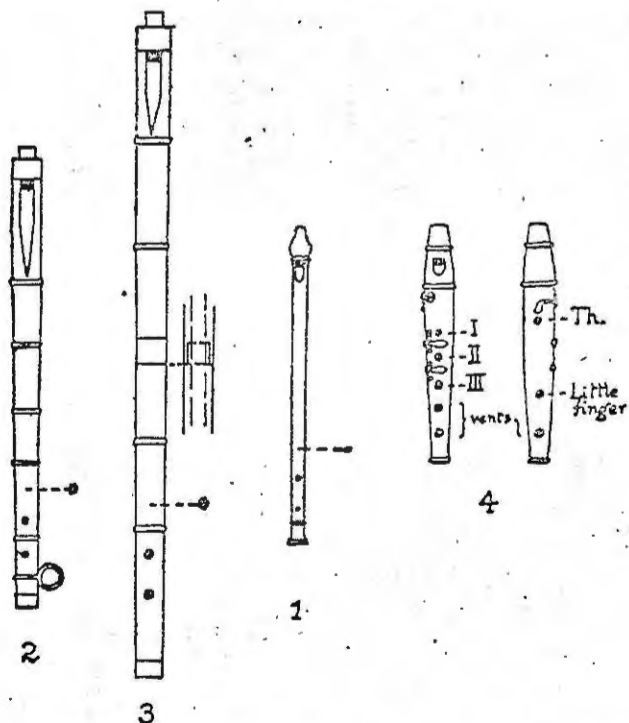
Flageolet after Mersenne.
Ciphers 1 and 5 denote holes
at the back of the instrument.

Fig. 69



Modern Six-holed Flute, miscalled
a Flageolet (C. Welch).

Fig. 71.



Tabor pipes: 1, Provençal; 2, 3, Basque; 4, Catalan
fluviol.

Fig. 70



Modern Flageolet
C. Welch - "Six Lectures".

CHAPTER XVIII
THE OBOE FAMILY.

The History of the Oboe is divided into two main periods. The Seventeenth Century marks the end of the first period and throughout this century the Oboe was transformed from the earlier type to the later type from which the Modern Oboe has developed.

<u>Earlier Type:</u>	<u>Later Type:</u>
<p><u>England:</u></p> <p>Shawn, Schalm, Shalm, Chalme, Bombarde, Howboye, Hoyerboye, Howebois, Hautboit, Hoeboy, Hoboy, Hautboy</p>	<p>Oboe, Hautboy.</p>
<p><u>France:</u></p> <p>Hautbois, Haulxbois, Bombarde, Chalamie, Chalumeau, Calenelle, Chalomei, Chalemie.</p>	<p>Hautbois.</p>
<p><u>Germany:</u></p> <p>Schalnei, Schalney, Schalemie, Schalemeye, Pommer, Bomhard, Bomhart, Bomhardt, Bomhardt, Puhart</p>	<p>Oboe, Hoboe.</p>
<p><u>Italy:</u></p> <p>Piffers, Bombardo, Bombardone, Bombardino</p>	<p>Oboe.</p>

Double Reed instruments appear to have reached Europe from the East in the later Middle Ages. Several Sixteenth and Seventeenth Century shawns are preserved in European collections and the illustrations in Virdung, Agricola, Praetorius and Mersenne give some idea of the form and capabilities of this instrument belonging to the pre-orchestral era and essentially used in open-air wind bands and, occasionally, in Church Bands.

The Shawms vary in size from just over one foot to nine or ten feet in length and were usually made in one piece from sundry hard woods. The bore is conical and narrowest from the upper end, expanding to a trumpet-like bell at the lower extremity. The double reed was fixed to a Pirouette (a detachable bell-shaped piece of wood) inserted in the narrow end of the instrument. When playing,

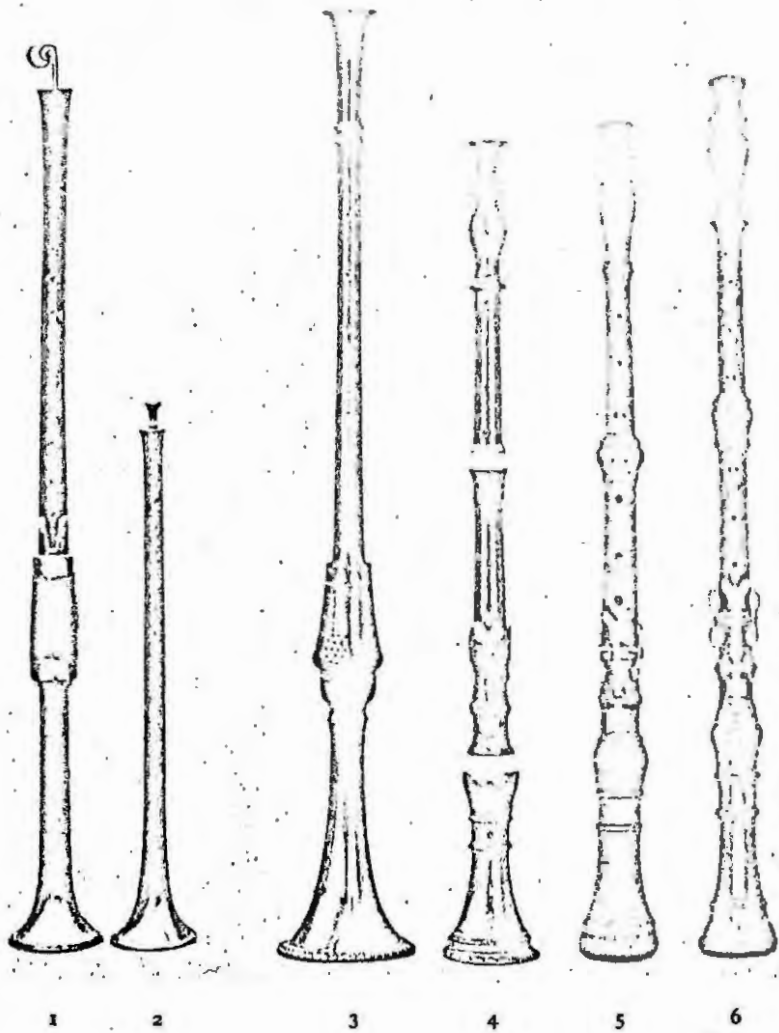
the reed was inside the cavity of the player's mouth and his lips, being pressed against the rim of the Pirouette, did not compress the reed which behaved more as a Free Reed, such as that found in the Bagpipe. Some of the Shawms and Crumhorns have an ivory or wooden case perforated at one end which completely encloses the reed and forms an artificial wind-chamber into which the player blows.

Musical organisation reached its highest state at this period at the Court of Louis XIV, "Le Roi Soleil" (1642 - 1715), when some of the members of "The Grand Écurie" Band were notable instrument-makers as well as instrumentalists. The families Hotteterre, Chédeville and Philidor served French Royalty in their different generations throughout the Seventeenth and Eighteenth Centuries. Jean Baptiste Lully (1633 - 1687) drew his required wind players from the Grand Écurie and where the Hotteterres are generally credited with the introduction of the Transverse Flute into France, Michel Philidor is coupled with the name of Jean Hotteterre in originating the New Oboe. In 1671 Cambert's Opera "Pomone" seems to have been the first work in which the Oboe was specified in the orchestration.

In England, where Cambert had settled in 1672, a number of foreign musicians were employed in the great Masque of "Calisto" 1674, by John Crowne and Nicolas Staggins. These included the French oboe players James Paisible, de Bresmes, Guiton and Boutet according to H.C. de la Fontaine in "The King's Music" (Novello, London, 1909).

"Calisto" may, therefore, be the first public appearance of the true Oboe in England. In 1676 it was well enough known to be the subject of a topical jest in Etheredge's "Man of Mode" and in 1678 was adopted in the British Army. Purcell first used it in 1681 in the score of his "Swifter Isis" and thereafter used it regularly in his larger works from 1690 until his death in 1695.

Fig. 72.

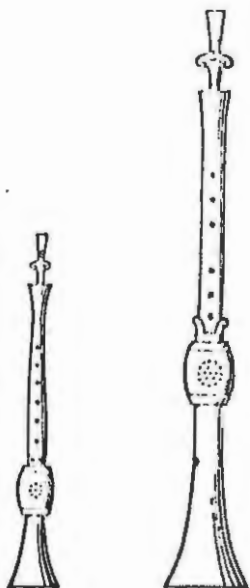


16TH- AND 17TH-CENTURY DOUBLE-REED INSTRUMENTS

- | | |
|--|--|
| 1. Tenor Pommer. <i>Anon.</i> | } 16th century. <i>Brussels Conservatoire Collection</i> |
| 2. Discant Schalmey. <i>Anon.</i> | |
| 3. Deutsche Schalmey. <i>R. Haka, Amsterdam. Later 17th century</i> | } <i>Gemeente Museum, The Hague</i> |
| 4. Oboe. <i>C. Rijkel, Amsterdam. c. 1695</i> | |
| 5. Oboe. <i>I. C. Denner, Nürnberg. pre-1700</i> | |
| 6. Oboe. <i>T. Stanesby senior, London. pre-1700. F. G. Rendall Collection</i> | |

Nos. 1 and 2 reproduced to $\frac{1}{2}$ scale of the other instruments.

From P. Bate - "The Oboe".



Shawms with Pirouettes.

From Adam Carse -

"Musical Wind Instruments".

The first known printed tutor in London was "The Sprightly Companion" of 1695. Jacques Hotteterre "Le Romain", in his "Principes de la Flûte Traversière", Paris (1707 and 1710) includes a supplement to the main text with instructions for fingering and playing the Oboe.

From this period until early in the Nineteenth Century the Oboe had only two keys. Six finger-holes provide the primary scale of D major and a closed key for D sharp is operated by the left or right little finger. (The earliest Eighteenth Century Oboes had a duplicate key for D sharp to be played by either left or right hand as desired by the player). A swallow-tail key for the low C also allowed this choice of left or right hand and persisted in the design of the Oboe long after the duplicate D sharp key was abandoned. Two "tuning holes" were made in the lower part of the bell. Experiments show that if these are closed, the note sounded through the bell is b natural.

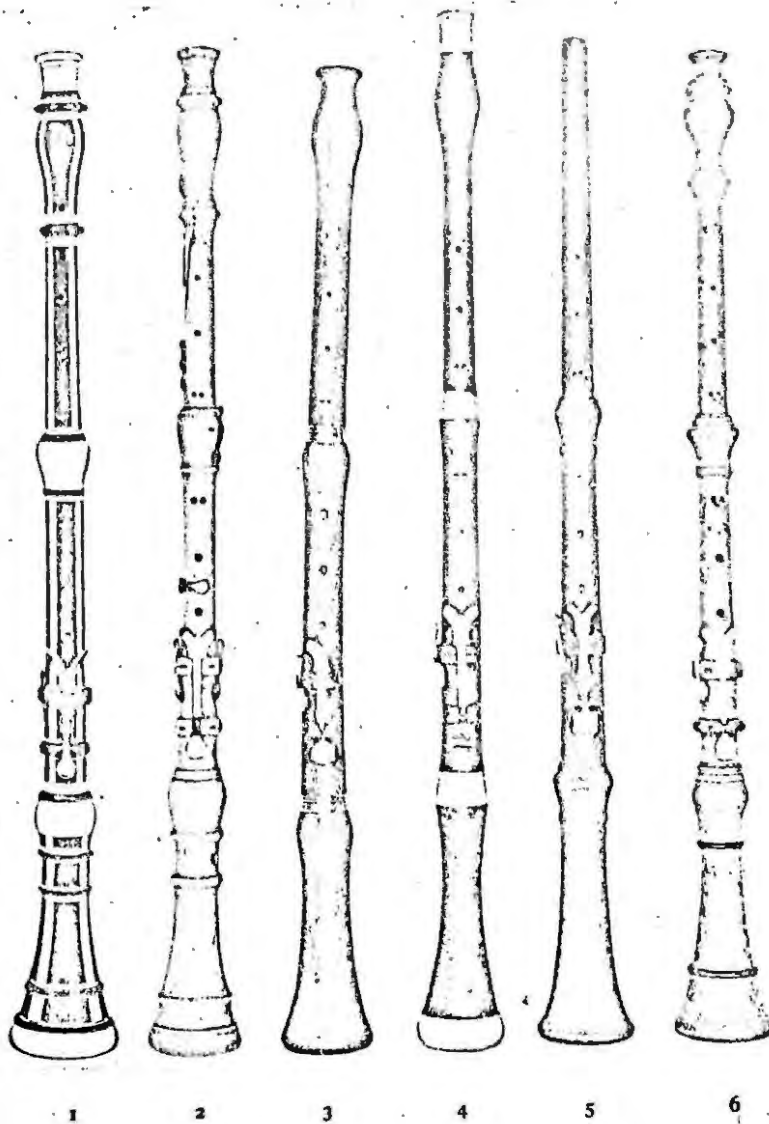
The instrument underwent no important change during the whole of the Eighteenth Century and this is the Oboe known to Bach, Handel, Haydn, Mozart and even to the young Beethoven.

The development of the Flute, when keys were added for certain bad notes (F, G sharp and B flat) led to the addition of chromatic keys to the Oboe. Two prominent German makers, C.A. Grenser and Grundmann (both of Dresden) did much experimental work, including the introduction of the Octave-key but the keys found on Grundmann's Oboes of 1791, 1793 and 1797 (Berlin Hochschule and Hamburg Collections) were not adopted for a considerable time.

During the first quarter of the Nineteenth Century, six additional keys to the octave key began to appear:

1. Closed g sharp key for left little finger, supplementing but not replacing the doubled hole No. 3 which survived until 1865.

Fig. 73.

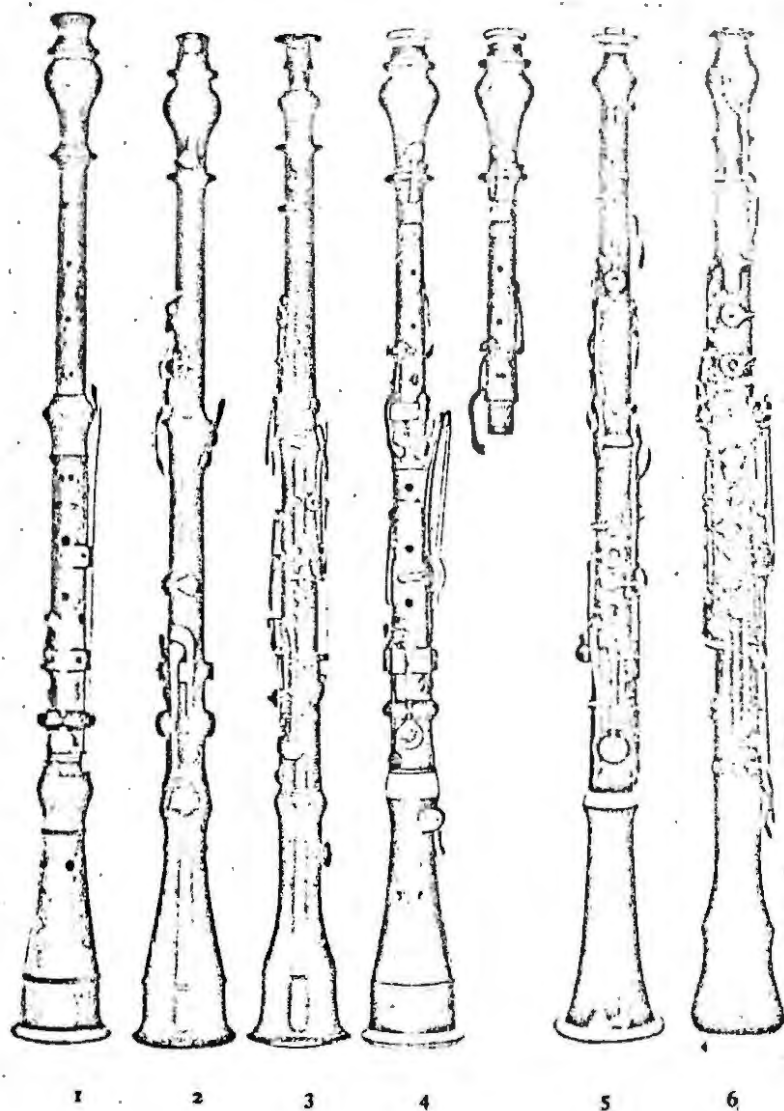


18TH-CENTURY OBOES

1. Dark wood (ebony?) inlaid with ivory. Silver keys. *French? Early 18th century. Edgar Brackenbury Collection*
2. Ivory, silver keys. (Several later additions.) *Debey, Paris? c. 1730*
3. Stained pear? wood, silver keys. *T. Stanesby junior, London. pre-1754*
4. Boxwood, ivory mounts, silver keys. *T. Lot, Paris. c. 1775*
5. Stained boxwood, brass keys. *W. Milhouse, Newark. pre-1789*
6. Boxwood, silver keys. *T. Collier, London. c. 1780*

From P. Bate - "The Oboe".

Fig. 74.

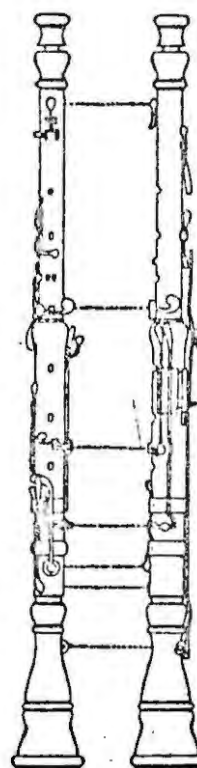


19TH-CENTURY OBOES. A

1. Boxwood, silver keys. *Milhouse, London. c. 1820*
2. Rosewood, silver mounts and keys. *Wylde, London. c. 1830.*
3. Ebony, German silver mounts and keys. *S. Koch, Vienna. c. 1825.* ('Sellner's 13-keyed oboe' shown with the tuning slide extended.)
4. Boxwood, ivory mounts, silver keys. *Bormann, Dresden. c. 1840.* (Shown with supplementary tuning joint)
5. Rosewood, ivory mounts, German silver keys. *A. Morton, London. c. 1860. E. Brackenbury Collection*
6. Blackwood, German silver mounts and keys. *Zuleger, Vienna. Late 19th century*

Nos. 2-6 show the development of German characteristics during the century.

Fig. 75.



Sellner's 13-key Oboe, from his Tutor of 1825.

2. Vent-key for right little finger, covering a hole midway between Nos. 4 and 5 which greatly improved f sharp. This key is also found on some contemporary clarinets but was superseded in 1840 by the now universal open-standing key controlled by two rings known as the "Brille" (spectacles) probably borrowed from Boehm's flute mechanism of 1832.
3. Low C sharp for right little finger. Many ingenious arrangements for playing this note independently of the low C natural have been evolved according to various specimens in collections.
4. Closed f natural key set across the lower joint as in the Simple-System flute.
5. Closed b flat on the upper joint for either left thumb or right forefinger (later by both as alternatives).
6. Closed upper c natural for either right forefinger or left ring finger. Both arrangements are found on Oboes made as late as 1850.

Finally, between 1800 - 1825 a long key was developed to cover a hole in the bell formerly occupied by the "Tuning Holes". This now added low b natural to the compass.

Thus, the up-to-date Oboe of Beethoven's latter years would have fifteen note-holes and one octave-key. Ten of the holes, controlled by keys, make the instrument fully chromatic from low b natural without recourse to forked fingerings.

The most advanced oboe of this period is probably that designed by Josef Sellner of Vienna (Fig. 75) who had played under Weber in Prague (1811-1817). Sellner added extra levers to b flat, f natural and d sharp keys and evolved "Sellner's Thirteen-Keyed Oboe" for which he published a tutor in 1825. Made by Stephan Koch of Vienna, this instrument served as a model for other makers

in Austria and Germany and much was done to develop the Oboe along the fifteen or sixteen note-holes in the Koch-Sellner model and these principles remain virtually unchanged in the present-day instruments in use in Germany and Austria.

(After Adam Carse - "Musical Wind Instruments", Section XI.)

CHAPTER XIXTHE OBOE : FRENCH DEVELOPMENTS

The French Oboe began an independent existence in the second decade of the Nineteenth Century. There is a suggestion that the Oboe's tendency to develop along national lines may already be apparent in the Eighteenth Century. On the one hand, the French were cultivating a refined and sensitive tone, while the German taste favoured warmth and robustness.

By 1820 two different ideals of Oboe Tone were being pursued in Europe and two corresponding types of instruments developed. In the French Oboe, the upper bore began to get appreciably narrower. Within twenty-five years, the French instrument had lost all the original exterior characteristics, whereas the German instrument retains many of these even at the present time.

France, at this time, was a large country with State Academies of Arts and Sciences - inherited in some cases from pre-Revolutionary times and preserved by successive governments. The German-speaking part of Europe had, until 1871, remained a conglomeration of independent sovereign states, in which patronage of the Arts depended mainly on the tastes of individual rulers. The effect of such a system on the development of music was very marked. The Paris Conservatoire was founded in 1793 and became the centre for advanced teaching where the most promising talent was attracted from all over the country. Centralisation became fully established and makers concentrated on one type of instrument. Competition and standards were very high for the average musician and this had obvious advantages for the musical manufacturer.

(Adam Carse, "The Orchestra from Beethoven to Berlioz", Chapter 4).

There has always been a Chair of Oboe-playing at Paris

Conservatoire and this has, in the course of time, been influential throughout Europe and beyond. The first two Professors, Sallantin and his pupil, Vogt (his successor from 1813 to 1853), favoured the old two-keyed instrument with the addition of only low b natural and F sharp keys.

Vogt argues against multiplicity of keys on the grounds that they are liable to leakage (m.s.s. "Méthode" c.1813). Younger players were more aware of the advantage of additional keys and Vogt's pupil, Henri Brod (1799 - 1839), was one of these. His probable association with the maker, Guillaume Triébert, led him in 1835 to set up as a maker and he remained in business until his death in 1839. He used pillar mounts instead of blocks or saddles to hold the keywork and adopted shallow metal cups for the key-pads. In his Tutor, Brod claims to have invented the "half-hole" plate for the Left forefinger and this mechanism exists on most Oboes of today.

Brod's other inventions, an improved Oboe, a new straight-bodied Cor-Anglais with a small curved crook, a Baritone Oboe and a set of reed-making tools, were shown in the Paris Exposition of 1839 and received high praise but Brod died before the results of the Jury could be published. Brod probably contributed more to the development of the Oboe in France than any of his immediate contemporaries and, as is often the case with many pioneers, the originality of some of his work has been later called in question.

Fétis in 1855 specifically mentions the half-hole plate as the invention of Frédéric Triébert. The Triébert family and their work brought the Oboe to its highest perfection. Guillaume Triébert was German by birth but moved to Paris while still young. Originally a cabinet-maker, he entered the workshop of Winnen the Flute-maker and his formative years were spent entirely under French influence. He opened his own business in 1810 which he directed

until his death in 1848. His sons, Charles-Louis and Frédéric, continued the business for another thirty years. Charles-Louis (1810 - 1876) was a virtuoso Oboe-player but Frédéric (1813 - 1878) gave up playing in order to devote his time to research and manufacture. On his death the Triébert business passed to Gautrot whose fine workman, François Lorée, set up his own business on Gautrot's death. Lorée's son brought the French Oboe to final perfection and his fine instruments are still sought by players of the present day.

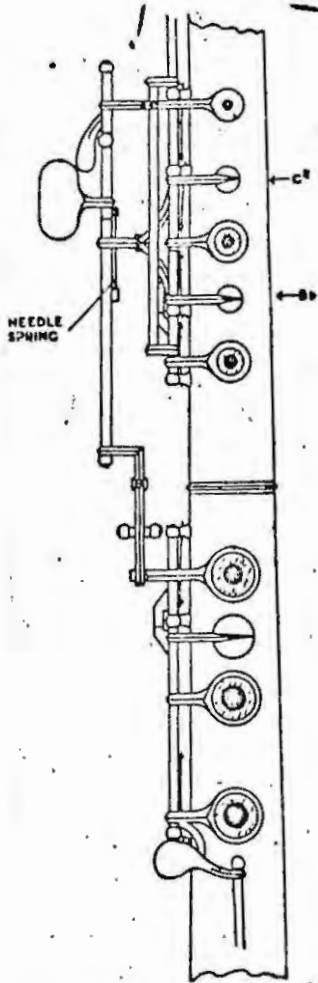
An early Triébert Oboe of around 1840 (Système 3), still retains the incurved exterior at the extreme end of the bell but all the bulges and undulations on the outside of the tube have been smoothed away.

All the keys are mounted on pillars and tempered needle-springs regulate those which are attached to rod-axles. The Right little-finger keys each work on a separate lever and the finger-holes for Right second and third fingers are provided with ring-keys attached to the same rod-axle as the small F sharp key. The cross F natural and note-hole for Right first finger remain unaltered. The Left little-finger keys for low B and duplicate D sharp work on separate levers. The finger-plate of the upper C key overlaps the lever of the B flat key so that both holes are open when C is played with the perforated half-hole plate, a shake-key and octave-key completing the model.

This instrument forms the basic Simple System for a further series of improvements from roughly 1840 until 1880. These were:

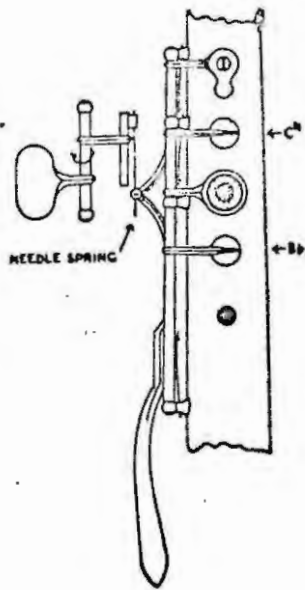
- (i) Right little finger keys were made to work on rod-axles and the now customary grouping of the three keys with the rounded C sharp in the middle. (This order of the chromatic notes E flat, C sharp and C natural in ascending order is peculiar to the present

Fig. 76.



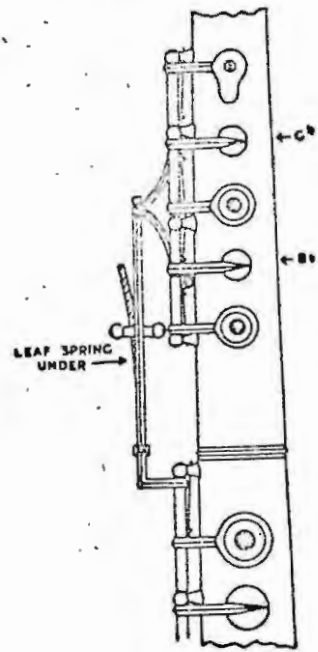
Barret's Action for B flat and C.

Fig. 77.



Triébert's Thumb-Plate

Fig. 78.



Conservatoire Action for B flat and C.

From P. Bate - "The Oboe".

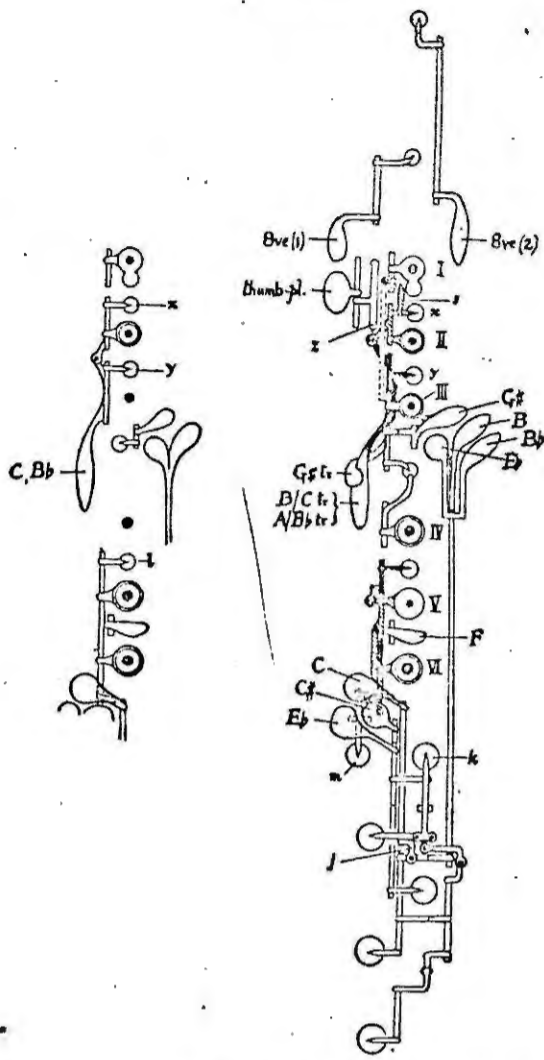
Fig. 79.



A. Typical French Oboe, c.1840.
B, C and D. Triébert's Systèmes Nos. 4, 5 and 6.

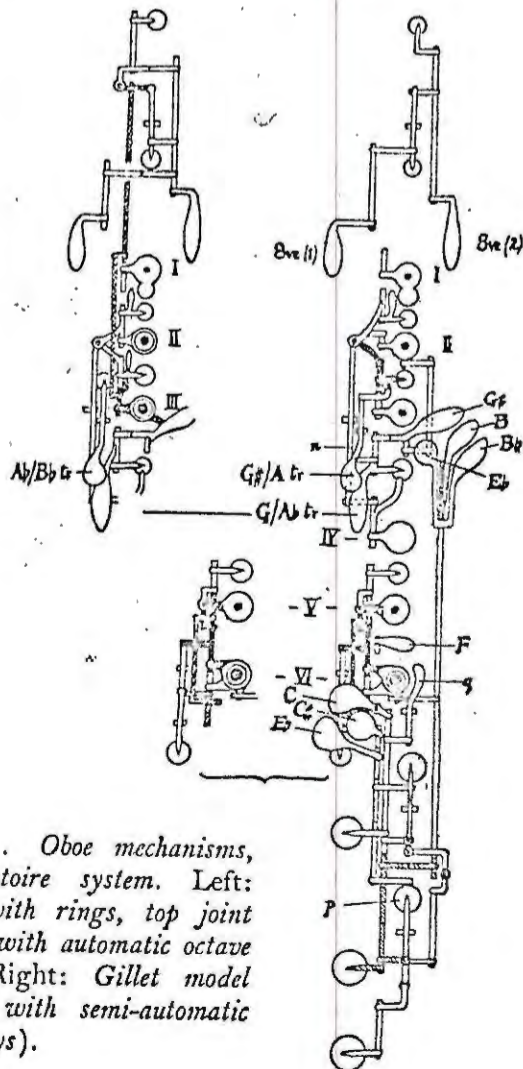
From P. Bate - "The Oboe".

Fig. 80.



Oboe mechanisms. Simple-system (left); thumb-plate system (right: shown with non-automatic octave keys).

Fig. 81.



Oboe mechanisms, Conservatoire system. Left: model with rings, top joint (shown with automatic octave keys). Right: Gillet model (shown with semi-automatic octave keys).

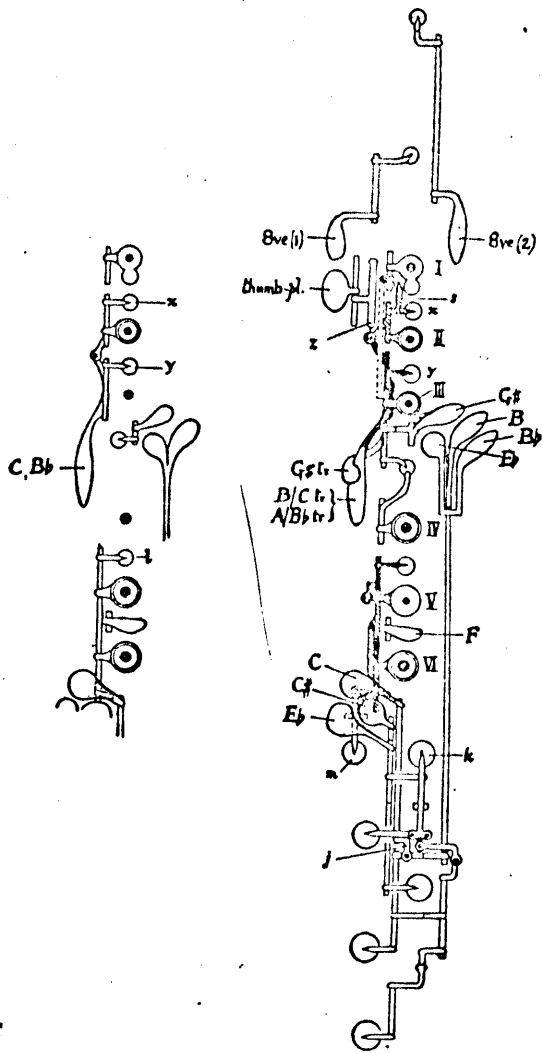
oboe systems and seems illogical to players of other woodwinds where the corresponding keys for the little-finger ascend in chromatic order).

- (ii) A shake-key for d" (and later d sharp") working on a rod-axle.
- (iii) Left little-finger keys were made to work on one rod-axle.
- (iv) A second octave-key was added for notes above a".
- (v) Upper B flat and C holes were placed in line with the other note-holes and both keys were made to work on a common rod-axle, controlled by a single finger-plate for the Right first finger.
- (vi) A thumb-plate was added for the Left thumb, duplicating the action of the Right first finger but in reverse (i.e., opening the upper B flat and C holes when released).
- (vii) The extension of the bell-joint with an additional note-hole for B flat controlled by an open key worked by the Left little finger.
- (viii) The "Conservatoire Model" (Triébert's Système No. 6, c.1880). The first, second and third fingers of the Right hand control the upper B flat and C keys. F natural and G sharp keys are duplicated in their action (Left little finger for F and Right first finger for G sharp). The second octave key works automatically.

In addition were various extra keys or levers to facilitate certain awkward or previously impossible shakes. (Adam Carse, "Musical Wind Instruments", Section XI).

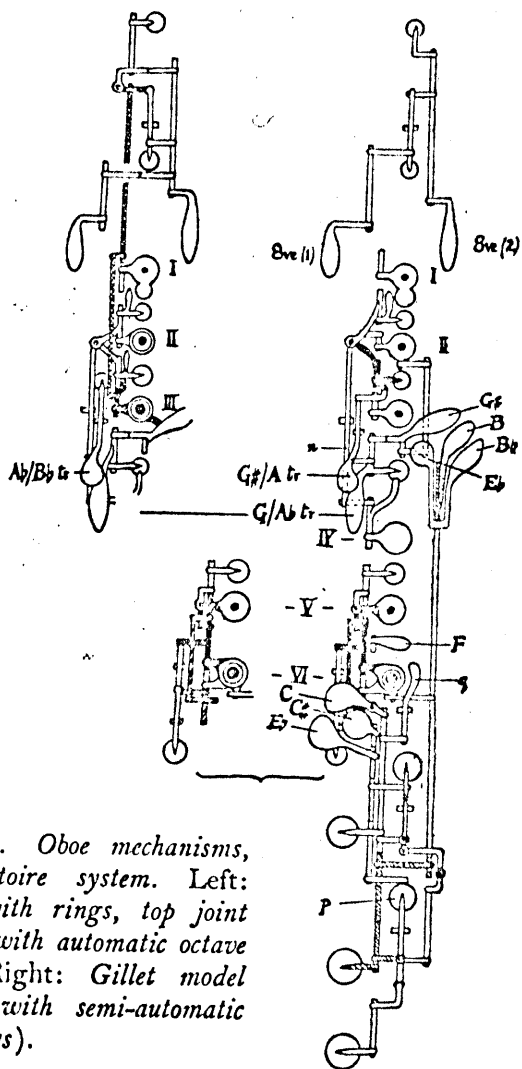
Triébert's Système 4 appeared about 1848 (the year of Guillaume Triébert's death) and was sometimes called "Système Charles Triébert" after the elder son who advocated its use in the Conservatoire. Apollon Barret (Barré), a pupil of Vogt, who was Solo Oboe at Covent Garden from 1829, adopted this system with the

Fig. 80.



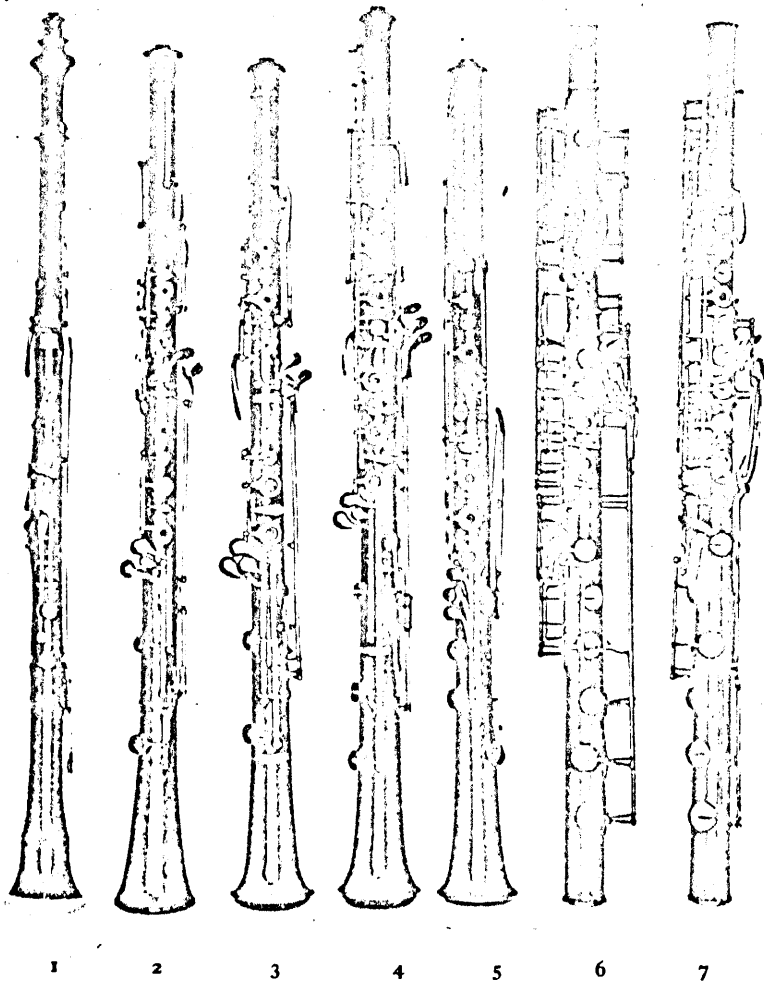
Oboe mechanisms. Simple-system (left); thumb-plate system (right: shown with non-automatic octave keys).

Fig. 81.



Oboe mechanisms, Conservatoire system. Left: model with rings, top joint (shown with automatic octave keys). Right: Gillet model (shown with semi-automatic octave keys).

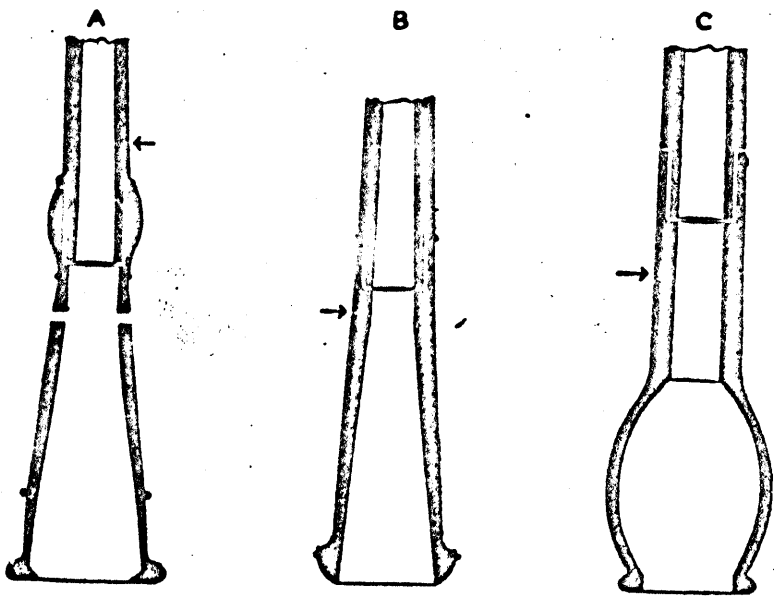
Fig. 82.



19TH-CENTURY OBOES. B

1. Violet wood?, ivory and silver mounts, silver keys. *H. Brod, Paris. pre-1839*
2. Boxwood, brass keys. *Triébert, Paris. c. 1855.* (Presumed experimental model)
3. Blackwood, German silver keys. *A. Morton and Sons, London. c. 1872.* (Military thumb-plate model)
4. Rosewood, silver mounts and keys. *Triébert, Paris. Barret's model of 1860*
5. Stained Maple wood, German silver keys. *L. A. Buffet jeune, Paris.* (Boehm system as patented by Buffet in 1844)
- 6 and 7. Cocus wood. German silver keys. *Anon.* Two Boehm system instruments to low *A*₄ associated with A. J. Lavigne's later experiments. Late 19th century

Fig. 83.



Three Characteristic Oboe Bells in Section.

- A. Late 18th Century Type with Tuning Holes.
- B. Modern French Type.
- C. Cor Anglais. *Triébert, c.1880.*

The arrows indicate the position of the lowest note-hole in each case.

low B flat key and based his celebrated Tutor, published in 1850, on this model. It has a ring for the Left-hand second finger associated with a duplicate hole for a "forked" C and also a special key for c - d trill which had been impossible on "Système 3". In addition, the long keys for the Left little finger were replaced by a single axle with a Double or Butterfly Touch working both ways; one closing the low b natural, while the other opened the d sharp. This connection called for extreme nicety of construction and exists in nearly all modern oboes (Fig. 79, B, C and D).

Système A4 followed the general lines of this system but had, in addition, a perforated plate and pad instead of the open ring for the middle finger of the Right hand. This greatly improved the d in the third octave and is now part of the routine equipment on all French-style oboes. This particular model (Système A4) is still extensively used in Military Service, where robustness and simplicity of design are highly desirable.

In spite of the enormous advantages given by all these designs, there still remained one marked disability - the awkward movement of the Right hand between b flat and c natural in the middle and upper registers to the holes of the lower joint. This was brilliantly overcome by the design of Oboe Système 5.

In this Triébert Model, the holes for b flat and c natural were transferred from the side to the front of the tube and each was provided with a small cross-key, each being independently pivoted on the same axle. Attached to the c natural key is a ring surrounding the b natural hole and to the b flat key a touchpiece for the Right forefinger. These keys are lightly sprung to stand open and their tails are bent so that they overlap and the c is on top of the b flat. Both key-tails together engage with one end of a stronger needle-spring clamped at the other end to an extension of a pivoted plate placed under the Left thumb.

When the Oboe is held in the normal manner, the pressure of the thumb transmitted by the plate and associated spring holds the keys closed against the bias of their own springs but a pressure of the Right forefinger, sufficient to overcome the plate-spring, allows one or both keys to fly open depending on whether or not the Left middle finger is holding down the ring. Thus the notes b flat and c natural can be made either by the orthodox fingering or by a simple release of the Left thumb in passages where the Right hand is not readily available.

At first sight this action would appear to be delicate and difficult to adjust but, in practice, as constructed by good craftsmen, it seems quite satisfactory. It is in fact used today by many leading professional players who cannot afford to risk anything that may be liable to sudden failure. A minor but distinct advantage is also gained by the transfer of the covered holes to a part of the tube which is usually more free of condensed moisture (Fig. 77).

This mechanism is nowadays frequently called the "Barret Action" but this term might better be applied to Barret's special key system which he designed around 1860, almost at the same time as Triébert's Système 5 appeared (Fig. 76). Barret and F. Triébert had been associated for a long time but there appears to be no evidence that Barret was concerned in devising the first thumb-plate and open b flat and c natural keys. The elements of this arrangement are described in Triébert's patent of 1849 together with mention of the perforated plate for the third octave d. Barret's name does appear in some of Triébert's later patents.

The English firm of Alfred Merton and Sons (1872 - 1883) used similar mechanical principles but later adopted the standard French mechanism.

Barret's Improvements:

Before Triébert's final model, an important instrument

which Triébert made in the 1860s but which does not properly belong to the main stream of Triébert's work, was the Full Barret System Oboe.

Apollon Mario-Rose Barret was a virtuoso performer and a great teacher. He began with the simple Oboe advocated by his teacher, Vogt, and advanced to increasingly complex instruments. In 1837 he possessed one of Brod's Oboes with ten or eleven keys, while his "Méthode Complet" of 1850 shows an increase to fourteen keys. Within twelve years his experiments had progressed to such an extent that the Second Edition (1862) shows what was virtually a new instrument.

F. Triébert was consulted on the matter of practical construction and, although he did not altogether approve of some of the details, his firm undertook to manufacture the instrument.

The main features of the Barret Oboe are --

- (i) The two octave-keys were both arranged to open when released by a movement of the Left thumb, the selection of either being governed by a ring for the third finger, Left hand. This automatic change-over of octave keys in passing from g sharp to a in the second register eased slurring to a great extent. A duplicate touchpiece occupied the position of the formerly independent second octave-key.
- (ii) Barret seems to have objected to the "half-hole" on c sharp which is an essential feature of all modern oboe systems. In the Second Edition, Barret's method shows a pierced plate covering the hole and apparently linked to a small extra touchpiece for the Left thumb, as well as to the ring governing the automatic octaves. By this device the half-hole also operated automatically for all normal fingerings without any shifting of the Left

forefinger. The thumb could take over in exceptional circumstances but the main purpose of the extra thumb-touch appears to have been to counteract the automatic change-over of the octave keys when fingering top f.

- (iii) The most important feature is probably the arrangement used to control the upper b flat and c natural keys. Like Triébert's model of 1849, these were sprung open and were closed by a thumb-plate but the counter-pressure which released them was not applied by a side touchpiece. Instead, any finger of the Right hand served for this by simply dropping into its normal position (Fig. 76).
- (iv) The position at the side of the upper joint formerly occupied by the C natural key was now taken up by a duplicate touchpiece for G sharp and a ring given the Right forefinger, thus giving an easy trill on f sharp - g sharp. The "Articulated G Sharp" as this action is called, is in constant use at the present time on modern oboes, clarinets and saxophones.
- (v) Various other trills were obtained throughout the compass of the instrument by the addition of duplicate touches.

Triébert's last phase and his successors.

Many players of the 1870s disliked the use of the left thumb to close b flat and c natural keys and Triébert designed a similar device to Barret's but with the difference that the Right forefinger was used to operate these keys instead of the thumb-plate (Fig. 78).

A secondary advantage for this mechanism is claimed by some players in closing the g natural hole every time it is used,

which has the effect of steadying both b flat and c natural. Plus the articulated g sharp key, with alternative touches, the low b flat key and an improved form of Automatic Octaves patented in 1872, these were the principal features of Triébert's Système 6 at the time of his death.

The Elder Lorée continued to experiment and considerable influence on his work was exercised by Georges Gillet (Professor at Paris Conservatoire). Système A6, known as the "Gillet System", allowed any of the three fingers of the Right hand to operate the b flat - c natural mechanism. This system was adopted by the Paris Conservatoire in 1882 (Fig. 81). Lorée also produced a Conservatoire Oboe with perforated cover-plates to the finger-holes in place of rings and this, now generally known as the "Gillet Model" (Fig. 81) was finally perfected by Lorée's son in 1906. Many outstanding players favour this model which first figured in the Lorée Catalogue as "No. 6 Bis" and is nowadays listed as standard by many good makers.

A few defects still remained at the end of the Triébert period in the scale of the Oboe. Most of these have since been remedied. The f natural produced by "forked" fingering is often appreciably flat which is due to the slight re-positioning of Hole No. 5. In 1907 M. Bonnet succeeded in designing a mechanism which would open only for the forked f natural and not when the middle finger was raised for any other purpose.

Surveying the progress of the French Oboe between 1820 and 1910 the story appears to be one of ever-increasing mechanical complication but this is really only part of the truth, since tone has always been regarded as of first importance. The bore has required adjustment for almost every piece of mechanism which has been added. At the present time this most vital part of the

instrument conforms generally to the proportions adopted by the best opinions of over half a century ago, but in its details many modifications have been made, some of them so subtle as to be revealed only by the Micrometer.

After P. Bate "The Oboe" (Ernest Benn, 1962) Ch.V.

CHAPTER XXTHE OBOE : GERMAN DEVELOPMENTS

The Sellner-Koch design of 1825 was very near to the quality of the mid-Eighteenth Century Oboe. There is little doubt that in Germany from the Earlier Classical Period onward, the Oboe has been valued quite as much for its ability to blend in an ensemble as for its qualities as an outstanding solo voice. The tube, then, of the German Oboe was to continue for a good many years without radical alteration.

The Bell remained wide and flaring with a heavy rim and a very pronounced "step" where it met the middle joint. Sometimes there was a step between upper and middle joints but usually smaller than in French instruments. These inconsistencies between the designs of individual makers might perhaps be explained by the geographical and political separation of the principal German musical centres. Well before 1900 the leading German makers were united in using a smooth bore without steps, somewhat wider than the French pattern at the upper end (about 4.4 mm, as against the average French measurement of 4.2 mm) and with a slightly less rapid expansion. The inner curve of the bell now developed smoothly out of the main cone of the bore and finally contracted abruptly by about 8 mm. at the open end.

Players remained content with the key-work as it had been left by Sellner and makers therefore concentrated on the improvement of existing mechanism.

The key for low b natural given to the Left thumb was undoubtedly disliked by many players, probably because of the sense of insecurity given by the flexibility of so long a lever and, again, since the thumb had already sufficient duties. Uhlmann, like Koch, regularly made a most elegant version of the thumb-key which was hinged to fold away when the instrument was packed in its case but other makers soon abandoned this and

transferred the key to the Left little finger.

The oldfashioned wooden blocks for the key pivots remained in favour long after they had been abandoned in France and often these were strengthened with a metal lining. When the Germans did at length adopt metal pillars, most of them did so in the best possible form, attaching them to anchor-plates screwed to the body of the tube. In 1860 Meyer of Hanover uses this excellent arrangement and by this time the f sharp with an axle and two rings for the Right hand was regularly fitted. Apart from this key, there seems to have been an abiding preference for simple levers which seems to be a strange example of conservatism in the country which actually gave birth to the key-axle.

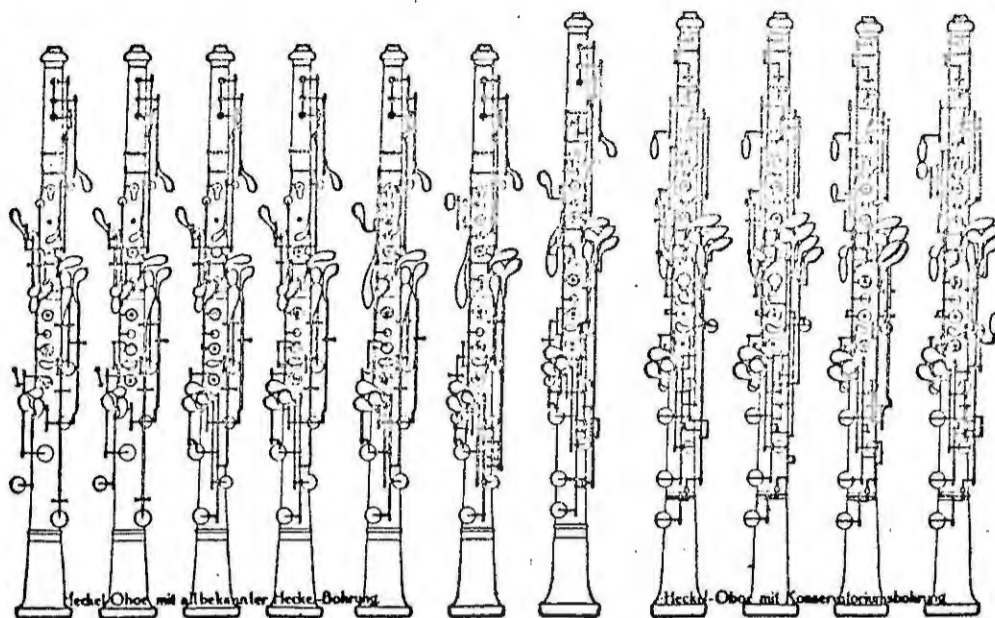
The outside of the tube was finally cleared of protruberances during the last twenty years of the Century when the key-axle came into extensive use.

The Half-Hole Plate and second octave-key were also late additions in Germany which is surprising, considering the insistence by players on good intonation.

The Koch-Sellner instrument included a tuning-slide in the original design and Uhlmann's model included a screw-adjustment for this. Other makers, apparently disliking the idea of introducing a cylindrical section in the conical bore as is necessitated by any sort of telescopic slide, provided instead sets of two or three alternative upper joints of different lengths.

Before the end of the Century, the German Oboe had become as streamlined in external appearance as the French instrument but was still heavier and more robust.

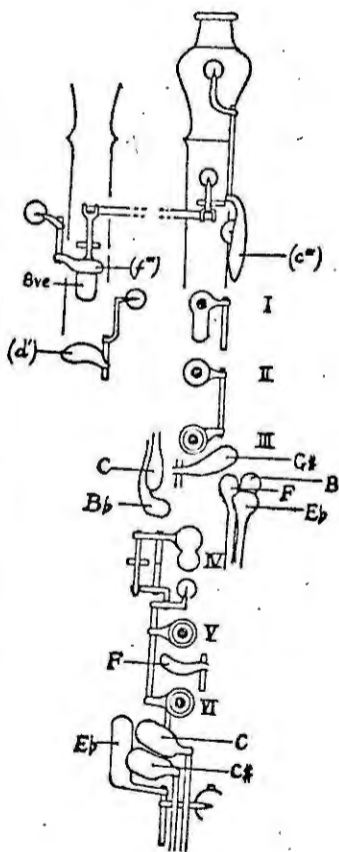
Fig. 84.



HECKEL OBOES from Catalogue, C.1935.

(P. Bate - "The Oboe").

Fig. 85.



VIENNESE OBOE (Zuleger Model).

From A. Baines

(Woodwind Instruments and their History").

CHAPTER XXITHE OBOE IN BELGIUM, ITALY AND ENGLAND.Belgian Developments.

Belgium has produced an impressive list of instrument-makers since the middle of the Fifteenth Century. Many examples of their work are to be found in public collections, the finest of which is the Musée Instrumental of the Brussels Conservatoire. The most important makers in Brussels in the period under review were Charles Joseph Sax, Charles Mahillon and his son, Victor, and Eugène Albert and his family.

Guillaume Guidé was Professor of Oboe at Brussels Conservatoire from 1865 until his death during the 1914-1918 War, having been also Director of the Théâtre Royal de la Monnaie noted internationally for the excellence of its orchestra.

Belgium has important Conservatoires of Music at Ghent, Liège and elsewhere in addition to Brussels and according to M. Bleuzet writing in 1927, these have remained independent of Paris influence regarding the Oboe, although Constant Pierre states in 1890 that the standard Belgian Oboe was based on Triébert's Système No. 5.

Belgian players and teachers have become prominent in England and America. Victor Mahillon spent some time in London advising certain prospective Oboe-makers and provided pairs of Oboi D'Amore for Sir Henry Wood's Queens Hall Orchestra. He also made two Oboi D'Amore for the Dolmetsch Concerts of Ancient Music.

The Oboe in Italy.

Between 1800 and 1850 the Italian makers Maino and Piana, both of Milan, were producing good instruments with the tendency to follow French models but there was also a distinct Austrian influence, particularly in those instruments made by Miraz of Udine. Sellner's

Tutor was issued in Italian translation when much of Italy was under Austrian rule. At the end of the Century, Constant Pierre in his account of the Paris Exposition of 1889 records that the Triébert Système No. 5 was in common use but that there were two native systems peculiar respectively to the Conservatoire of Milan and to the St. Cecilia Conservatoire of Rome. The former had thirteen keys with no rings, while the latter had fourteen or fifteen keys.

The Oboe in England.

The English Oboes of the early and mid-Nineteenth Century tended to be little more than well-made unimaginative successors to the Eighteenth Century types. As late as 1840 Oboes were being built with no more than eight or nine keys, mainly by firms whose main business was flute-making.

Barret and Lavigne were already established in London and their influence, together with that of other continental teachers, caused their pupils to seek their instruments in Paris. British firms began to import the French Oboes for sale under their own names, a practice which has continued until fairly recently.

The English-made Oboes of c.1840 tended more toward the German rather than the French pattern. The German Oboe in its fully developed form had never taken root in England, which may seem surprising in view of the extravagant admiration accorded to German music and musicians in Victorian England. The brilliance of the French Oboe Professors put their chosen instruments beyond competition in England. The geographical position too, must have had some effect since communication with France was certainly easier than with Germany, while the great French Music Industry, centralised in Paris, was better able to supply export requirements in quantity.

With two notable exceptions, British Oboe-makers in general disappeared after 1850. Alfred Morton (1827 - 1898) began

his apprenticeship in Uhlmann's workshop in Vienna, completing his indentures in 1847. He seems then to have abandoned the music trade in favour of metal-working but resumed instrument-making towards the last quarter of the Century, specialising in London as a maker of Double-Reed Instruments. The test-piece made by Morton at the end of his apprenticeship showed some slight departure from the Austrian type of Oboe but the magnificent Oboes of his later London period were virtually French Oboes, although he showed an independent mind and was far from being a mere copyist. He did not keep the proportions of the bore at typically French measurements and his key-work was frequently original in design and extremely efficient.

Morton's sons became his partners from 1872 and the reputation of the firm increased. Many Oboes and Bassoons were made for the British Army which remained in use until the Service finally discarded the "Old Philharmonic Pitch" (sometimes called "High" or "Sharp" Pitch) where $A = 452.4$ changing to the lower "Flat" Pitch in 1929. The Flat Pitch had been introduced at the Queen's Hall in 1895 and had been accepted by the Philharmonic Society in the following year. Very few Flat-Pitch instruments were made by the Mortons and the partners never seem to have got really into their stride working to the new standards and after the death of the founder in 1898, the firm gradually ceased to make instruments, although Morton's apprentice, David Howell, continued to make instruments on his own account until he too ceased to work some time before 1914.

A contemporary of Morton was John Sharpe of Pudsey, near Leeds. He was an instrumentalist and choir-singer, renowned as a "character" and his fame might have remained purely local except for the fortunate circumstance that he was active at a time when orchestral music in the North of England had achieved International importance and could attract notable players away from London and

send Northern players Southwards in exchange. Thus a number of Sharpe's instruments found their way into London orchestras. Dr. Turpin, in the "Musical Standard" (August 20th, 1881) says:

"Some important improvements have lately been made in the construction of the Oboe by Mr. Sharp(sic) of Rudgey, near Leeds. These not only give facilities for the better and more ready production of middle A flat and B flat by self-acting keys and levers, but secure by its new key arrangements (five in all being added) a better and more equal intonation throughout the compass of the instrument".

Sharpe's later Oboes combined a Boehm-system lower joint with moderate-sized holes and a modified Barret-type upper joint. Although there is much to recommend this idea Sharpe, in uniting the two systems, incorporated certain automatic vent-keys of his own devising which required small "floating" levers to reverse the motion. Surviving examples show that they did not stand up to use and were not reliable mechanically. This is probably the reason that an otherwise excellent instrument was ultimately abandoned by British players. One of the last notable players to use the instrument was the late W.H. Shepley who was formerly a Professor at Trinity College of Music in London.

CHAPTER XXIITHE BOEHM OBOE AND THE "GIORGI-SCHAFFNER" OBOE.The Boehm Oboe.

Louis Auguste Buffet, who was active from 1831 - 1867, is chiefly distinguished for his work on the Boehm Clarinet. His contribution to the oboe was mainly in the application of the Boehm system mechanism.

Once the initial prejudice of Flute-players against Boehm's mechanism had been overcome, the underlying principles of his patent of 1832 found a rapidly growing appreciation and before 1840 several workers were seeking to apply them more or less completely to other instruments.

Buffet, in working on the designs of Victor Cöche for a modified Boehm Flute, acquired much skill and experience in making and fitting ring keys. Christopher Welch tells us that Boehm actually supplied a boring bit and dimensions for the holes of an Oboe to be constructed on his system.

The first instruments were enthusiastically taken up by A.J. Lavigne, a celebrated player resident in London from 1841 and by the Paris Oboist J. Soler. According to Constant Pierre, Soler was also concerned in the actual production of the instrument. The new Oboe was considered rather unorthodox. Boehm's ideas on free tone production required much larger holes than was customary at that time and these, together with the rather wide bore he favoured (4.35 mm at the top, compared with 4.2 mm as used by Bred and later by Triébert) resulted in a tone-quality which must have been very different from that generally circulated in France.

Lavigne carried these features even further and Buffet records that he insisted on having the holes of his own instrument made much larger than recommended. He therefore achieved a tremendously powerful tone of a quality which was by no means universally approved, although all agreed that his execution with

the new key-work was amazing. Lavigne remained a staunch champion of the Buffet-Boehm Oboe and continued to experiment and to remodel it until his death.

Two instruments survive which were found in General Dealers' shops, one in London and one in Northern England and are thought to be representative of the late developments of Lavigne's work. One of Lavigne's experimental tubes in possession of Messrs. Boosey and Hawkes at Edgware, London, corresponds closely in almost every detail to the more complex one. Both have plain cone bores without any suggestion of a bell and both descend to the low a below the treble stave. The instruments appear ungainly and are heavy in the hand but the unusually high pillars allow the key levers to be more finely balanced and they give remarkable facility in execution. In both cases the tone is very powerful. Nothing is known of their history, although the more complex one has been recognised by Mr. Montague George (late Manager of Messrs. Rudall Carte, 23, Berners Street, London) who recalled that during his apprenticeship this instrument was a frequent visitor for repairs in his workshop, where it was affectionately known as "Old Spider-Keys" (Fig. 82, 6 and 7).

The large and "open" tone of the Boehm Oboe was not generally acceptable in orchestral circles but for military music the instrument seemed, at one time, to have a considerable future.

The firm of Millereau described it in their Catalogue of 1874 as adopted by the Commission des Musiques de l'Armée, "being very loud in tone". It is some time since it has been abandoned by the French Army in favour of the normal Oboe.

There is still a vogue for the Boehm Oboe in Spain dating from the 1870s and the well-known Madrid player, E. Marzo, wrote a Tutor for it.

F. Triébert devoted some attention the Boehm Oboe but according to Bleuzet he found it defective alike in tuning

and tone. Triébert attempted to reduce the size of the bore and to bring the fingering more into line with established practice but in both objects he was running contrary to the nature of the instrument as conceived by Boehm and in neither did he achieve much success.

A few military-style oboes were sold by the London Flutemaker, Wallis, and show an interesting feature which may have been an attempt to ameliorate the tone. These, which are of good-class French manufacture, have a normal bore as far as the lowest finger-hole and below this the expansion is greatly reduced. The opening of the bell is so small as barely to admit the little finger. Whether or not this affected the tone is difficult to judge but it undoubtedly resulted in flattening the pitch since the total length of the tube is nearly 2 cm less than the regulation Military Oboe of the same date and to the same pitch standard.

In 1880 Lorée began to make a normal Oboe with key-work adapted to Boehm Fingering and other makers have since followed suit. Most leading makers today list such instruments but their use is mainly confined to players whose work obliges them to change rapidly between either Flute and Oboe or Saxophone and Oboe. The latest development in this direction is the Saxophone-fingered Oboe, on which all the holes are covered by finger-plates and all keys are made to resemble those of the Saxophone as far as possible.

After P. Bate, "The Oboe", Ch.V.

The "Giorgi-Schaffner" Oboe.

Devised by Giorgi and Schaffner in 1881 and patented in Paris in 1882, this instrument is interesting from the point of view of its theoretical construction.

Proceeding on lines similar to Boehm's of forty years

earlier, the inventors began by taking Flute, Oboe and Clarinet tubes of theoretical length which were measured off for each note required, according to the laws of physics, and at the divisions they placed a series of rectangular holes of graduated size and equipped each hole with an appropriate cover and pad which worked on a complicated system of rods and cranks. The fingering of all three instruments was intended to be identical. The idea came too late to compete with other established systems. Moreover, Schaffner's principle of virtually cutting off a theoretical tube-length for every note of the Fundamental Register is completely contrary to the use of small holes in relation to the bore of the Oboe which is the very essence of its accepted tone.

The only surviving specimens exist in collections where nowadays they remain as curiosities and monuments to a very considerable ingenuity.

Ref. P. Bate, "The Oboe", Ch.VII.

CHAPTER XXIIITHE OBOE OF THE PRESENT DAY

The arrival of the Conservatoire Oboe in 1880 was felt by many musicians to be the final state of perfection but within a very few years certain imperfections or minor failings which had formerly been disregarded were now emphasised against the otherwise general perfection of the instrument. M. Bonnet's forked f mechanism of 1907 has already been mentioned and by 1910 the remaining problems had been attacked singly and nearly all were adequately solved.

At that time the Oboist had four different and satisfactory oboe systems from which to choose, according to his tastes and circumstances. Both forms of the French instrument, "Thumb-Plate" or "Conservatoire" had reached a high degree of efficiency and both had their confirmed supporters among professional players.

The German model, although by then fitted with automatic octave-keys, still remained less highly mechanised than the others and many players found a virtue in its simplicity. Finally, for those to whom its special fingering was advantageous, the Boehm Oboe had been greatly improved.

Much work has been done during the last forty years and some too recently for an evaluation to be given.

In the present century the French Oboe has progressed along two different lines: first, towards a more powerful tone and, second, towards still greater mechanical facility.

The later instruments by A. Lorée, while lacking nothing in refinement or intonation, were rather "reticent" in the lower register and several makers have sought to improve this matter by re-designing the tube. The latest Oboes tend to show a slightly larger bore with fewer deviations from the true cone. The step in the middle joint on many Lorée Oboes has been abolished and the upper joint is being made with slightly thicker

walls. The tube has been made rather longer than is absolutely necessary to produce the low b flat which is now brought into tune by a small automatic vent-key on the side of the bell. The purpose of the extra length is to steady the upper notes and render them easier to attack. (This effect was at first widely noticed with the introduction of the low b flat on Triébert Système 6).

The addition of a third octave-key also assists the production of extreme high notes. The entire instrument, while retaining its general character, is rapidly becoming adapted to a more robust style of playing.

There have recently been a number of ingenious attempts to combine all the facilities of both major key-systems which has resulted in heavy and complicated mechanisms which are really not much in advance of Barret's last design. Notable among these are the "Brussels Conservatoire" and the "Full Barret Conservatoire" which are produced in England. Many leading players object to such intricate keywork, on the grounds that it may be wiser to become familiar with one of the basic systems and to adopt only those extra keys which one finds the most constant help.

Some notable players have devised their own systems; in particular, Charles Reynolds who transferred certain shake-keys to the opposite side of the body from normal, and Stephen Whittaker, who sacrificed the vent-key for forked f natural in favour of a mechanism which provided a very convenient e flat - f natural passage which eased rapid playing in flat and extreme sharp keys.

Automatic octaves are not popular among professional players in Britain and many use the "Semi-Automatic" octave mechanism which allows the thumb to remain on the touch of the first octave-key while the second is operated as usual by the left forefinger from g sharp upwards.

The style and make of instruments favoured by leading

teachers have naturally been adopted by their pupils. The influence of Fernand Gillet has been profound in America and the covered-hole Lorée model is probably the most popular. An American maker following this lead is Laubin of Scarsdale, N.J. On the Western side around Los Angeles there is a marked preference for Cabart Oboes with Single Octave-Touch, due to the widespread influence of de Buescher (a celebrated London player at the beginning of the century). Other notable American makers are A. Lynn and Gordet.

In London in the early 1900s, few Oboes were made completely. Part-finished Oboes were imported from France and Belgium and London dealers marked and sold these instruments, often of second-rate quality, for many years until between the Wars there occurred a revival of London oboe-making when the celebrated clarinettist, Charles Draper, directed the small Chelsea firm of Louis which made excellent instruments on the Lorée model. Another London firm, T.W. Howarth & Company, are also producing many fine Oboes.

In Paris, the small firms of Marignaux, Rigoutat and Robert have each established a world-wide reputation.

In Germany a marked change of front occurred in 1904, when Richard Strauss published his enlarged version of Berlioz' "Orchestration" in which he compared the German style of Oboe-playing unfavourably with the French style. This undoubtedly had a great influence and German makers began to turn their attention to French models. Today the well-known German makers such as Adler, Mollenhauer and Heckel supply excellent "Conservatoire" or "Thumb-Plate" models of their own manufacture. The late W.H. Heckel met the changing conditions very cleverly in 1935 by designing a number of different oboes, combining French and German characteristics in varying degree. His Catalogue illustrates no fewer than eleven types ranging from the simple Vienna instrument to the fullest French models (Fig. 84).

The last stronghold of the simple Austrian Oboe is Vienna,

the City of its birth. The leading players there, notably of the Philharmonic Orchestra, remain faithful to a fifteen-keyed instrument not much in advance of Sellner's Model. The main additions are a "Brille" for the Right hand f sharp, the second octave-key and the "half-hole" plate. Sometimes this plate is duplicated by an entirely independent key and the octaves are linked to operate automatically.

Finally, a "helping-key" for the note f^{'''} is sometimes added which corresponds roughly to the third octave-key found on the most recent French instruments. Heckel has perfected an arrangement by which the three octave-speakers operate automatically on only one touchpiece. This arrangement does not yet appear to have been attempted by any French maker.

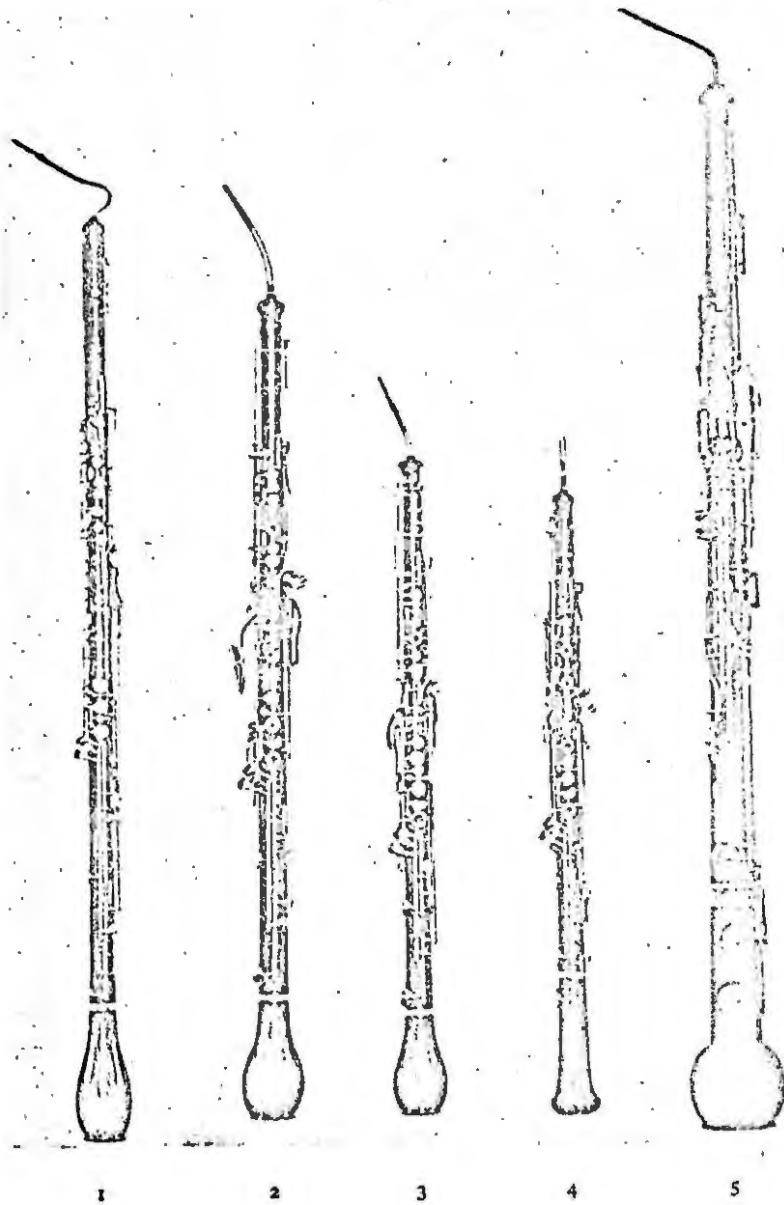
Until recently the most favoured Vienna-model Oboe was made by Hermann Zuleger (Fig. 89). He provided the thick inner rim and tuning-holes in the bell, together with the pronounced "step" at the bell-joint. Most Vienna players hold that these features contribute much to the special quality of tone they cultivate. Zuleger retained the heavy Eighteenth Century baluster or bulge at the top of the upper joint on the theory that a large mass of wood at this point makes the tube less susceptible to changes of temperature and consequently less liable to collect condensed moisture in this most sensitive region of the Oboe.

In October, 1953, it was reported that in Vienna instrument-making on the whole was in sad decline and only three makers remained - H. Zuleger's widow, Franz Koktan and Josef Strecher.

References: A. Baines, "Woodwind Instruments and their History",

P. Bate, "The Oboe", Ch. VI.

Fig. 86.



THE OBOES OF THE MODERN ORCHESTRA

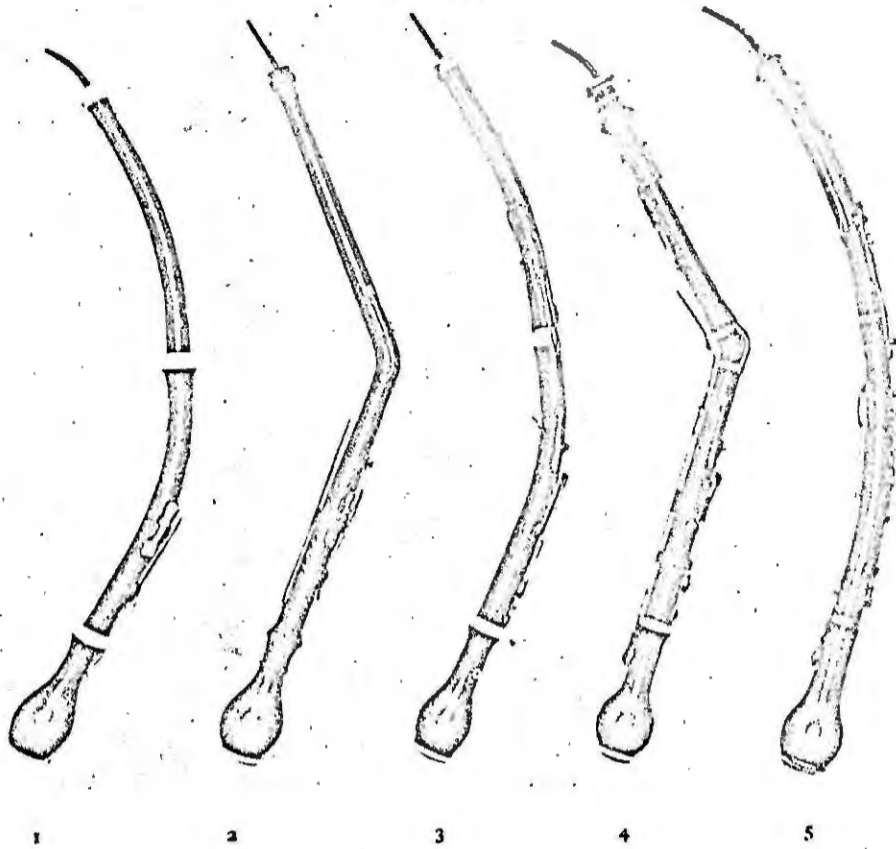
1. Bass (Baritone) in C. *Cabart, Paris*
2. Cor Anglais in F. *Lorée, Paris*
3. Oboe d'amore in A. *Louis, London*
4. Soprano in C. *Lorée, Paris*
5. Heckelphone in C. *Heckel, Biebrich a/Rh*

The four oboes are all of the 'Brussels Conservatoire model. No. 1 has only the essential keywork of the type, the others are fitted with additional trill-keys.

For convenience Nos. 1 and 5 are reproduced to $\frac{2}{3}$ th the scale of the others. *Photograph by courtesy of E. O. Pogson, Esq.*

(From P. Bate - "The Oboe").

Fig. 87.

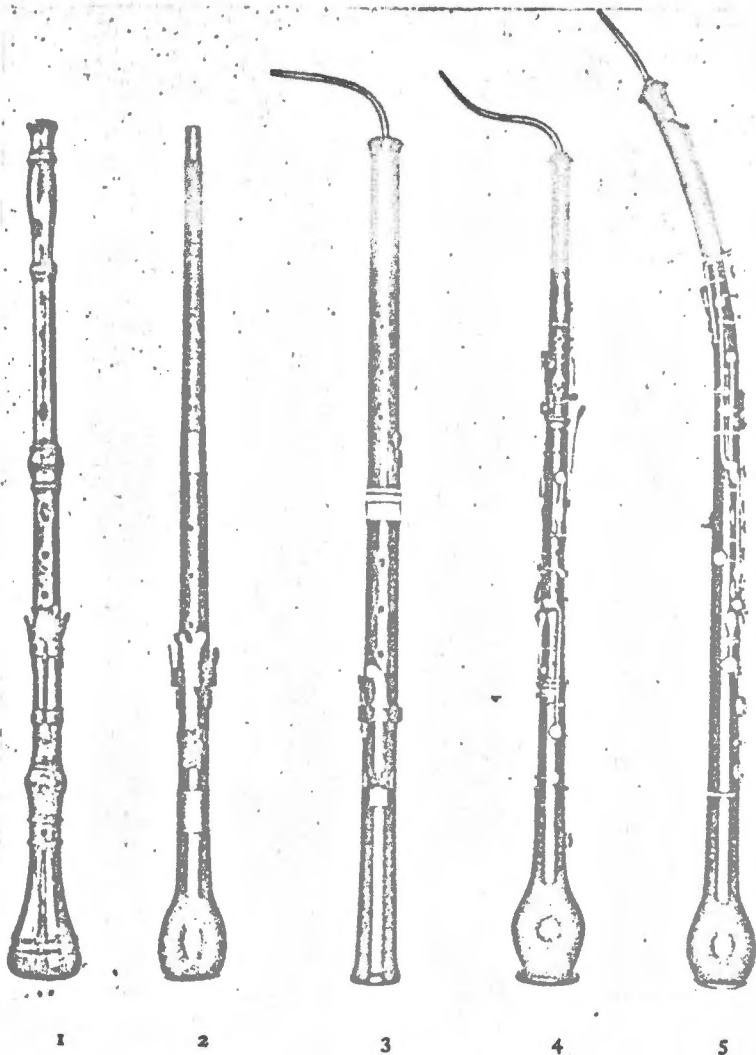


CORS ANGLAIS, CURVED AND ANGULAR
TYPES

1. Hardwood, leather covered. Ivory mounts and keys. *Italian. Early 18th century. The instrument is thought to have been repaired and later marked by Fornari of Venice*
2. Stained wood, brass keys, some late additions. *P. di Azzi, Venetian Republic. Late 18th century*
3. Maple wood?, leather covered, ivory mounts, brass keys. *Anon. Austrian? c. 1830*
4. Stained Maple wood, ivory mounts, brass keys. *J. Uhlmann, Vienna. c. 1850.*
5. Maple wood, leather covered. German silver mounts and keys. *Triébert, Paris. c. 1850*

From P. Bate "The Oboe".

Fig. 88

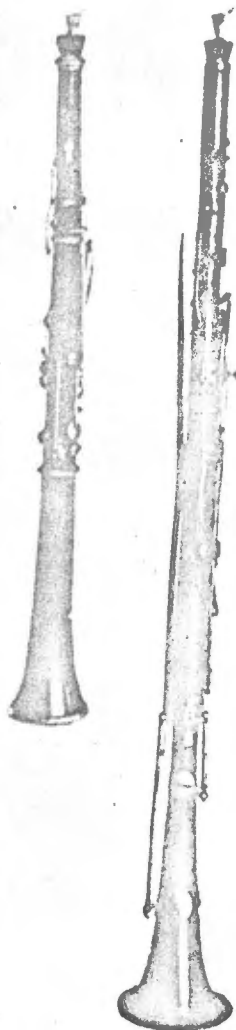


TENOR OBOES

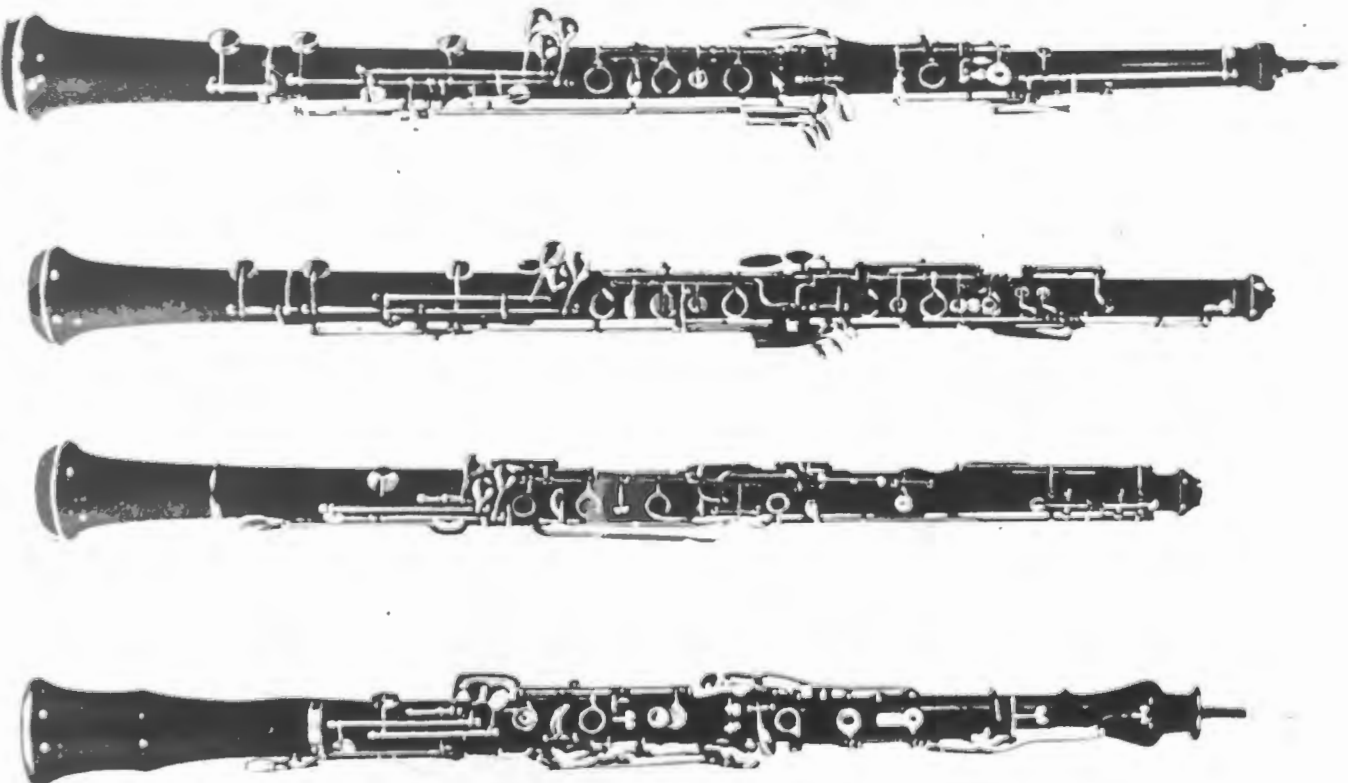
1. *R. Wyne, Nijmegen. Early 18th century? Gemeente Museum, The Hague*
2. *J. H. Rottenburgh, Brussels. c. 1750*
3. *'Vox Humana.' Longman and Broderip, London. c. 1785. Boosey and Hawkes Collection*
4. *'Cor Anglais Moderne.' H. Brod, Paris. pre-1839*
5. *Cor Anglais. Triébert, Paris. c. 1875*

From P. Bate - "The Oboe".

Fig. 89



SHAWMS
 (Tiple)
 ora.
 Baines).



From left to right:

Selmer Simplified Thumb-Plate.

Selmer Full Thumb-Plate.

German model, used in Russia.

Vienna Akademie Model (Zuleger).

(From A. Baines).



MODERN GILL-T-CONSERVATOIRE SYSTEM

Left: Oboe. Middle: Oboe D'Amore. Right: Cor Anglais.

(From A. Balnes).

Fig. 98.



OBOI D'AMORE AND BASS OBOES.

1. Stained wood, brass keys. P. Wolraupier, Brussels? Early 18th Century? Brussels Conservatoire Collection.
2. Cocus wood, German silver mounts and keys. V. Mahillon, Brussels, c.1890. Bernard Hague Collection.
3. "Hautbois Baryton". Brass keys.)
C. Bizzy, Paris. c.1740.)
4. "Hautbois Baryton". Brass keys.)
G. Triébert. Paris. c.1823)
5. "Hautbois Baryton". German Silver Mounts and keys.
F. Triébert, Paris. Mid-19th Century.

Paris Conservatoire Collection.

Nos. 3 - 5 approximately 5/8 scale of 1 and 2.

(P. Bate - "The Oboe").

CHAPTER XXIV

THE COR ANGLAIS, OBOE D'AMORE AND BASS OBOEThe Cor Anglais.

Tenor or Alto Oboes sounding a fourth or fifth lower than the Treble Oboes were undoubtedly in use before the end of the Seventeenth Century. They can all trace their descent from the Alto Shawm, Fomner or Bombard and even if the transformation did not take place simultaneously with the transformation from Treble Shawm to Oboe, it must have been accomplished before the end of the Seventeenth Century, since Purcell in his "Dioclesian" (1691) specifies a "Tenner Hautboy" in the score. This must have been the instrument sounding a fourth or fifth below the Oboe, known as the Taille, Oboe da Caccia or Hautecontre de Hautbois which, after the middle of the Eighteenth Century, became known as the Cor Anglais.

Neither Speer (1697), Mattheson (1713), Walther (1732), Eisel (1738) nor Majer (1741) seem to have known the Tenor Oboe although Walther knew the Oboe d'Amore; yet such instruments apparently made in the first half of the Eighteenth Century survive in several collections in Berlin, Vienna, Salzburg, Leipzig (Heyer), Basle, Breslau and Brussels with specimens by Denner in Berlin and Leipzig.

These existing specimens are either straight or curved tubes with metal crooks at the narrow end and occur with and without the bulb-bell. They are provided with keys identical with those of the contemporary Oboe (the open C and closed D sharp keys duplicated as on most earlier examples of the Oboe).

The awkwardness of holding such a long instrument doubtless caused makers to bend the tube, thus making it easier for the player to reach the finger holes and this may explain the origin of the name Cor Anglais ("English Horn") derived from the similar sounding Cor Anglé ("Bent" Horn). This curve in the tube which varies in specimens from a gentle bend to almost

a semicircle, remained an acoustical weakness of the Cor Anglais until modern mechanism enabled all the note-holes to be properly spaced while keeping the finger-plates comfortably under the fingers.

Some authorities see the curved tube as a survival from military days when the instrument could be played on horseback with the curve fitting over the back of the horse. Many marches and flourishes are to be found in the "Collection Philidor" (André Danican, known as "Philidor L'Ainé", 1647 - 1740), where a large and famous collection of Court Music, ranging from the time of Henri III to the end of the Seventeenth Century was compiled by this Librarian and Court Musician to Louis XIV. Two Treble Oboes, a Taille and Basse de Hautbois were the almost invariable combination for military use.

In England the problem of compactness was tackled differently in the form of a rather inelegant instrument known as the "Vox Humana" where the straight tube was retained but was made in two pieces with no separate bell, while the proportionately long crook was bent sharply at right-angles (Fig.87, 3). A rare fingering-chart for an instrument made by the Younger Stanesby (Longman, Lukey and Company) may be found in the British Museum Library).

The name "Cor Anglais" occurs in the score of Gluck's "Alceste" (1767) while the Italian "Corno Inglese" is found in certain of Jomelli's works in 1741 and in Haydn's Divertimenti of 1764.

The acoustic behaviour of the Bulb-Bell requires fuller investigation than it has yet received but there is no doubt that its effect upon the tone has been consistently exaggerated.

Sanford Terry ("Bach's Orchestra", London, 1932, p.103) has concluded that the curved Cor Anglais proved unsatisfactory

and...../130.

and was soon displaced by the straight form. Museum specimens show at least three different methods of construction employed in the Eighteenth and Nineteenth Centuries.

The curved Cor Anglais (Fig. 87, 5) was favoured in France until c.1870 and for even longer in Italy. In 1900 an Italian Oboist named Tromba was playing upon a curved instrument at the Opera in London.

The same influences were brought to bear on the larger Oboes as had affected the development of the Oboe after 1800. The Cor Anglais was a rather weak relative of the Oboe, since its greater length of tube called for wider spacing of the holes while these had still to be kept within reach of the fingers. The result was poor intonation until Triébert's key-mechanism had advanced sufficiently to solve this problem once and for all.

Attempts to bore the holes slant-wise helped to some extent but after 1850 all difficulties with the placing of holes had virtually disappeared. It is rather surprising, in view of the recognised initiative of mid-century makers, that the curved Cor Anglais persisted in France and Italy. This must have involved expensive and tiresome techniques in building and may have been yet another example of the conservatism of players which has impeded progress in the designs of all the woodwinds.

Brod had produced a straight Cor Anglais at the Paris Exposition of 1839. In Germany at this time Uhlmann and other makers produced excellent models of the "knee-shaped" Cor Anglais, and from an ample number of specimens it may be clearly seen that by 1850 the Cor Anglais had outgrown its former weaknesses and become an efficient instrument.

Makers were still preoccupied with the alleged tonal effect of the Bulb-Bell and the proportions vary enormously between them. F. Triébert adopted an orifice of 38 mm in diameter where a fairly late example by A. Morton measures only 26 mm.

The key-mechanism is modelled exactly on the lines of the accepted Oboe systems but with the low B flat key usually omitted.

The Oboe D'Amore.

Pitched a minor third below the Treble Oboe, this instrument may have derived its name from having at one time doubled the part of the Viola D'Amore. At the present time modern Flutes, pitched in A, are known as Flûtes d'Amour, although these are somewhat rare.

It is probable that the Oboe D'Amore was originally taken as interchangeable with the Treble Oboe when the Tessitura of the music demanded, and this seems to be the manner in which J.S. Bach regarded it. The first recorded appearance of the Oboe d'Amore comes in G.P. Telemann's "Der Sieg Der Schönheit" in 1722 and Terry disqualifies a possible claim to earlier employment of the instrument by Bach on the grounds that it appears only in revisions of the works concerned made after 1722. ("Bach's Orchestra", p.110).

In structure, the Eighteenth Century instrument was merely an enlargement of the Treble, usually with a small crook to carry the reed. The incurved bell was credited with certain mysterious tonal virtues in the Eighteenth Century, and later and because of this it was deliberately added to the smaller Oboes. Once the name d'Amore had been transferred to one particular Oboe it became associated with the special feature of that instrument. Thus the Bulb-Bell became known as Pavillion d'Amour and Leibesfuss and hence the terms "d'Amore", "d'Amour" and "Leibes" applied to Bulbed instruments in general.

The most important revivals of the Oboe d'Amore took place in France at the hands of Winnen around 1835 and again in

1889 under Lorée.

Mahillon of Brussels designed a very successful Oboe d'Amore with an open bell in 1875 and four of these instruments were imported into England, two for Sir Henry Wood's Queen's Hall Orchestra and two for the Dolmetsch Concerts of Ancient Music. Many professional players in Britain today possess an Oboe d'Amore, chiefly for use in the choral works of J.S. Bach, although a few modern composers have used this beautiful instrument, notably Richard Strauss, Holbrooke, Holst and Ravel.

Like the Cor Anglais, the mechanism is similar to that of the Oboe, except that the lowest B flat is usually excluded by most makers.

The Bass Oboe.

The Bass Oboe is pitched in C (one octave below the Treble Oboe). Very little is known of its early history but it seems clear that although it stands in the same relation to the other Oboes as did the Bass Pommer to the Higher Shawms, it was never employed as a regular bass to the Oboe group. Perhaps the Bass Oboe arrived on the scene too late to compete with the Bassoon for a place in the Reformed Orchestra.

The earliest recorded specimen is by J.S. Demmer (c.1700) which was preserved at Nürnberg before 1939. A facsimile in Brussels Conservatoire (No. 958) has been described in detail by Mahillon, who reports that it has a primary scale of d - c'. A second important example by Charles Bizet (probably before 1750) is in the Paris Conservatoire (No. 494). This instrument is shortened by doubling the tube back on itself below the d hole in the manner of the Bassoon. Just below the d sharp hole the bore enters a kind of miniature Bassoon Boot* to emerge again in a small conical bell (Fig. 92, 4 and 5).

*"Boot" versus "Dutt"

A Baritone Oboe of English origin, formerly in the Collection of the late Canon Galpin, is now housed in the Museum of Fine Arts (Boston, Mass.) and can best be described as a Baritone Vox Humana. It is described in "Ancient European Musical Instruments", Bessaraboff (Boston, 1949).

The revival of the Bass Oboe was again the work of the Triébert family. G. Triébert built an instrument for Vogt about 1823 which is now in the Paris Conservatoire (No. 335). In shape this is similar to the Bizet example, except that it has eight keys instead of two and a rather wide Bull-Bell. One key covers the lowest finger-hole which is fairly well-placed but the remaining holes are too closely set and are obliquely bored through thick projections of the body-wall. Both Brod and Frédéric Triébert removed the need for obliquely bored holes by the addition of improved key-work but both these makers adhered to the principle of doubling back the bore inside a foot.

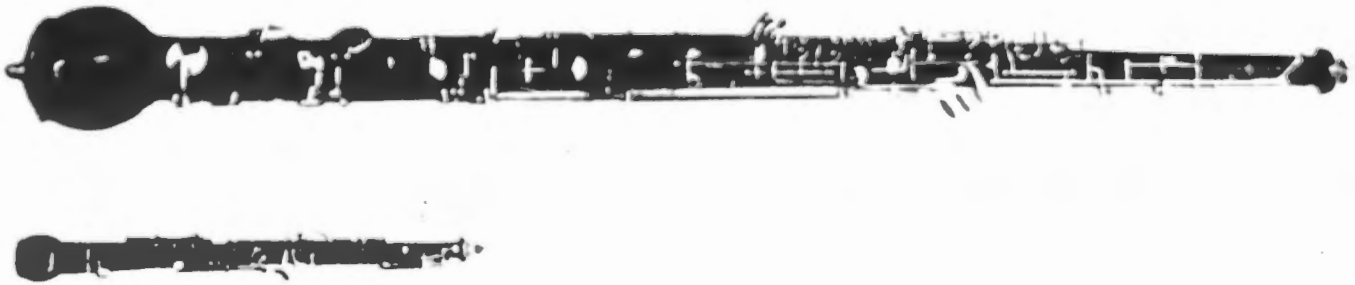
Not until 1889 did Lorée re-design the instrument in the modern straight form. The Bass Oboe, rarely seen even in larger symphony orchestras, is often replaced nowadays by the Heckelphone.

Constant Pierre, writing in 1890, mentions that Lorée, having introduced his new Oboe d'Amore and Baritone in the previous year, proposed to complete the family with a Contrabass. In "La Facture Instrumentale", Pierre offers an interesting speculation as to its tone and future use, but the project seems to have been abandoned because of insufficient demand among composers who found that the long established Bassoon filled all their needs in the eight-foot Register.

Ref. P. Date, "The Oboe", Ch. VII.

A. Baines, "Woodwind Instruments and their History".

Fig 93.



Heckelphone and Piccolo-Heckelphone.

(From A. Barnes).

CHAPTER XXVTHE HECKELPHONE

In 1877 Wilhelm Heckel succeeded to the family business on his father's death and shortly afterwards concluded certain marked improvements to the German-model Bassoon and Contra-Bassoon. His work had aroused such interest in German musical circles and Heckel was presented to Richard Wagner. Wagner regarded Heckel's Bassoon as fully perfected but still felt the need of a Baritone voice among the Woodwinds which "should combine the character of the Oboe with the soft but powerful tone of the Alphorn".

Wagner's curious description fired the imagination of the young Heckel and he set himself to design such an instrument. This was ten years before Lorée was ready to exhibit his perfected Baritone Oboe and Heckel was not seeking a similar version of existing instruments which represented a mere downward extension of the Cor Anglais.

Heckel sought a larger air-column and after nearly twenty-five years of experiment, assisted by his two sons, W.H. and August Heckel, he completed in 1904 the first model of the instrument which bears his name.

Richard Strauss introduced the Heckelphone to the Orchestral World in his opera "Salome" in 1905 and, since then, many composers have used it extensively both on its own account and as a substitute for the Baritone Oboe.

The body of the Heckelphone is made in three separate sections of hard Austrian Maplewood. At the top end is a short metal crook to carry the reed and at the lower end an almost spherical bell. Built to present-day pitch, its total sounding length is 138.5 cm. The main bore is truly conical and double the mean diameter of the German-style Oboe. The conicity is, therefore, more marked than that of a Baritone Oboe of the same pitch.

Two varieties of bell have appeared at different times, the original with the plain open end and one large vent-hole in one side, and a more modern one with three smaller vents and a perforated stopper which is designed to slightly mute the lower register. Throughout the instrument the note-holes are large in relation to the bore and are controlled by key-mechanisms built to correspond with the accepted fingerings of the Oboe. (Fig. 93).

A reed similar to the Bassoon is usual but some players prefer an enlarged version of the Cor Anglais reed. The tone of the Heckelphone, when controlled, is rich and satisfying with great body and prominence in the Orchestra.

At the present day there exists a group of three different sizes of Heckelphone. The largest, pitched in c, stands exactly one octave below the Oboe, but has an extended lower register. Its full compass is from A below four-foot c to g⁴, with sometimes three higher semitones. This is the accepted range today, although the original fingering-chart issued by the makers showed a smaller compass. A choice of B or B flat as the lowest note was offered.

The Terz-Heckelphone pitched in E flat and the Piccolo-Heckelphone in F complete the family. These sound respectively A minor third and A fourth higher than the Heckelphone.

The part for the instrument is usually written in the Treble Clef and placed in the Full Score between the Cor Anglais and the Bassoons.

Ref. P. Bate, "The Oboe", Ch.8.

CHAPTER XXVITHE CATALAN SHAWM

The typical music of the Costa Brava, from the North of Barcelona to the French Frontier, is that of the Cobla Band, used for the Sardana Dances. The leading instruments of these bands are a modern version of the Shawm (one of the predecessors of the Oboe). In each Cobla Band two pairs of these Shawms are used (Fig. 89), two Trebles (Spanish - "Tiple") and two Tenors ("Tenora"), supported by several Brass instruments, and their sound is extremely strident and reedy. They are most effective as outdoor instruments which was, after all, the chief function of the original Shawms. Their reeds are short and triangular with a wide opening and are mounted on a Pirouette or "Tudel" which enables the player to grip and control the reed like an oboist but by resting his lips against the Pirouette he is able to keep the strong reed vibrating at its full power without tiring his embouchure muscles.

The Tiple (around twenty-two inches long) is pitched in F (a fourth above the Oboe) and the Tenora (thirty-three inches long) with a wide metal bell, is in B flat (one tone lower than the Oboe).

Pepo Ventura modernized these instruments in the Nineteenth Century and they are fitted with a Simple-System key-work with half-hole plate for the lower part of the upper register and an octave-key for use above g". Both instruments have extension keys for little fingers and Left thumb.

The Tiple descends to written a (sounding d¹);

The Tenora descends to written f sharp (sounding e).

Anthony Baines has reported the sound of these Shawms as unbelievably exciting. The effect is that of tremendously loud, full-throated Oboes and yet the players are able to command a full dynamic range down to mezzo-piano. Although these splendid

instruments...../137.

instruments (made by Pardo of La Bisbal) might greatly enhance the Military Bands of more Northern countries, as Mr. Baines has suggested, it is unlikely that they have been exported from Spain for use in other countries with any degree of success, since the Pitch commonly used is the "Old Philharmonic Pitch" or "High Pitch" (a' = 452).

Ref. A. Baines, "Woodwind Instruments and their History",

and personal research in Spain, 1964.



CHAPTER XXVIITHE CLARINET FAMILY

In the early Eighteenth Century with the established orchestra of Oboes, Bassoons, Horns, Strings, Trumpets and Drums, on the very rare occasions when a peculiar tone-colour was demanded by the composer, then usually special instruments were played by the Oboists. One of these special instruments was a small cane pipe fitted with a thin cane reed or tongue, tied at its upper end. This instrument is described by Bonanni in his "Gabinetto Armonico", Rome, 1722, and confirmed in its description by Diderot in his "Encyclopedie". Handel uses it in "Riccardo Primo" and other composers who have employed this instrument known as the Chalumeau or Schalmei, are Telemann, Vivaldi and Gluck. Books of tunes for the "Mock Trumpet" were published around 1698 and recent particulars brought to light by Prof. Thurston Dart have identified this instrument as the Chalumeau or "Clarinet".

Having a single beating reed placed on a cylindrical pipe, the overblown Fundamental gives a twelfth instead of an octave. The instrument was undoubtedly pastoral in origin which accounts for the particular employment given to it in this context by Handel and Telemann. As a serious musical instrument it seems to have been little better than a toy.

Single-reed instruments were slow to develop by comparison with the double-reeds. John Christopher Denner (1655 - 1707), a Recorder-maker of Nuremberg, experimented with the Chalumeau around 1700 and finally designed a tube based on the Tenor Recorder but fitted with a beak-shaped mouthpiece and a flat single wooden reed. He joined the "break" between the Fundamental register and the overblown Twelfth register by adding a thumb-hole and two keys near the top (Fig. 94). Doppelmayr's "Historical Report of Nuremberg Mathematicians and Craftsmen", 1730, described J.C. Denner as the inventor. The German players introduced the new instrument into France and England, using it in pairs with

horns in a vigorous open-air fashion. Arne's Opera, "Thomas and Sally" 1760, contains a picturesque hunting-scene with Clarinets in C blithely echoing each other in company with two horns.

At this time the Clarinet began to undergo great improvements in its design which has given the instrument its final basic form. Elongation of the bell, in order to accommodate the long B-key, and then the B flat key followed by the long c sharp key formed the Five-keyed Classical Clarinet of the Mannheim Orchestra which so entranced the boy Mozart and which retained its form until the end of the Century.

By 1800 the number of keys had been increased to eight or even ten and in 1809 Ivan Müller (1786 - 1854), added the stuffed skin pad (as opposed to square pads of solid leather standard on all woodwind instruments) and a metal screw ligature to replace the cord tied round the mouthpiece in order to secure the reed. (Some modern Clarinetists in Germany still prefer to tie their reeds in this manner).

In 1827 Simon of Lyons raised the number of keys to nineteen which became the standard instrument of the soloists of that time (Willman and Baermann, for whom Weber wrote his concertos). Berr was the first player to recommend playing with the reed downwards as is done today.

Müller's system of 1810, using thirteen keys, has formed the basis of all Clarinet systems other than the "Boehm" system adapted to the Clarinet by Klosé in 1843.

The Boehm Clarinet is now standard in France, Italy, the United States of America and Britain, while in Germany an advanced Simple System is still favoured. The bitterest opposition to Boehm's improvements has come from Boehm's own countrymen!

VOLUME II

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CONCLUSION AND BIBLIOGRAPHY

CHAPTER XXVIITHE CLARINET FAMILY

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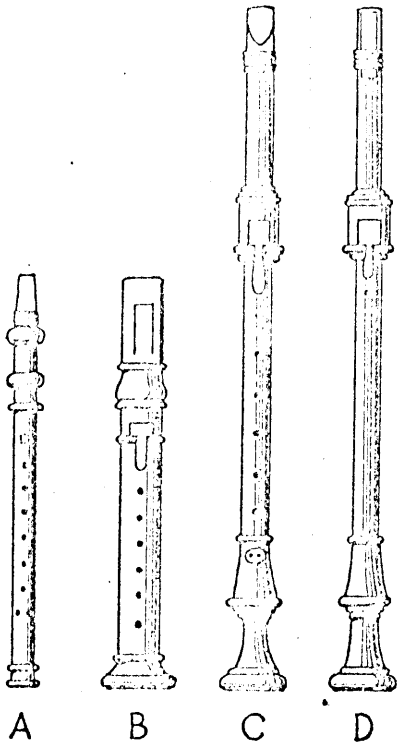
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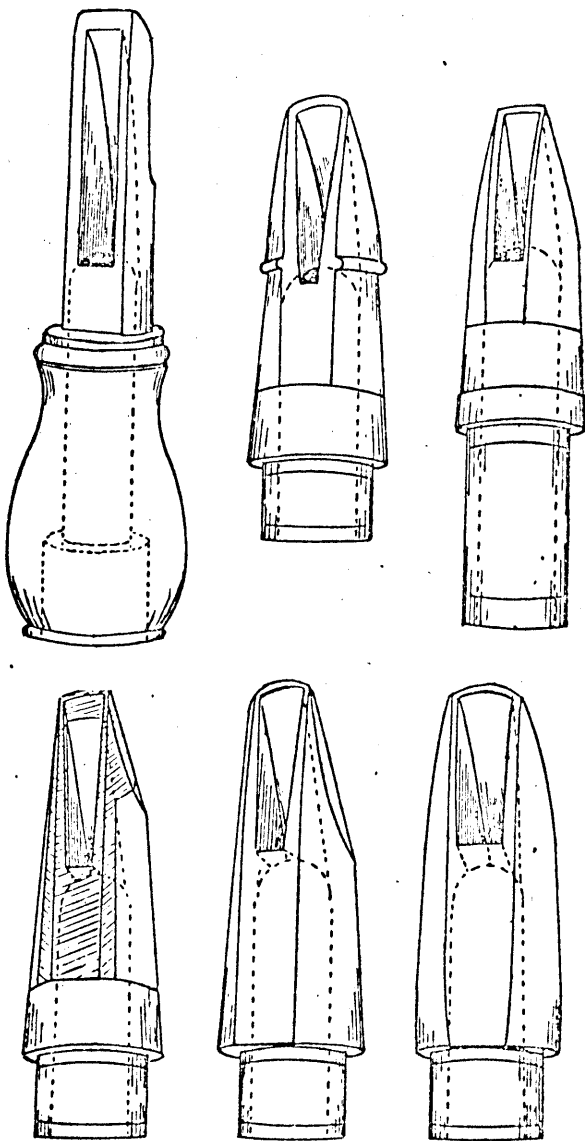
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Fig. 94.



-A. Diderot's Chalumeau.
 B. Reynvaan's Chalumeau.
 C. Two-keyed Clarinet (front).
 D. Two-keyed Clarinet (back).

Fig. 95.

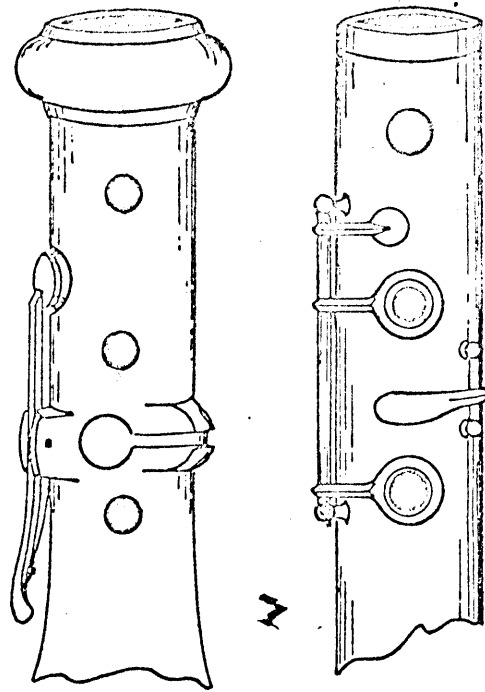


Mouthpieces

Top L. to R.
 Klenig, in one piece with barrel, c. 1710.
 Continental pattern—stepped lay with retaining ring for cord, c. 1800.
 English pattern with long tenon for tuning.
 Bottom L. to R.
 Modern German with metal inlay.
 Older French and Belgian (Albert).
 Modern French.

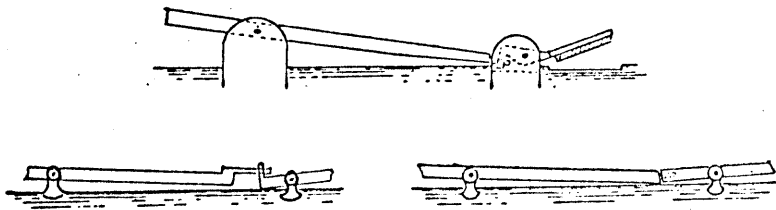
(Diagrams from F.G.
 Rendall "The Clarinet")

Fig. 96



L. Closed *b* natural and *b* flat keys on lower joint, c. 1810-1840.
R. Ring-keys, introduced, c. 1840.

Fig. 97.



Low *e* key (*clef d bascule*) of early and Müller clarinets in knob and pillar mountings

(Diagrams from F.G. Rendall "The Clarinet").

THE CLARINET

e	.. .B	.. .C	b'	
f	.. .	.. .C	c'	
f#	{ : : : C# : : : B }	{ : : : C }	c#'	
g	.. .	.. .	d'	
g#	.. .	.. .Eb	e#b	
a	.. .	.. .o	e'	} as opposite
b♭	.. .	{ : : o F o }	f'	
b	.. .	o o o	f#'	
c	.. .	o o o	g'	
c#	.. . G#	.. .	g#'	
d'	.. . o	.. .	a'	
e♭	{ : : B b o : : : }	.. .	b♭	{ : : B b o o o o : : : }
e'	o o o	.. .	b'	o o o
f'	{ : : o o : : (o) }	C o o o o o o o o o o o	c'	{ : : o o C o o o : : : }
f#'	o o o	C o o o		
g'	} as Boehm			
g#'		c#'	o o o	.. . Eb
a'		d'	o o o	.. .
b♭		e♭	o o o	.. .
		e'	o o o	.. .
		f'	{ : : : G# : : : G# }	o o o (Eb) o o o Eb
		f#'	.. . o	.. .
		g'	.. . o o	.. .
		g#'	o o o	.. .
		a'	o o o	{ o o o Eb : o o o }
		b♭	{ o o o : : : G# }	o o o C
		b'	{ A : : (o) : : : }	.. (o) (Eb)
		c'	o o o C#	o o o C

Chart for simple system and other non-Boehm clarinets. In the left-hand column, the thumb-hole is closed until g'; in the right-hand and bottom columns, the thumb-hole is closed and the speaker key is opened.

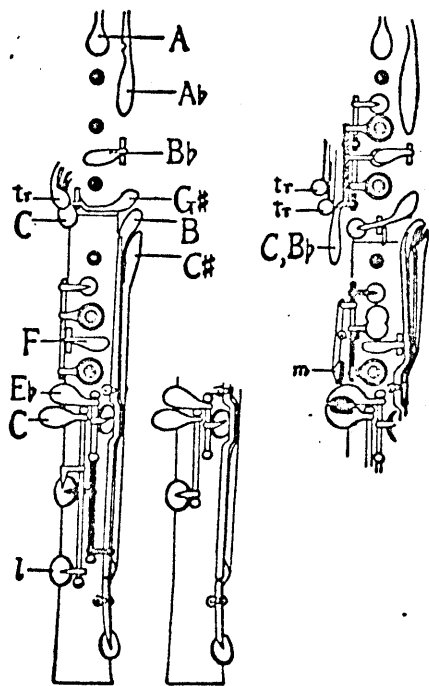


Fig. 99.

Diagram of simple system and Clinton clarinet mechanisms. Left: simple system (the lower end shown with and without the patent C#); right: Clinton model.

CHAPTER XXVIIITHE CLARINET FINGERING SYSTEMSThe Albert or Thirteen-Key Clarinet:

In spite of the general adoption by British players of the Boehm System, this "Simple-System" is still favoured by many Clarinetists and has remained even after forty years a standard Clarinet for use in British Army Bands. The system has not been manufactured in Britain since 1930 and undoubtedly the Boehm System is gradually replacing it.

The major difference between the Albert and the Boehm is in the basic fingering for F sharp (as on the Simple-System and Boehm Flutes) which is fingered by the first finger, Right-hand:

. . . / . o o	Simple,
. . . / o . o	Boehm

While this same fingering gives F natural on the Boehm System and F sharp has to be fingered with the middle finger of the Right hand. The Simple System has a key for F natural placed above the E natural hole or the note may also be obtained by "forked" fingering:- . o . / .

On the upper portion of the tube the Thumb-hole gives F sharp' instead of F', as compared to the Boehm. Several cross-fingerings play an important part in the fingering of this instrument and are inclined to give poor tone quality in the lower register although they are much superior to the Boehm in their higher register. The "Patent C sharp", allowing C sharp to be played without sliding the Left little finger from one key to another when playing B - C sharp, makes C sharp possible by pressing only the B key without the C natural key. A duplicate C sharp hole is controlled by the C natural key. The "Patent C Sharp" or extra C sharp enabled the f sharp and its twelfth to be made by the Left little finger alone by means of an additional tone-hole and gave greater facility in sharp keys. The credit for its invention (circa 1862) was claimed by Mahillon but it appeared on the

instruments made by Albert and patents for similar designs were taken out by both Chappell and J. Tyler (a well-known London player).

Additional keys to this system are sometimes added:

- (i) Top joint "Brille", giving rings for First and Second finger, Left-hand, involving a small vent with key soldered to edge of Ring I and brings F sharp' in tune without the help of the side C natural key. The rings keep this vent closed for fingerings downward from F'.
- (ii) Top joint "Brille", combining with an improved Left-hand "Fork". Another small vent soldered to Ring II and closed by Ring III secures reduced venting for the forked B flat"/E flat'. French makers hinge these extra rings on the right hand side of the Clarinet while the German makers hinge them on the opposite side (thus making them pivot on the same side as the hand is held).

Clinton Model Clarinet:

The London firm of Boosey first devised and made this system, named after the famous player George Clinton and designed by D.J. Blaikley, in 1835. It has been a popular Clarinet system in the British Army for many years since it was cheaper to buy than the Boehm and less liable to the accidental damage that is so frequent in barrack life.

The chief differences from the "Albert" system are:

Forked-F vent converting . . . / . o . to a completely vented fingering available for b flat in the Chalumeau register (Fig. 99, n).

Re-sited G sharp key (first introduced by Sax) where the G sharp hole is drilled through both tenon and socket (correct

alignment being ensured by a metal stop on the outside of the body-tube). This re-siting greatly improved the G sharp and the lower C sharp.

Barret Action: Adapted from the Oboe to make c^{'''} and b flat^{''} (or f['] and e flat['] in the lower register) with a single side key. The small keys between the left-hand holes are normally kept closed by the master-spring of the long side key. When this side key is pressed either both the small keys (for c) or only the lower (for b flat) open according to whether Finger II is raised or not. Ring III allows the side key to be held down during trills or tremolos involving G or A flat and B flat in the upper register and simplifies many passages.

Lengthened A flat touch, allowing A flat to be operated by Finger II when desired.

The "Clinton Boehm" combines the Clinton System with the Little Finger Keys as found on the Boehm System, with an Articulated G sharp Key.

The Boehm System Clarinet:

Following Theobald Boehm's Flute System of 1832, Hyacinthe Klosé, in association with the Paris maker Auguste Buffet, devised the Boehm Clarinet in 1843 and a Patent was granted in 1844.

Only certain features of Boehm's Flute-System were incorporated in Klosé's design but free use was made of the Boehm mechanism to control the twenty-four holes which Klosé considered necessary in his newly designed Clarinet.

The two little fingers (for E flat and G sharp) controlled the same keys as they had done on the instruments before Boehm but duplicating levers were now fitted to the three lowest note-holes which could be controlled by either little finger. Klosé took over the Boehm fingering in order to control the four holes which lie between the two little fingers. The Right-hand fingers now

controlled the corresponding semitones to those on the Flute but Klosé added a closed b natural key for the third finger to allow trills or easy movement from b flat to b natural.

On the upper half of the instrument, the Third finger and Little finger of the Left hand act as on the thirteen-key Clarinet. The next four ascending holes of the Chromatic Scale are controlled by rings and cups on rod-axles and the thumb-hole fitted with a ring giving F natural (F sharp being produced by the First finger of the Left hand - a direct reversal of these two notes on the "Albert" system). Two extra shake keys for trills across the Break make up the total changes from the Albert System, apart from the "Speaker" or Register-Key which on the Boehm System is placed on the under side of the tube.

The elaborate key-system of the Boehm Clarinet gave control over note-holes which were more evenly spaced and acoustically better situated than they had been on the simpler instrument and a more even quality with better intonation was gained.

Klosé's problems were those which faced Boehm before 1832 but Klosé had before him Boehm's example. Buffet had the knowledge and experience derived from Boehm's Flute in which he himself had contributed to the advancement of Rod and Axle mechanism.

The new key-system was not readily accepted by players, since it involved changes of the established fingering (as did Boehm's Flute) but Paris was the origin of the system and gradually it began to be adopted by prominent players. A Tutor published by Klosé was published with official recognition by Paris Conservatoire and the Boehm Clarinet was established in France during the third quarter of the Nineteenth Century. In 1873 an English translation of Klosé's Tutor was published and by the beginning of the Twentieth Century most of the leading British orchestral players were changing over.

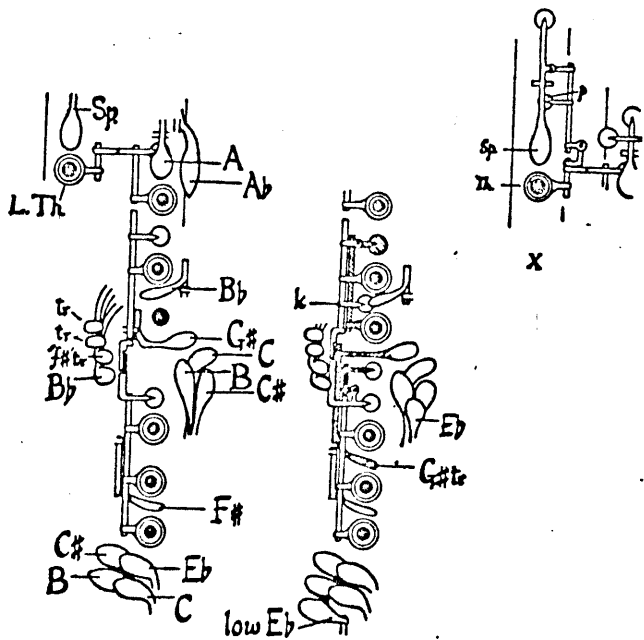
THE CLARINET

	L.Th.					
†e	•	•••	B	•••	•	b'
†f	•	•••		•••	•	c'
†f#	•	•		•••	•	c#'
g	•	•		•••	•	d'
g#	•	•		•••	•	d#'
a	•	•		•••	•	e♭'
b♭	•	•		•••	•	e'
b	•	•		•••	•	f'
c	•	•		{•••}	•	f#'
c#	•	•		{•••}	•	g'
d	•	•••	G#	•	•	g#'
d'	•	•••		•	•	a'
†e♭	•	{•••}	B♭	{•••}	•	b♭'
e'	•	•••		•••	•	b'
f'	•	•••		•••	•	c''
f#'	{•	•••	f#tr	{•••}	•	
g'	•	•••		•••	•	
g#'	•	A♭•••		•	•	
a'	•	A•••		•	•	
b♭'	S•	A•••		•	•	

Chart for Boehm-system clarinet. L. Th: left thumb; S: speaker key. For the use of the alternative keys for the notes marked †, see text. N.B. On many models the E♭ key should remain closed for e'''♭.

c#'	S•	•••	•••	•	E♭
d'	•	•••	•••	•	•
e♭'	•	•••	•••	•	F#
e'	•	•••	•••	•	•
f'	•	•••	G#	•••	•
f#'	•	{•••}	•••	{•••}	•
g'	•	{•••}	(•)•••	{•••}	•
g#'	•	•••	(•)•••	•••	•
a'	•	•••	•••	•••	•
b♭'	•	•••	G#	•••	•
b'	•	•••	•••	•••	•
c''	•	•••	•••	•••	(•C#)

Fig. 101.



(From A. Baines)

Boehm-system clarinet mechanism. Left: standard or 'plain' Boehm; centre: full Boehm; X: example of an 'improved B♭' device.

The "Full Boehm" Clarinet:

A more elaborate model is used by some players. In addition to the Standard mechanism it has the low E flat key (played with the Right Little finger) for reaching the low E natural of the A-Clarinet. This system is favoured by players (especially in Italy) who play A and B flat parts on one instrument (Fig. 102, C).

A duplicate E flat key (e flat") for the Left Little finger makes it possible on the B flat Clarinet to slur the E - A of the A Clarinet.

Articulated G sharp to trill f sharp" - g sharp" with Right hand alone (as on oboe) makes the g' - a" trill of the A Clarinet practicable on the B flat Clarinet.

Extra G sharp Cross-key (Cross-key for V).

Ring for III closing the Open B flat key (between Rings I and II) to provide a forked B flat. There is a small vent-hole to compensate for the closure of Hole III, which is kept closed by Rings II and IV.

An additional Trill-Key for g' sharp is sometimes added to the customary four on the upper joint.

The improved b flat' mechanism found on many German Boehm Clarinets can take several forms but basically works automatically. When the "Speaker Key" and Thumb-ring are both released an extra vent opens to assist the tone of b flat' (a traditionally faulty "throat" note). An alternative arrangement is a key which opens instead of the "Speaker"-hole when both "Speaker" and A-Keys are pressed.

The low e flat and additional a flat/e flat lever were known in the 1820s. The articulated G Sharp and Forked B Flat were fitted to the Clarinet in the 1860s. P. Gosmas who did much

to improve the Boehm Clarinet and was one of the partners in the firm of Buffet-Crampon, Paris, took out a patent for the Forked B Flat Mechanism in 1865.

The Oehler System Clarinet:

The advanced mechanical evolution of the Clarinet in Germany has paralleled that of the Oboe in France and has led in a similar way to a complicated non-Boehm instrument that even yet has not settled down into one final pattern.

The "Albert" or Simple-System forms the basis and incorporates all the extra devices described under these models (Patent C sharp, side B-flat key, three top-joint rings and the Forked-F vent) and in addition certain features of the earlier German system of C. Baermann (c.1860), son of the Baermann for whom C.M. von Weber wrote his concertos.

The instrument perfected by the Berlin maker, O. Oehler (died 1940) is, in effect, an improved Baermann model with lighter mechanism and is the favourite model of most German and Austrian players of today.

The Left little finger has still four keys to control and on the lower joint the following devices are included:

- (i) Patent C sharp;
- (ii) Vent-Key to improve the Forked f^{''}.
- (iii) Duplicate E-flat key for left little finger, sometimes with a duplicate F key beside it.
- (iv) High E correcting device which is a small vent soldered to Ring IV which is lowered by the E flat key. The purpose is to provide normal venting for g^{''} but diminished venting for e^{''} which otherwise tends to become too sharp.

On the upper joint there are:

- (v) An improved Left-hand fork. The fork-fingering, by means

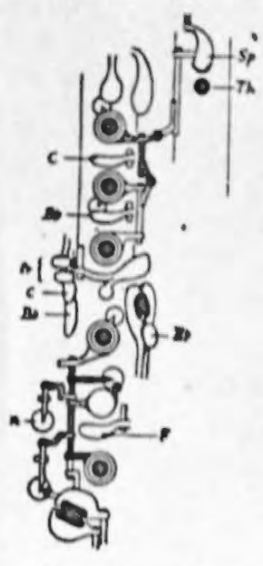


From F.G. Rendall, "The Clarinet".

MODERN CLARINETS

- a. *Boosey & Hawkes, London.* (B♭) Clinton-Boehm
- b. *Mahillon, Brussels.* (B♭) Papeschi system, Barret action with long tenon, and additional lever for f. Low e flat, c. 1900. Author's Collection
- c. *Boosey & Hawkes.* (B♭) Full Boehm
- d. *Maugras, Paris.* (B♭) Plain Boehm
- e. *Oehler, Berlin.* (B♭) Oehler system

Fig. 103.



(A. Baines).

Diagram of Oehler-system clarinet.



1.
Clinton
(Boosey)



2.
Vienna
Akademie
Model (Koktan)



3.
Cehler
System
(Heckel)



4.
Metal Boehm



5.
A-flat
Clarinet
(Rampone)



6.
Full
Boehm
(Orsi)



7.
Schmidt
Reform



8.
Albert Patent
C Sharp
(Boosey)

(From A. Baines)

of Ring III closes the small vent soldered to Ring II giving an improved E Flat in the lower register.

- (vi) Top-joint Brille (involving Rings I and II) combined with Baermann's Corrected Open C-sharp as follows:
The open fingering for c sharp ^{'''} is a good note for many passages but this top-joint Brille would make it too sharp. Ring I, therefore, which carries the Brille vent, is automatically lowered by the Speaker-key. The A-key also lowers it to prevent a' from becoming too sharp.

Some German Clarinets now have a small closed key, fitted to the bell, to be opened by the Right thumb. This may be opened by the player if he feels that his b' or e is too flat, which, with the long cylinder of the German Clarinet bore, these notes are prone to be.

Like the French Oboe-makers, the German Clarinet-makers prefer to keep a maximum tube-length in spite of the slight problem this may cause in tuning.

The Schmidt Reform-Boehm Clarinet:

The controversy that has been going on in Northern Europe between the partisans of the Boehm-System Clarinet and those of the German models has been recently resolved in Holland, where there has been widespread use of this latest development in Clarinet design.

Schmidt of Mannheim produced this model in which the Boehm fingering has been combined with the German type of bore, with the holes set out according to revised principles after much research and experiment. The bore is very wide (15.75 mm) and is cylindrical as far as the lowest tenon when there is an abrupt widening into the Bell-joint which has a vent-hole for b'.

There are several additions to the normal Boehm

mechanism:

- (a) Hole VI is made smaller than usual but there is an automatic vent-key for e" further down on the Right-hand side of the lower joint.
- (b) Small vent for f sharp" attached to Ring IV which remains up when f sharp" or b is fingered.
- (c) Trill for F sharp/G sharp. Since Hole III is smaller than usual, a small vent key corrects the venting for a". This key can be closed by Ring III or by Rings IV and V. (Ring III, being raised, gives g sharp"
 . . . ^{Tr} / e . o for F sharp/G sharp trill).
 Similarly this device gives . ^{Tr} o / . o o A flat/
 B flat trill.
- (d) The improved b flat' device described under "Full Boehm".

The Romero Clarinet:

Antonio Romero y Andía introduced the Boehm Clarinet on his appointment as Professor at the Real Conservatoire of Madrid in 1849 but during the 1850s he began to devise a better system to give more facility across the "Break". After repeated journeys to Paris, he failed to awaken any interest in Buffet (Jeune) and Triébert, but finally Paul Bié consented to realise his invention and Romero took out Patents in 1862 and 1867.

The perfected model of that year is a miracle of ingenious and complicated workmanship. The one-piece body is pierced with twenty-eight holes (Fig. 105.B.) (plus one extra when the low e flat is fitted) but has no more touchpieces than the plain Boehm. Many duties of the Left hand are transferred to the Right. The holes for g' sharp, a' and b' flat, relocated in a line above the g' hole, were each closed by a key sprung to open. These keys were in turn depressed by levers bearing upon the cups and actuated by a stronger spring. Pressure was released and the keys were allowed to open by

Fig. 107.



UNUSUAL CLARINETS

- (a) Heckel, Biebrich (B flat) Rod-Key Mechanism (c.1860).
- (b) Bié, Paris (B flat) Romero System (c.1867).
- (c) Simiot, Lyons (B flat and A), Nineteen Silver keys (c.1827).

(F.G. Rendall - "The Clarinet")

the fingers of the Right hand. The principle is similar to the Articulated G Sharp which also made its appearance - and possibly its debut - on this Clarinet. The idea is more attractive in theory than in practice, since pads under constant pressure are apt to cling to their holes and weak springs lose their power when constantly depressed.

The lower joint is plain Boehm with a modification in detail which transforms the normally closed f sharp into an open key to give additional venting to g'. Romero provided some additional trills, including a useful key for b' to c" stake at the top of the instrument.

Had the mechanism been entirely reliable, the instrument might have enjoyed some popularity. The paucity of extant specimens, however, shows that its appeal was limited. Among some drastic changes of fingering b' flat and not g' was the open note obtained with all fingers removed. The provision of fifteen adjusting screws seems to indicate that the mechanism was in constant need of adjustment.

Mahillon exhibited a similar, but simpler, model at the Paris Exposition of 1867 (Brussels Collection, 2300) which was based on the thirteen-key Clarinet while Romero's was based on the Boehm. A similar idea by G.H. Child is found on his ingenious and novel system for which a provisional patent was obtained in 1924.

The Schaffner Clarinet:

The bold conception of a Florentine Surgeon-Dentist, H.L. Schaffner, this was made in one piece of Monite, squared for four-fifths of its length, which terminates at the top in a circular neck and socket to receive the mouthpiece and at the bottom in a tiny ball. The bore is circular, slightly flattened at the top, the upper surface of the body being formed by a long

strip of metal. This metal facing is perforated with twenty carefully graduated oblong and rectangular tone-holes. These are at least double the size of the usual round hole and are closed by bold finger-plates hinged above them. Along the sides run thin steel tracker-rods, five to a side, to close automatically the plates which cannot be directly controlled by the fingers. There is no tuning socket but two speakers are provided, actuated by a rocking action of the left thumb. The mechanism is a miracle of ingenuity and precision but the provision of at least thirty-five adjusting screws points to the necessity for frequent and skilled adjustment. Specimens may be seen in the Brussels and former Meyer Collection.

Schaffner co-operated with C.T. Giorgi of Rome in designing Oboes and Flutes. (See "Giorgi-Schaffner Oboe" and "Giorgi Flute").

CHAPTER XXIX

ATTEMPTS TO COMBINE TWO CLARINETS OF DIFFERENT PITCH
IN ONE INSTRUMENT.

Buffet's model of 1862 (Brevet 53494) consisted of two metal tubes fitting one over the other. The outer and shorter tube carries the mechanism, each key and ring-key being fitted with two padded cups. The inner tube is pierced with forty-eight holes and by rotation of the bell, to which the inner tube is attached, either series of twenty-four tone-holes can be brought simultaneously under the control of the appropriate set of padded cups. This description has been based on pp.170-2 of C. Pierre's "La Fabrique Instrumentale", since no specimen has been reported in any collection. The idea is ingenious but quite unpractical since deadness and lack of response are associated with metal clarinets and it is, in practice, impossible to tune either series of tone-holes to a nicety. The additional weight of the complicated mechanism presents yet another problem.

Maino and Orsi of Milan introduced a simpler system in the 1880's. Their "Clarinetto a Doppia Tonalità" was based, like Buffet's, on the Sliding-Tube principle but here rotation of the barrel did not bring another series of holes under the player's control but merely elongated the body at three points.

Triebert's "Clarinetto Multiphonico" of 1847 was apparently designed on the same principle, giving three tonalities, C, B flat and A.

C. Binda's patent of 1884, made by E. Albert, included an auxiliary set of tone-holes, each fitted with a metal tube. In each tube was fitted a sliding piston. By twisting a rod these pistons were drawn out to their full extent and the Clarinet stood in A; when the pistons were pushed in, the pitch was raised a semitone.

Clinton's elaborate instrument with Boehm fingering, made by Jacques Albert of Brussels, is well illustrated in K.

Schlesinger's "Instruments of the Modern Orchestra" (1908).
A company was formed, with Sir Arthur Sullivan as Chairman,
to promote the invention and recitals were given on it by its
inventor and other distinguished artists, including Marnel
Gomez (1859 - 1930) at the Royal College of Music, but it did
not outlive its inventor.



CLARINETS OF WELL-KNOWN PLAYERS

- a. Key, London. Bass clarinet. c. 1825. Author's collection
- b. Key, London. (A) clarinet, 13 keys, with later additions and enlarged bore. c. 1825. Bossey & Hawkes collection
- c. Fieldhouse, London. (A) clarinet with Boehm improvements. c. 1855. Author's collection
- d. E. Albert, Brussels. (A) clarinet, 16 keys. c. 1865. Author's collection. The above were property of Henry Lazarus
- e. Fieldhouse, London. Clarinet (B \flat) in eborite. 16 key system with vent keys. 1862. Formerly owned by Julian Egerton
- f. German. Clarinet (B \flat) 13-key system, with ivory barrel and metal mouthpiece. c. 1825. Formerly owned by the Duke of Sondershausen, the pupil of J. S. Hummel
- g. Vienna. Clarinet (B \flat) 16 keys and 4 rings. c. 1860. Formerly property of Ferdinando Busoni. Berlin 1442
- h. London. Bass clarinet, Boehm model. c. 1865. Formerly property of H. Lazarus. Bossey & Hawkes collection



BASS AND CONTRABASS

- a. Bossey & Hawkes, London. Modern Boehm bass
- b. Hebel, Biebrich. Modern contrabass in metal
- c. Hebel, Biebrich. Modern bass (German system) in wood
- d. Besson, Paris. Pedal clarinet, 13-key system. c. 1890



OTHER DEEP CLARINETS.

B flat Contrabass

Simple System to
Low E.

Haller.

Bass Clarinet

Oehler System to
Low C.

Schmidt.

E flat Alto Clarinet

Boehm System.

Selmer.

From A. Baines.



MODERN ORCHESTRAL SET OF BOEHM SYSTEM CLARINETS.

Left to Right: Bass Clarinet, Bassett Horn, A and B Flat Clarinets, C Clarinet and E flat Clarinet.

(From A. Baines).

CHAPTER XXXTHE BASSET HORN AND ALTO CLARINETThe Basset-Horn:

The manufacture of Basset-Horns was revived by V. Mahillon of Brussels in the 1880s and the instrument now figures in the catalogues of many German instrument-makers. Robert Stark taught it in the Music School at Würzburg and made many arrangements besides original compositions for it. In England Francisco Gomez (d.1937) reintroduced "Non, Più di Fiori" to Promenade Concert audiences after a long lapse. Most Opera Houses today possess Basset-Horns which are now used in works for which they were intended instead of replacing them with Clarinets.

In practice the Basset-Horn is a difficult instrument to handle, although in theory it is immediately playable by any Clarinetist. The length makes it a difficult instrument to tune and the "Basset" keys do not recommend it to the occasional player.

In 1909 Richard Strauss used two Basset-Horns to reinforce the Clarinet chorus in "Elektra" and the instrument also appears in "Die Frau Ohne Schatten", "Der Rosenkavalier", "Daphne", op.92 (1938) and "Capriccio" op.85 (1942).

His example was followed by Holbrooke in England and by Van Dieren, Roger Sessions and Frederick Converse in U.S.A., while in Holland it has been used by Marius Flothuis and Rudolph Escher.

Whereas most of the deeper Clarinets are Nineteenth Century, French inventions with a wide bore, designed originally to supply Military Bands with fat, resonant tones useful in the transcription of string parts from orchestral works, the Basset-Horn is truly an instrument of the Eighteenth Century and its major composer of that time is Mozart. "Magic Flute", "La

Clemenza di Tito", the great "Serenade in B flat for Thirteen Wind Instruments" and the "Requiem" (which employs no Clarinets), together with several chamber works, employ the Basset-Horns.

Pitched in F (a major third lower than the A-Clarinet), it is traditionally made with the same bore as the A or B Flat Clarinets and played with the same mouthpiece. The Uebel instruments of the Vienna Philharmonic have a bore of 15 mm, while most French instruments used by London players have a bore of 16 mm. The compass has been extended below Low E (sounding A) to Low C (sounding F) which is done with four keys. On German instruments all four are worked by the Right thumb, while on French instruments two are worked by the thumb and two by the little fingers. The crook may sometimes be of wood but is usually of metal.

Possibly the Basset-Horn was introduced to Mozart by the Stadler Brothers. Mozart's use of the Basset-Horn in the orchestra was not followed up by other composers.

Beethoven uses it in the "Prometheus" Ballet-Music but after this its appearances are infrequent and sporadic. It again became a solo instrument and some of its better-known exponents were Carl Baermann, J.G.H. Backofen, Iwan Miller, Tausch, K.F. Bauersachs and Beerhalter. Neither Weber nor Spohr seem to have been attracted by it although Mendelssohn wrote two delightful trios for it with Clarinet and Pianoforte, inspired by the fine playing of Heinrich Baermann and his son Carl. (Konzertstücke, op. 113 and 116). The Basset-Horn was welcomed into Prussian and German Military Bands but by 1855 its popularity had completely waned. The last virtuoso of note in Germany was Aloysius Beerhalter (1800 - 1852), of Stuttgart, who had considerable success in London in 1843.

Brahms, writing to Clara Schumann in November, 1855, expresses his joy at hearing Frau Guhrau, accompanied in a Mozart Aria by two Basset-Horns which had been obtained with great difficulty.

The Alto Clarinet.

In outward appearance this instrument, pitched in E Flat, or sometimes in F, resembles a truncated Basset-Horn. Its history is obscure. It may have been a development of the Clarinet in G or simply a variant of the Basset-Horn. Iwan Miller must take the credit for its "invention" since in 1808 he was performing upon an 18-keyed Basset-Horn by Grenser of Dresden. Possibly Miller found the Thumb-Keys an obstacle to rapid execution, since in his Tutor published c.1825, his "Clarinetto-Alto" is shown without them. Curt Sachs in "Handbuch der Instrumentenkunde" states that in 1808 Grenser began the manufacture of straight-bodied Basset-Horns without supplementary keys and thus claims this as a German invention. The E Flat Alto Clarinet has had a long and honourable career in Military music and still maintains its place in many Continental and American bands. In England its place has been taken in the Military Band by the E Flat Alto-Saxophone which has resulted in less variety, tone colour and available compass in this section of the Band.

Mozart's frequent use of the Basset Horn is mentioned in "Orchestration" by Cecil Forsyth pp.282-283. See also Kochel pp. 332-3 (K.V.411).

An Adagio for two Clarinets and three Basset-Horns. The third Basset-Horn descends to F (its lowest note).

Balfe in "The Bohemian Girl", 1843, uses a Basset-Horn in "Heart Bowed Down". This part is often "faked" by modern Clarinetists but the written low concert C could only be reached by a Basset-Horn or Alto Clarinet.

CHAPTER XXXITHE BASS CLARINET

The documented history of the Bass Clarinet may be said to begin with an announcement in the Paris newspaper "L'Avant Courreur" (11th May, 1772) quoted from Constant Pierre, "Les Facteurs d' Instruments de Musique" (pp.103 - 4) since no known specimen has survived.

"Le Sieur G. Lot, Facteur d'Instruments à Vent, demeurant dans la cour des moines de l'Abbaye Saint-Germain, vis-à-vis de la Fontaine vient de faire paraître un instrument de musique d'une nouvelle invention, sous le nom de Basse-Tube (Basso Tuba) ou Basse de Clarinette. On n'a point encore vu d'instruments d'une étendue considérable. Il est susceptible de Trois Octaves et Demie pleine: il descend aussi bas que le Basson et monte aussi haut que la Flûte. Cet instrument, qui est d'une forme tout à fait particulière, contient plusieurs clés pour l'usage des semi-tons, toutes très artistement arrangées et d'un mécanisme fort ingénieux. Les sons qu'il produit sont très agréables et si parfaitement sonores, qu'ils imitent de fort près, dans le tons bas, ceux d'un orgue dans l'action des pédales. Cet instrument étant joué par un habile artiste, ne saurait manquer de produire un très bon effet et d'avoir l'approbation du public, soit qu'il soit entendu seul ou dans l'Orchestre".

The Bass Clarinet may well be much earlier than this documented history. Two specimens in good order, one in the Berlin Collection (No. 2810, formerly No. 910 in the Snoeck Collection) with only one key and the second with three keys in the Brussels Conservatoire (No. 939), once owned by Adolphe (Antoine Joseph) Sax and is described by Victor C. Mahillon (Catalogue Vol. 2, p. 219). Both are identical in essentials of design. The body-tube, an inch thick, is considerably wider at the bottom than at the top and resembles, in shape, a narrow triangle with a blunted apex. A long crook of graceful and

surprisingly modern appearance is fitted at the top and an upturned widely-flared bell at the bottom. Both crook and bell are of brass. A third specimen may be seen in the Museo Storico Civico of Lugano which differs little from the others but has a downward-pointing bell.

The Klarinetten-Bass of Heinrich Grenser (1720 - 1807), the famous Bassoon-maker, was probably designed to replace the Bassoon in Military Bands. The Revolutionary Period of 1790 - 1805 witnessed the growth and development of Military Bands throughout Europe and a portable Bass Clarinet for military purposes, doubling back upon itself in the manner of the Bassoon, begins a series of Bass Clarinets after Grenser's model. Possibly the design is not yet quite extinct but such a model sets the manufacturer severe mechanical problems which have never been satisfactorily solved.

One specimen of the Klarinetten-Bass survives and this is preserved in the Herzogliches Museum at Darmstadt (No. 266). One specimen by Desfontelles of Lisieux, made in 1807, may be seen in the Paris Conservatoire Museum (No. 1136) and has been considered to be the immediate predecessor of the Saxophone. C. Pierre in "Les Factures" (p. 402) admits his error in stating this fact and J. Koel "Das Saxophon" (pp.184-5) and V.C. Mahillon "Catalogue Descriptif" (Vol.iv, p.357) also put forward a strong case for Antoine Joseph (Adolphe) Sax as the original inventor of the Saxophone.

The specimen by Desfontelles is a striking anticipation of Iwan Müller's invention since it has thirteen keys, mounted in saddles and between pillars, and this is the first known instance of pillars being used in Clarinet design.

Nicola Papalini (c.1810) solved the problem of shortening the tube by an ingenious, if grotesque design where the bore is curved in serpentine fashion. The instrument is pitched in C and has sixteen tone holes, of which five are closed by keys.

The bell turns outward towards the player's right and a double-curved crook, carved from wood, brings the mouthpiece conveniently to the lips.

The undulating bore is excavated in two separate blocks of Pearwood, glued together and secured by iron or wooden pegs along the edges. This type of construction is found in nearly all early and obsolete woodwinds of curved shape and usually the finished tube was covered in leather. This specimen is not covered with leather.

Five specimens survive in public collections: Brussels (940), Paris (550) Meyer (1538), New York (2545) and Boston (119, formerly in the Galpin Collection).

Dumas of Soumiers presented his Bass Clarinet for trial at the Conservatoire in 1807, where it was warmly praised by Cherubini, Méhul and Catel and was recommended in 1810 to the Garde Impériale but the players, accustomed to six keys, were alarmed at the thirteen keys of the new invention and showed no disposition to re-learn a new fingering. This is the account given by Pontécoulant "Organographie" of Dumas' invention which was exactly contemporary with that of Desfontenelles.

Isaac Franco Dacosta (1778 - 1866) is said to have acquired this instrument from the inventor on his death in 1832 while Dumas was co-operating with Buffet in the production of a Bass Clarinet. He gave a recital upon it at the Salle Saint-Jean de l'Hôtel-de-Ville where the beauty of its tone and effortless execution on the part of the artist were much appreciated by the critics. "Revue Musicale" (June 5th, 1834) describes the body of this instrument as being straight with a curved crook carrying the mouthpiece towards the player. According to Lavoix, the famous solo in Meyerbeer's "Les Huguenots" was written for this very instrument.

In 1812 Sautermeister of Lyons produced a Bassoon-shaped model, called the "Basse Orgue" (C. Pierre les Facteurs,

p.344) and a similar model extended to low C was brought out by L. Muller of Lyons in 1846.

Gottlieb Streitwolf (1779 - 1837) of Göttingen made a bent-up model in box-wood which extended to Low c or b flat. Pitched at first in C and later B Flat, it was equipped with seventeen, eighteen or nineteen keys. Some tone-holes were bored obliquely and were uncovered. It is described in "Revue Musicale" (1830 Tom 8/9, p.329).

Catterino Catterini of Padua designed an ingenious instrument c.1838 called "Glicibarifono". It is made from a single block of Boxwood of oval section, approximately twenty-three inches long. A long brass crook carries the mouthpiece, while the other end terminates in a widely flaring bell of wood. Twenty-four cleverly contrived brass keys, mounted on saddles, cover correctly located tone-holes of adequate size. This model, described from a specimen in the Bate Collection, is pitched in C and extended downwards chromatically to c. Another specimen in the Brussels Collection (No. 941) stamped "P. Maino, Milano" is pitched in B flat and may be a later model.

Catterini's instrument attracted the attention of Klosé in Paris, who communicated details of it to Kastner ("Traité Général de l'Instrumentation", Paris, 1837 -44).

Adolphe (Antoine-Joseph) Sax applied his mechanical skill to a new Bass Clarinet (19th June, 1838) which has since become standard in shape and design for all models made since. The straight body, accurately-placed tone-holes, each covered by a padded cup, properly proportioned bore and an additional speaker-key near the mouthpiece are the main features. The new Bass Clarinet was provided with the usual metal crook and a downward-pointing bell. The compass was increased at the top by the Second Speaker-key and the lowest note was E, sounding D. Sax later

improved the design by providing a large upturned bell - the "Concave Metallic Reflector" mentioned by Berlioz.

The Rod-Axle Mechanism was being applied to all Woodwind instruments after the middle of the Nineteenth Century and the Bass Clarinet with its large and wide-spread tone-holes presented no more serious difficulties to makers and from that time the model of today with the straight tube with metal bends at both ends and an upturned bell, became the standard type in France and England.

The German model, like their Bassett-Horn, was straight except for the bend at the upper end. Most instruments are now provided with an extra low semitone so that the lowest note written for a Bass Clarinet in A can be played on the B Flat instrument. This key may work from either the little finger or right thumb. Bass Clarinets are given two speaker-keys which are often nowadays made to work automatically.

Bass Clarinets have been made in C, B flat and A. The C was more or less obsolete by the middle of the Nineteenth Century and although Wagner did write for the instrument in A, the Bass Clarinet in B Flat is now very generally used for all purposes. Simple System, Oehler or Boehm mechanism may be fitted to modern instruments.

African Blackwood is generally favoured as the material for Bass Clarinets in Britain and France. Boxwood too, was a favourite long after its use for the instruments of higher pitch had been abandoned, probably by reason of its comparative lightness. German makers have experimented with the softer woods, such as Rosewood and Maple. Heckel favours Maple.

Sax employed metal in the 1850s and Losschmidt of

Glomac produced a Bassoon-shaped model in 1867 (Crosby Brown Collection, N.Y. No. 2459) which has foreshadowed the striking designs of M. Claude Mouvenaghiel, Technical Adviser to Messrs. Leblanc, who has declared himself in favour of metal for all Clarinets of deeper tone.

CHAPTER XXXIITHE CONTRABASS, CONTRA-ALTO AND OCTO-CONTRABASS
CLARINETS.

Designed by M. Charles Houvenachel and manufactured by the Paris firm of Leblanc, these comparatively new arrivals in the Clarinet Family are rapidly gaining popularity among professionals and composers in the commercial world of Film and Broadcast Music (Figs. 110 and 111).

These instruments are made in German Silver (Maillechort) and have a truly cylindrical bore unlike the conventional B flat and A Clarinets which have roughly one third of their bores conical.

The compass of these large instruments is five octaves (up to the fifteenth harmonic) and in the top register sounds rather like a Cor Anglais. Ease of blowing, mobility almost equal to the normal Clarinet and remarkable sustaining power should contribute towards the Contrabass Clarinet in B flat (one octave below the normal Bass-Clarinet) taking its rightful place in the modern Symphony Orchestra and Wind Ensemble before many years have passed. Already modern composers such as Pierre Boulez have included the instrument in their scores.

The Contrabass Clarinet as made by Leblanc has an extension to written low D which gives it a playing compass down to the lowest C of the Pianoforte.

A single specimen of the Octo-Contrabass Clarinet has so far been made to demonstrate that the Clarinet Family should logically provide the deepest tones through their comparatively short tube-lengths and absence of difficulty in controlling the lowest notes at the pianissimo (a characteristic of all conical tubes).

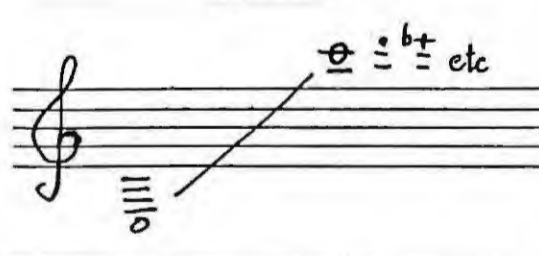
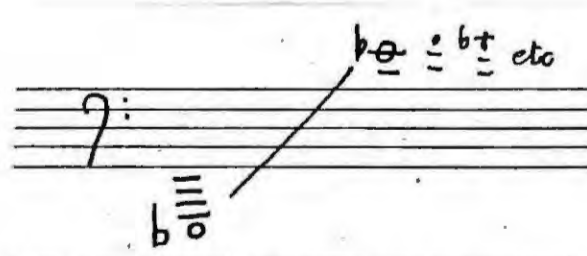
Since Messrs. Leblanc manufacture a Piccolo B flat Clarinet (one octave higher than the normal B flat Clarinet) the total compass of the entire Clarinet family is just a few

notes short of that of the largest organ.

The Contrabass Clarinet in its conventional form manufactured by Muller and made of wood has surprisingly been neglected by composers. Its voice has been described as "God-like" and it must be the most effective instrument in the Contra-Bass range - not excluding the String Contrabass. Perhaps its extreme weight and expense has so far accounted for its rarity among players and its consequent neglect by composers but now that the magnificent instruments of Leblanc are gaining in popularity by reason of their comparative lightness in weight and compact design, with the ingenious cross-action of divided bars across the adjoining curves of the body-tube, the Contrabass Clarinet and possibly the Octo-Contrabass Clarinet will undoubtedly take its well-deserved place in the orchestra and wind-bands of the future.

The latest Catalogue of the Leblanc Corporation (1962) offers the B flat Contrabass Clarinet and the E flat Contra-Alto Clarinet, the latter sounding one octave below the written notes of the E flat Alto Clarinet.

The compass of the Leblanc (Paris) E flat Contra-Alto Clarinet is:

<u>Written:</u>	<u>Sounding:</u>
	

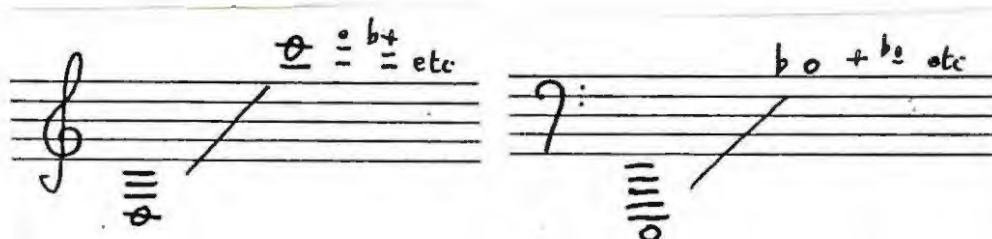
from which it may be perceived that the player is able to play straight off the written Bass-part without difficulty of transposition other than the necessary attention to accidentals. This makes the instrument a very useful addition to the Wind Ensemble which has become very popular in U.S.A. in the past

few years.

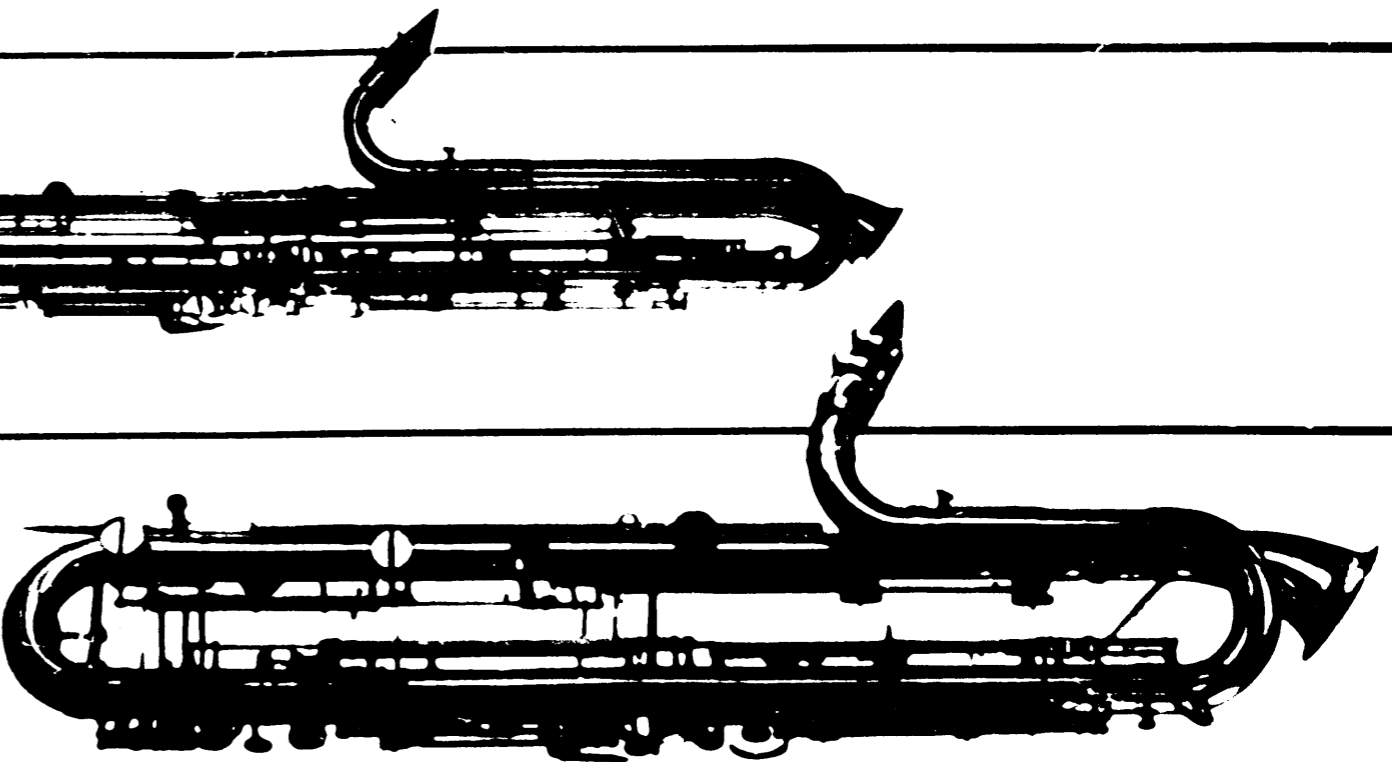
The compass of the Leblanc (Paris) B flat Contrabass
Clarinet is:

Written:

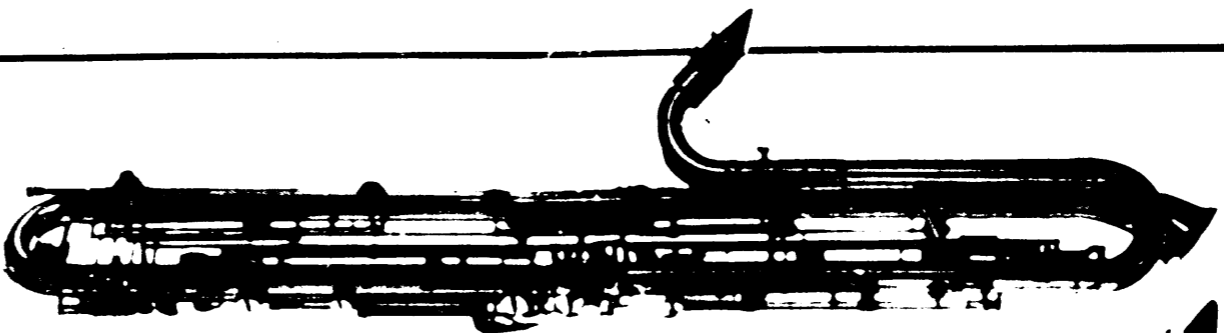
Sounding:



with an optional Model 345 with extension to Low C, giving the
lowest sounding note as B flat.



CONTRA ALTO CLARINET
LEBLANC PATENT



CONTRA ALTO CLARINET
LEBLANC PATENT

LEBLANC CONTRABASS AND CONTRA ALTO CLARINETS.
(The cross-action and divided bars may be clearly seen).

By courtesy of the Leblanc Corporation, Kenosha, Wisconsin, U.S.A.



Model 140
Leblanc extended
range Bb
contrabass
clarinet



Model 150
Leblanc extended
range Bb contra
alto clarinet

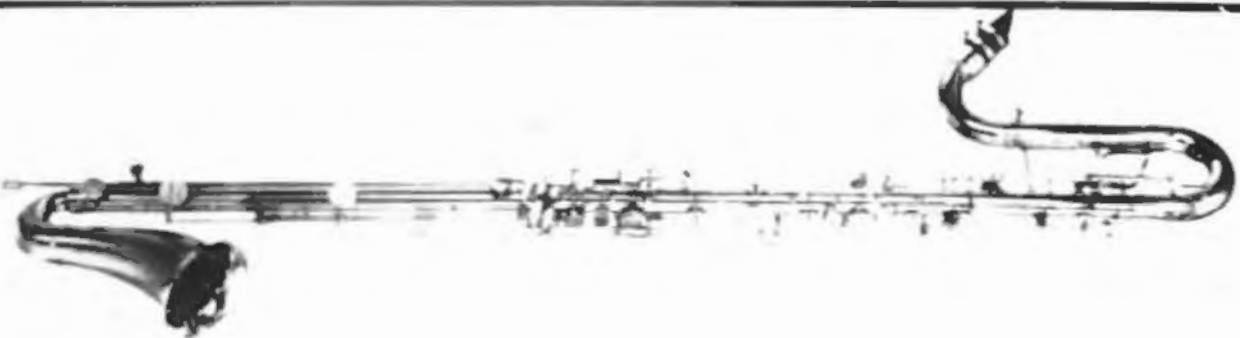
LEBLANC CONTRABASS AND CONTRA ALTO CLARINETS.
(The cross-action and divided bars may be clearly seen).

By courtesy of the Leblanc Corporation, Kenosha, Wisconsin, U.S.A.

Model 12
Leblanc RR
contrabass
(Straight)



Model 132
Leblanc Eb
contra alto
(Straight)



LEBLANC STRAIGHT MODEL CONTRABASS AND CONTRA ALTO CLARINETS.
Specially designed for use by young players seated on high stools.

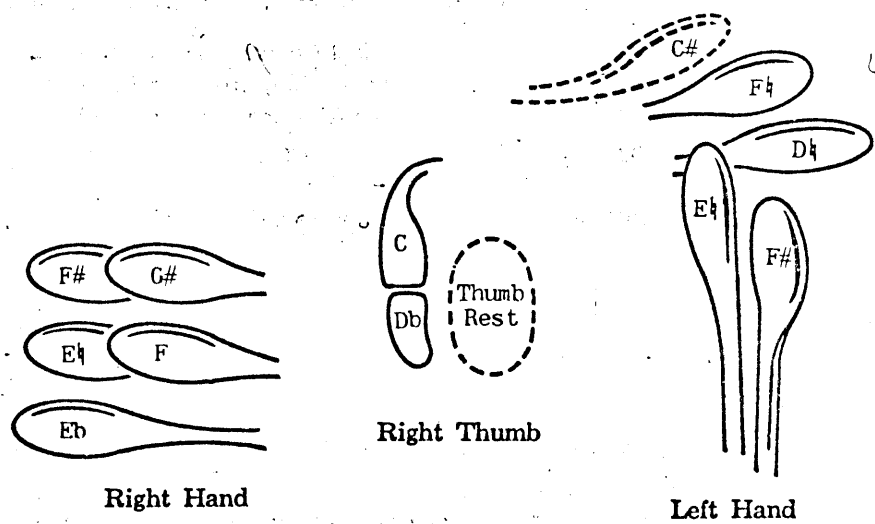
By courtesy of the Leblanc Corporation, Kenosha, Wisconsin, U.S.A.

Fig. 112.

FINGERING for the Leblanc (Paris) Bb Contrabass clarinet is the same as for all the other clarinets from low E to high C. Below the low E, Eb is fingered with the extra key for the right little finger and the D with the extra key for the left little finger.

The Leblanc (Paris) Eb Contra-alto clarinet descends to LOW C. Its Eb and D are played as indicated above. The Db is fingered with the lower spatula for the right thumb and the C with upper spatula also with the right thumb. (See below.)

The Leblanc (Paris) Bb #345 Contrabass clarinet descends to low C (as low as the contra-bassoon). Its fingering is the same as described above for the contra-alto clarinet. (See below.)



CHAPTER XXXIIITHE SAXOPHONE

Antoine Joseph ("Adolphe") Sax (1814 - 1894) may not have been the actual inventor of the instrument which bears his name and which is counted as the most recent arrival among the families of Woodwind Instruments. In 1807 the addition of a mouthpiece with single reed to a conical tube was made by Desfontenelles, a clock-maker of Lisieux. The first imperfect model was fitted with a register key which raised the Fundamental register by a fifth. (Ref. Alphonse Leduc "Musique pour Saxophone", Paris, Current Catalogue).

Prof. P.R. Kirby has pointed out that the earliest Saxophone may well have been an Ophicleide fitted with a Clarinet mouthpiece. He recalls having seen such a specimen in a shop in Aberdeen.

Adolphe Sax added an octave-key and simplified the fingering, softened the tone-quality and added a metal bell of brass or copper. Kastner's Opera "Le Dernier Roi de Juda", 1844, contains the earliest Saxophone part.

By 1846 the instrument became practicable and among Sax's earliest supporters were Berlioz, Auber and Halévy, but since the tone-quality of the new instrument was thick and without distinctive character it was not accepted in the Symphony Orchestra. It did, however, fill the needs of Military Bands, where it was able to intensify the harmony and fulfilled the function of Viola, 'Cello and Double Bass in Band instrumentation.

In 1872 Georges Bizet orchestrated his incidental music to Daudet's "L'Arlesienne" and the Alto Saxophone appeared for the first time in the Orchestra. Massenet used it later but the tone quality did not generally attract the attention of composers until several years after. The rise of Jazz and Dance Music established the Saxophone in this specialised field and manufacturers have improved and developed the instrument to an extent where it has now a distinctive character and tone

quality, so individual that modern composers have included it in their works for Symphony Orchestra. R. Vaughan Williams uses an Alto Saxophone in his Ballet Suite "Job" and in his Sixth Symphony employs a B flat Tenor Saxophone. Walton uses it in "Balshazzar's Feast" and Honegger in "Jeanne d'Arc au Bûcher" uses three Saxophones to replace Horns.

In 1852 a Saxophone class was formed at the Imperial Conservatoire de Musique in Paris, strictly for Military Bandsmen but this was suppressed in 1870. M. Claude Delvincourt, Directeur du Conservatoire National de Musique, caused the class to be reformed in 1942 under the Professorship of M. Marcel Mule and the French School now possesses several admirable virtuosos on an instrument which may justly claim its place in the modern Symphony Orchestra.

The Saxophone was first introduced into England about 1850 by Richard Carte of Rudall, Rose and Carte but in Germany it was almost ignored and it is said that the specified Saxophone Quartet in Richard Strauss' "Sinfonia Domestica" could not be recruited amongst local players.

The modern Family of Saxophones in general use are:

- E flat Sopranino (very rare),
- B flat Soprano which may be straight or curved (sometimes pitched in C),
- F Mezzo Soprano (very rare)
- E flat Alto,
- C Melody, (sounding one octave below the Oboe)
- B flat Tenor,
- E flat Baritone,
- B flat Bass (Rather Rare)
- E flat Contrabass (Very Rare).

The chief manufacturers in France are Selmer, Coesnon, Buffet, Leblanc, and Martin and in the United States of America, Conn and King. While many other well-known instrument makers

do manufacture Saxophones, the French instruments are in greatest demand by professional players.

The addition in 1860 of automatic octave-keys to the Oboe System devised by Barret, led to the application of automatic octaves to the Saxophone. Where automatic octave-keys have long been out of favour among Oboe-players, this mechanism is standard on all modern Saxophones. The development of the Saxophone by manufacturers catering for the Dance-Band instrumentalists led to a widening of the bore which, together with the automatic octave keys, has transformed the instrument in both appearance and tone-colour from the primitive Saxophone of the Nineteenth Century. The somewhat flashy tastes of Dance instrumentalists led also to the addition of mother-of-pearl key-touches which again are a characteristic visual feature of the modern Saxophone.

Messrs. Selmer of Paris have extended the bell of their E flat Baritone and fitted this with an extra hole to give the Low A (equivalent to the lowest G string of the Cello). The extra hole is governed by a trigger-key placed under the thumb-rest for the Left thumb.

During the Classic Age of Jazz in the 1920s and 1930s each member of the Saxophone Family developed an individual character of its own. The clear, if somewhat monotonous tone of the Alto Saxophone established this as the chief melody instrument in Ensemble work. Two Altos and one Tenor form the basic Ensemble but the modern Theatre or Dance Band may include two of each, Alto and Tenor plus a Baritone. The small b flat Soprano is not favoured because of the Bflat Clarinet which has such a greater compass and is invariably "doubled" by most Saxophonists.

The quartet of Saxophones (Soprano, Alto, Tenor and Baritone) has been developed and exploited by the great French

soloist and teacher, Marcel Mule, with his "Quatuor des Saxophones de Paris" and this has been accepted as one of the most sensitive Wind Ensembles in the world. In the modern Wind Ensemble which caters primarily for the enthusiastic amateur wishing to perform concerted music (mostly arrangements) for several diverse Reed and Brass instruments, the Alto, Tenor and Baritone Saxophones fill a useful place in the middle and lower voices.

The Baritone can form a very efficient Bass, while not entirely replacing the splendid tone of a Bassoon, and may be easily played by reading straight off any existing concert-pitch Bass-part, provided that the player retains the correct change of key-signature and the attention to changed accidentals. With very little practice the player may transpose at sight from Bass-clef into the Treble-clef while the written pitch of the E flat Baritone sounding at the lower minor third gives the required sounding pitch in concert.

The Alto Saxophone sounding one octave higher becomes a useful substitute for the French Horn if the player is able to manage the simple transposition of the whole tone higher for Horn in F. It is, moreover, an agile voice in passages which might tax the executive resources of even the finest Horn-player. The B flat Tenor strengthens the part of the Bassoons especially in their weaker upper register.

"Saxophone le Rationnel" par M. Houvenaghel (Leblanc, Paris).

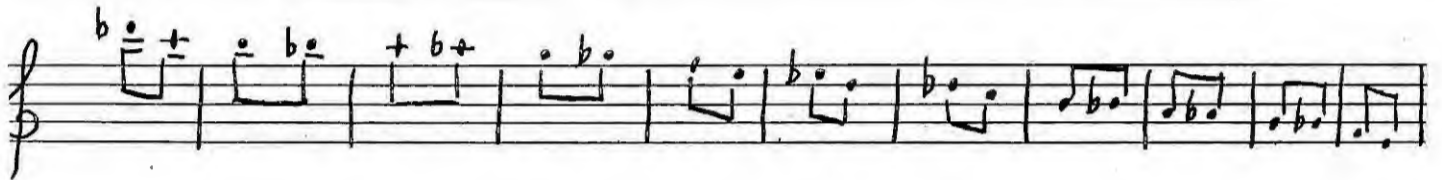
(Ref. J.A. MacGillivray, Galpin Society Journal XII, May 1959).

This instrument appears at first sight to be no more complex than the normal Saxophone and yet it provides additional facilities for the player which are - to say the least - astonishing.

On the Boehm-System Flute the B flat is obtained by adding the first finger of the Right hand to the B natural fingered in the

Left hand and on the Boehm-System Clarinet and Saxophone this same note B flat is obtained by the addition of any one of the three fingers of the Right hand rings or plates.

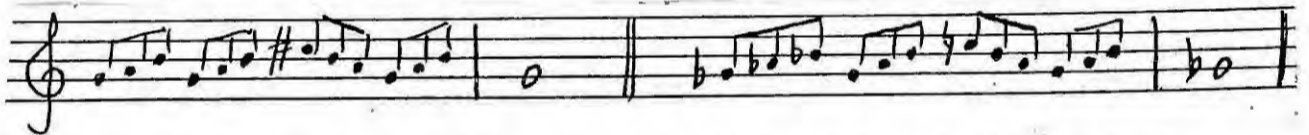
M. Houvenaghel's system allows the whole series of notes, C sharp, B, A, G and F (with alternative "Forked E flat") to be lowered in pitch by one semitone, simply by the addition of the second finger of the Right hand.



In this phrase, therefore, one holds the same fingering throughout each bar, adding the second finger of the Right hand to obtain the second note.

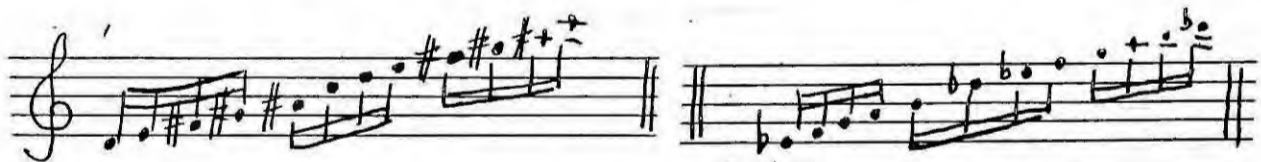
(i) Normal Fingering

(ii) Addition of R.H.2. throughout



(iii) R.H.3.1. L.H.321
in succession

(iv) R.H.2. raised throughout



The player may either use his normal Saxophone fingering or experiment with the new facilities as he may desire.

This Saxophone has been designed on Boehm's principles with holes in geometric series. The key system has already been incorporated in M. Houvenaghel's Contrabass Clarinet.



- (A) Baritone (Schunda, Budapest).
- (B) Alto Saxophone (Pre-Jazz), Mahillon
- (C) Modern Saxophone (Conn. U.S.A.) showing rare mezzo-soprano size in F.

(From A. Baltes)

CHAPTER XXXIV

THE OCTAVIN, TAROGATO AND HECKELPHON-KLARINETTE.The Octavin.

Designed by Julius Jehring in 1894 and made by Adler of Markneukirchen, this instrument resembles the Butt-Joint of a Bassoon, in that two parallel passages are bored in an oval joint of wood about eleven inches long and are joined at their lower ends by a U-bend. The bore is conical but somewhat narrower than that of a Saxophone of the same pitch. The smaller end of the bore continues for a few inches above the butt and terminates with a Clarinet-type mouthpiece and reed. A small detachable metal bell projects from the wide end of the bore and is curved over to face sideways.

The Primary Scale is $d' - c''$ and the key-system closely resembles that of the Simple-System Oboe. Keys for both little fingers give an extension to low b natural and three thumb-plates for the left hand add three more semitones to the downward range. An octave-key is worked by the Left thumb. The Octavin has been made in C and in B flat and according to a fingering chart published by Zimmermann (Leipzig) the full compass is from written g sharp to g''' .

The instrument is exceptionally easy for any reed-instrumentalist to play and its tone is reedy and bright, rather between the tone of the Oboe and that of the Soprano Saxophone. Altenburg mentions a bass Octavin (descending to G) but the Octavin is very rare and few musicians have heard of it. Most Musical Dictionaries ignore the Octavin and it is difficult to say exactly for what purpose this quaint little instrument was first designed. There is no doubt that it owes its origin to the Saxophone Family and is possibly a German attempt to circumvent the Saxophone which was not popular in

Germany for many years. The Adam Carse Collection in the Horniman Museum contains two specimens, one in B flat, fifteen keys, two rings, Sounding Length, twenty-nine and a half inches, Height, sixteen and three-quarter inches (No. 99) and another in C, fifteen keys, two rings, Sounding Length, Twenty-seven and a half inches, Height, Fifteen inches (No. 261). My own personal experience of handling and playing one of these rare little instruments dates from 1938 when I saw the specimen owned by Mr. Reginald A. Tritton of Acton, London, who still has the instrument at this time.

Adam Carse and personal research.

The Tárogató.

Originally a primitive double-reed instrument with a conical bore, known as the "Hungarian Shawm" and romantically associated in Hungarian national lore with Rakowsky (d.1735). A fresh national spirit moved certain Hungarian musicians to revive national instruments in the 1890s, when the Cimbalom (Hungarian Dulcimer used in Kodaly's *Mary Jane's Suite*) and the Tárogató were re-designed to suit patriotic musical requirements.

The Tárogató is best known today as one of the instruments used in the second stage call in the last act of Richard Wagner's "Tristan and Isolde".

W.J. Schunda of Budapest devised the modern version in 1900 and it resembles a wooden soprano Saxophone both in shape and in tone quality, since Schunda replaced the double-reed with its over-strident effect with a Clarinet-type mouthpiece and single reed (Fig. 114, a.)

Richter is said to have preferred the Tárogató in "Tristan" at Bayreuth, although Wagner's score marks the second stage call "Cor Anglais" but observes in the Preface that it would be better "if a special instrument of wood be made for it

after the model of the Alp-Horn which, on account of its simplicity, should be neither difficult nor expensive".

In Covent Garden Opera, Richter's Tárogató is still used, while in Vienna they use a Soprano Saxophone, in Barcelona the native Tiple is used and in Germany a straight wooden Trumpet in C, with one whole-tone value, which is said to give the most satisfactory effect for Wagner's work.

A single specimen is to be seen in the Horniman Museum (No. 245), made by J.T. Lamy, Paris, twenty-nine inches long with fifteen keys and two rings. I am again indebted to Mr. R.A. Tritton (see Octavin) for the opportunity to handle and play his own Tárogató (made by W. Schunda) which was pitched at the now obsolete "High-Pitch" (a' = 452). This instrument was similar in fingering to the Octavin and had vent-holes bored in the bell. It was surprisingly easy to blow.

The Tárogató is popular as a folk-instrument in Rumania.

Ref. A. Baines,

Adam Carse Collection
and personal research.

Heckelphon-Klarinette.

Designed in 1907 by Heckel of Biebrich. A wooden Saxophone-type with a very wide conical tube continuing at the narrow end by a slightly bent metal tube with single-reed mouthpiece. The lower end has a slightly incurved bell. The instrument was designed to augment the lower Clarinet register in Military Bands. It is in unison with the E flat Alto Saxophone.

The Heckelklarina is similar to the above instrument but is pitched in B flat and in unison with the Soprano Saxophone. It has also been made in High E flat under the name Heckel-Piccoloklarina.

Ref. Adam Carse.

CHAPTER XXXVTHE BASSOON (1600 - 1800)

The doubled tube of the Bassoon was undoubtedly the outcome of attempts to shorten an inconveniently long instrument while still preserving the full sounding-length of the tube. Straight tubes, when made of sufficient length to cover the Bass Register, require a length of six to eight feet and are consequently awkward to hold and play. Metal tubes could be shaped more compactly by folding or coiling the tube but since it is not possible to fold or coil a wooden tube, some other means had to be found for reducing the size of the instrument.

The idea of uniting two parallel passages bored through the same piece of wood cannot be traced further back than the Sixteenth Century.

Michael Praetorius (1571 - 1621) in his works "De Organographia" (1619) and "Theatrum Instrumentorum" (1620) gives a detailed description of the instruments in use during this period and remarks that from olden times up to his day, all wind instruments such as Flutes, Pommers, Schalmeys and Crumhorns were, for the most part, fashioned and pitched in groups (Accorten) or Registers, always differing one from the other by a Fifth.

The name "Pommer" is derived from the Ancient Greek term for all long pipes which was Bombyce or Bombi (Italian - Bombardo or Bombardone). Some writers have connected the name with artillery weapons which may again have derived from the Greek name.

Fagotten and Dulzians (Italian - Fagotto and Dolcesuono) are so called indiscriminately but it is believed that the English Curtail or Curtal is the genuine Dulzian and in depth of pitch these are like the Bass Pommers but quieter and softer in tone.

The Bass Curtal was about thirty-nine inches tall,

commonly known in England as the "Double Curtal" and in Germany as "Chorist-Fagott" (being the size most employed in Church Music as Bass to the Cornetts).

The Kunsthistorisches Museum of Vienna contains three Dulzians of presumed Italian origin (Nos. 195, 199 and 201), each having two keys and other collections at Frankfurt, Hamburg, Berlin, Vienna, Linz, Salzburg, Prague, Venice and Paris possess specimens.

Otto Steinkopf, a Bassoonist from Berlin, has made several modern reproductions of these instruments. The Cervelat or Racket is another early example of an extremely compact instrument with up to eight channels forming a continuous bore when certain finger-holes are closed.

It is not possible to state precisely when in the Seventeenth Century the one-piece two-keyed Dulzian gave place to the three-keyed Bassoon. Historians formerly accepted that the Bassoon was invented by Afranio a canon of Ferrara, early in the Sixteenth Century from the illustrations by his nephew in 1539 of a strange contrivance called the "Phagotum", for which the wind was supplied by a bellows and air reservoir but its tubes seem to have been cylindrical and the sound was generated from a single reed enclosed in an air chamber (Grove, pl. lviii; Wasielewski, pl. v and iv; Forsyth, pl.xii; Galpin, "European Musical Instruments" p.206). The only kinship between the Phagotum and the Bassoon, however, would appear to be in the form of the doubled tubes.

Marin Mersenne (1588 - 1648) in his "Harmonie Universelle" (1636) describes the "Fagots", so-called because unlike the Bass Oboe they were made in two parts and resembled sticks "Fagotés" together. The name "Basson" already occurs at the beginning of the century as a name for the Curtal but Mersenne describes as

"Basson"...../174.

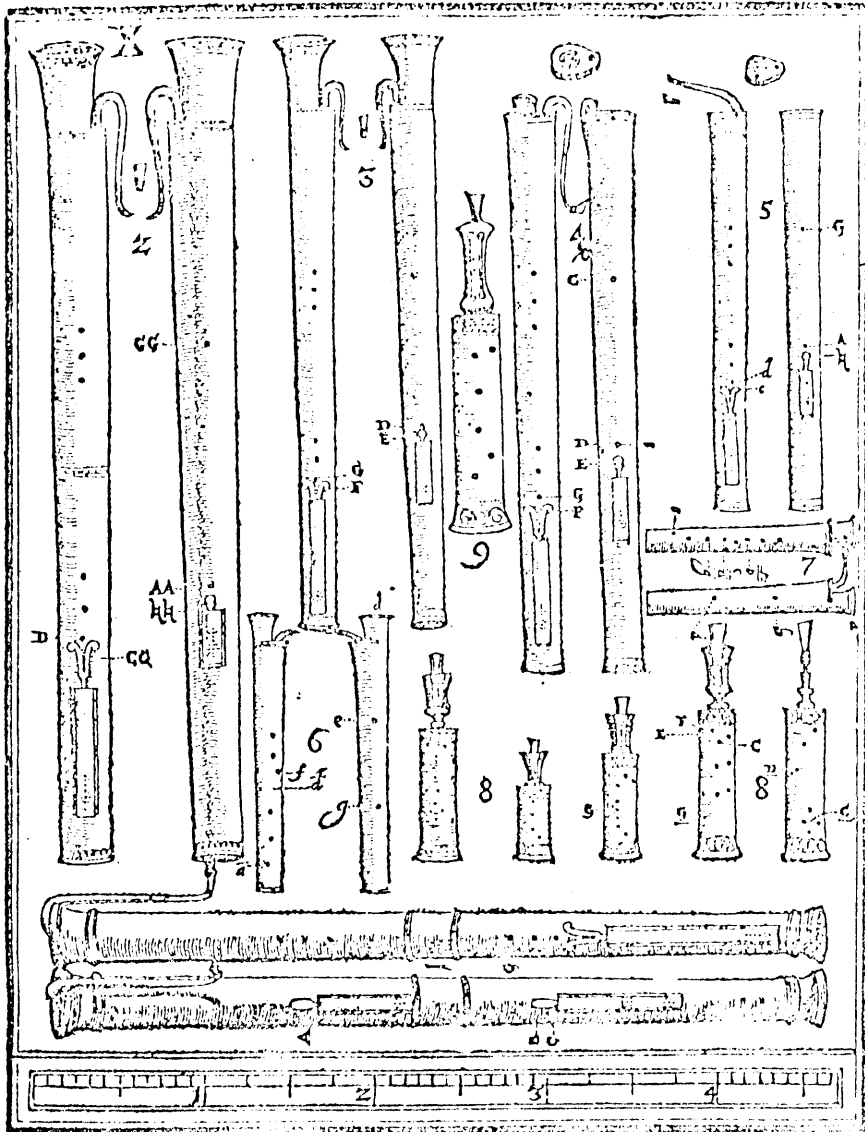
"Basson" a special type of Curtal extended to B flat', presumably to match the Violoncellos of Louis XIII which were tuned one tone lower than normal. The change from Dulzian to Bassoon entailed separation of the long-joint and tenor-joint connected through the U-shaped Butt-Joint and the addition of a Bell-Joint, prolonging the bore to enable the production of B flat which remains, to this day, the lowest note of the Bassoon.

Remodelled in four separate joints, probably by the Hotteterre Family (see Oboe), the Bassoon took the shape which it has retained since the time when it arrived in Purcell's London under the name of "French Basson". It is first named in a Lully score of 1674 but it may well have been in use ten or more years earlier.

The earliest type had three keys (F, D and low B flat) and could be played either Left or Right handed but the addition of a key for A flat stabilised the manner of holding it on the Right since the new A flat key lies beside the F key and is played by the same finger. This key could not be reached if the hands were reversed. It had long been the practice to duplicate the D sharp key on early Oboes in order to accommodate Left or Right-handed players but only one unique specimen of a Bassoon with duplicated A flat keys exists in a specimen by Scherer (c.1750) in the Hug Collection at Zurich.

The Four-Keyed Bassoon (with keys for F, D, B flat and A flat) became the standard Bassoon of the Eighteenth Century and it was probably the type of instrument on which Mozart's Bassoon Concerto of 1774 was performed. A little later the E flat key was added and within ten years this was followed by a key for F sharp, making the common six-keyed Bassoon of the latter end of the Century.

Fig. 115.



1. Sorduen-Bas auff beyden Seiten. GG. 2. Doppelt-Fagott bis ins GG. 3. Für Chor-
 Alt-Fagott C. 4. Ged. et Chorist-Fagott. C. 5. Sings- oder Chorist-Fagott. C. 6. Alt. d. 7. Discant oder Exilent zum Chor-Fagott. a. 8. Einm. et Nad. iten.
 9. Gref-Racketts so tief als der gar Grosse Bass-Bombard, CC, Diff 18. Fuß Thon.
 NB. Sunden 1. 2. 3. 4. 5. stehen die Buchstaben des Clavis bey m. 2. cch/ do es fugemachte wird.
 Im 6. 7. 8. 9. stehen die Buchstaben des Clavis, do das Le. heissen klaffen.

'Praetorius' Plate X, showing the five sizes of Fagott.

The type instrument, the Chorist-Fagott, is of two kinds, No. 3 unmuted and No. 4 muted.

No. 1 is a Bass-Sordun, an obsolete type of cylindrically-bored, woodwind, double-reed instrument.

Nos. 8 and 9, a set of Racketts - another obsolete type.

(Lyndesay G. Langwill - "The Bassoon and Contrabassoon").

Fig. 116.

Extracted from Michael Praetorius' "De Organographia" 1619. (pages 22-23) 898

	1.	2.	3.	4.	5.	6.	7.
X Bombyces, Pommeren, Piffari, Schallmeyern.	1. Bass.	2. Bass Ten. Alt.	3. Bass Ten. Cont.	4. Alt.	5. Tenor Alt. Cont.	6.	7.
	Gross Bass Pommer	Bass Pommer	Bassett Tenor Pommer.	Nicolo.	Klein Alt Pommer	In diesen Theil were auch ein vor sig.	Schal-meyern.	In diesen Theil were auch ein sehr hoch vor.
XI Fagotten, Dolcianen.	1. Quint Fagott	2. Quart Fagott	3. Fagott	4. Fagott piccolo	5. Discant Fagott		
	Doppel Fagott	Fagott grande	Fagott. Chorist Fagott. Corthol. Doppel Corthol.	Fagott piccolo. Alt Fagott. Singel Corthol.			
Modern Development	Contrabassoon, but descending to B ₂	Bassoon, but descending to A ₁	(intermediate) Heckelphone or Barytoneoboe.	Cor Anglais, in F. (intermediate) Oboe d'amore, in A.	Oboe, descending to b ₂	Piccolo	Heckelphone.

In 1619 the Pommeren were still in use beside the Fagotten. The table shows the compass of the respective members of both families and, below, the modern survivals which have evolved from those above.

(Lyndesay G. Langwill - "The Bassoon and Contrabassoon")

Fig. 117.

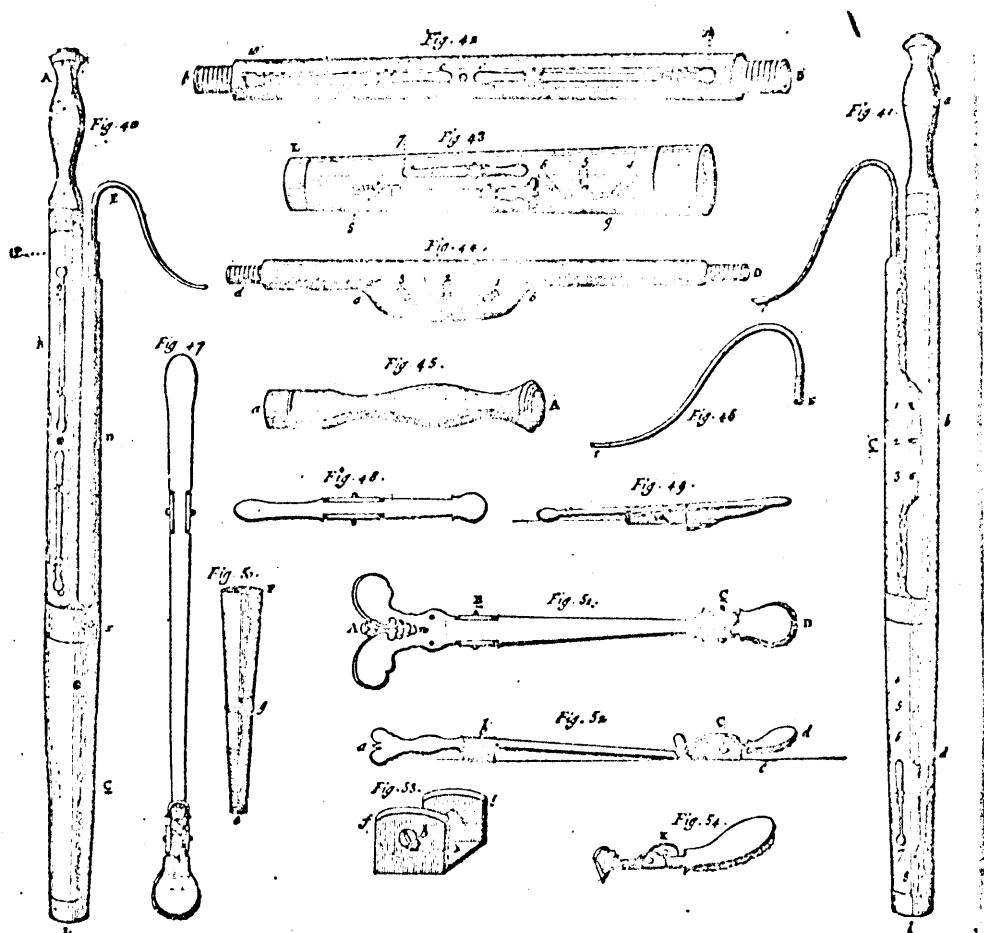
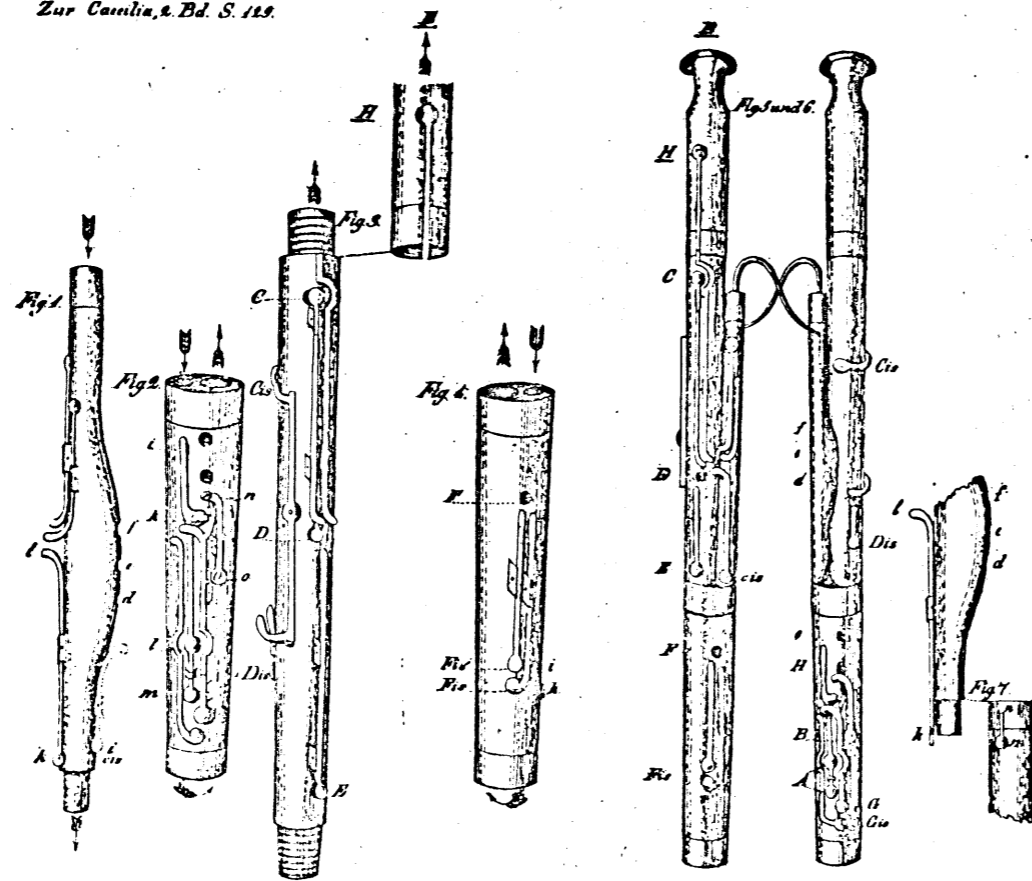
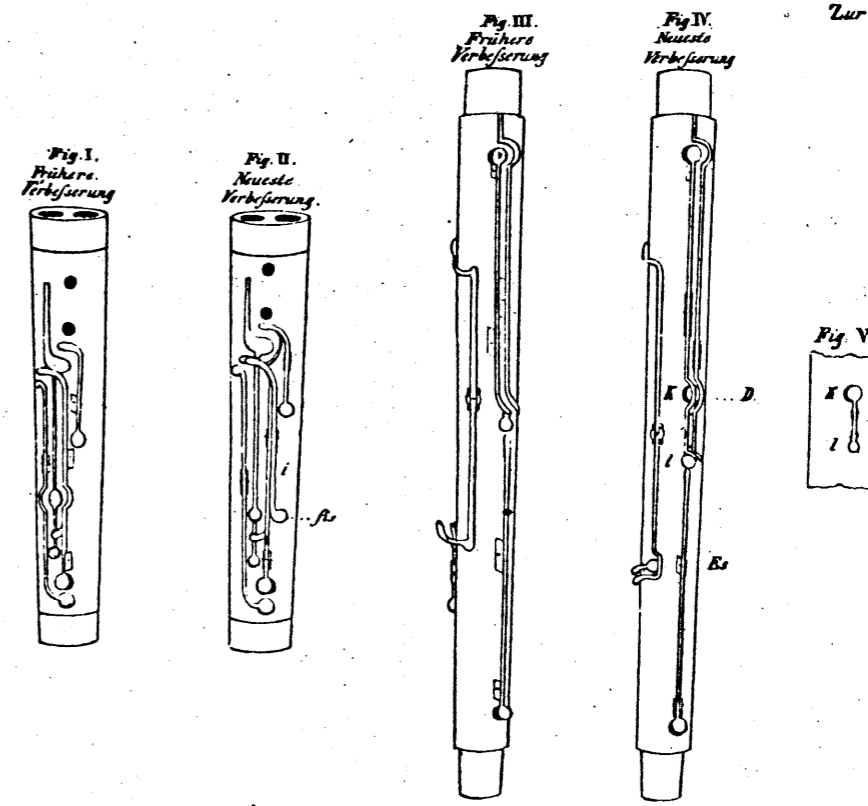


Plate IX in the section *Lutherie* in Diderot and D'Alembert's *Encyclopédie* (1751-65). The various parts of a 4-keyed bassoon are shown in detail. At that period keys were mounted in saddles (Fig. 53) and the key-heads were padded with flat leather. The long reed (Fig. 50) is noteworthy.



This plate from *Caecilia* (1825) shows Almenräder's improvements as described in the text. The twin-headed G-key (lm) in Fig. 2; the altered position of the C# key (z) in Fig. 1; and the Bb key (o) in Fig. 2 are the principal features.



Fayolle nach dieser neuesten Verbesserung werden verfertigt bey B. Schott's Söhnen in Mainz.

This further plate appeared in *Caecilia* (1828) showing two further improvements by Almenräder.

CHAPTER XXXVITHE BASSOON - GERMAN DEVELOPMENTS

When Beethoven's First Symphony was performed in 1800 the Bassoon had gained its fifth and sixth keys and at this time makers in France and Germany had begun to add a seventh "Wing-Key", operated by the Thumb and aiding the production of a' (as the twelfth of d in the Fundamental Scale), b flat' and b natural. Ozi's "Méthode de Basson", 1803, shows a Bassoon of this type.

Later a second Wing-Key was added to aid the production of c", c sharp" and d". Koch's "Lexikon" (1802) specifies seven keys without low F sharp and states that the two Wing-Keys are to be found "only on modern Bassoons".

English Bassoons, c.1800, were beginning to have the normal six keys plus the two Wing Keys. The crooks of this time were heavy brass tubes, wider than the modern crook and without a crook-key hole.

The best makers of this time were K.A. Grenser (1720 - 1807) of Dresden and his successors, J.H. Grenser (1764 - 1813) and J.F. Grundmann (1727 - 1800); in France Savary Père (1775 - 1827) and his son, J.N. Savary Fils (1786 - 1850) and in England, Milhouse, Calaisac, Wood and Bilton were among the best makers.

W. Heckel, in "Der Fagott" (1931 p.13) remarks that although the Dresden Bassoons excelled in their soft beautiful tone, they were only adequate as accompaniment instruments and restricted to the keys of F, B flat, E and G major and in G and C minor. The inequality of individual notes in other keys (e.g. A minor and E major) was apparent in phrases where a smooth technique was demanded. Although experiments were made in adding different keys, the defects were not eliminated and it was finally realised that the body of the Bassoon was at fault and required radical change.

This task was undertaken by Carl Almenröder (1786 - 1843),

a Bandmaster, Bassoonist and afterwards Chamber Musician to the Duke of Nassau in Biebrich and Weisbaden. Gottfried Weber (1779 - 1839), an expert acoustician, musical theorist and founder-editor of the Periodical, "Caecilia", guided Almenröder's experiments. These were carried out in Schott's Factory at Mainz and Almenröder published his findings in his Treatise (1820), describing a fifteen-keyed Bassoon. This and subsequent improvements on it were described and illustrated by Gottfried Weber in "Caecilia" (Band 2, No. 6, 1825 and Band 9, No. 34, 1828). Almenröder's greatest improvement was increased purity and uniformity of the notes, with easier rendition of formerly difficulty passages and an extended compass.

Almenröder used the new stuffed skin pads (first introduced by Ivan Müller in 1809 on the Clarinet) and gives detailed instructions in his Treatise on making these improved pads.

In 1828 G. Weber published an account in "Caecilia" of Almenröder's further improvements made between 1825 - 1828 which were:

1. An extra key for low F sharp on the front of the butt for F3, overlying the F key touch, Fig. II(1).
2. Holes for C and the E flat key moved more into their correct position, making it possible for them to have a size requisite for production of a full sound, Fig. IV. The open-standing C-key touch (1) closes the key at K to give C as shown in the detail in Fig. V.

G. Weber points out that, notwithstanding the removal of several tone-holes to often widely separated positions on the instrument, the key-work has been so devised that the player's fingers could now control these holes from the hitherto normal position.

The Bassoon had now acquired a complete chromatic compass

from B flat to a flat" (four octaves less one note).

Johann Adam Heckel (1812 - 1877) joined the firm of B. Schott at Mainz in 1829 and met Carl Almenröder who was then forty-three years of age and busily engaged in his work on improving the Bassoon. Almenröder persuaded Heckel to join him in founding a Bassoon-making business at Biebrich on 11th March, 1831, and for three years they made Bassoons for B. Schott Fils, Mayence.

After Almenröder's death in 1843 Heckel continued to improve the Bassoon. The improvements made during the Heckel-Almenröder Partnership included the replacing of the middle B flat hole to the back of the Butt-Joint and the provision of the key with dual control (either by the Right thumb with a lever passing through the Butt or by R.H.3 as normally, whichever might be more convenient). At the same time the position of the Right thumb-hole was altered and the hole enlarged and more comfortably controlled by an open key, now known as the "E-Plate". These features, among many other mechanical devices, remain in the present-day Heckel Model. Before 1850 Heckel discarded flat keys mounted on saddles in favour of cupped keys mounted on pillars and improved the key mechanism still further by adopting rod axles as used in the Boehm Flute.

Johann Adam Heckel died in 1877 and Wilhelm Heckel (1856 - 1909), his son, succeeded him in the business.

The Heckel-Almenröder Bassoon was entirely successful from the point of view that an instrument was produced on which the notes could be emitted steadily and evenly as on the smaller Woodwinds. The tone-quality however had been so radically altered from the original ideals of Bassoon Tone (Heckel himself having written that "the clear, hard tone and greater volume of the new Bassoon was less pleasing than the delicate soft tone-colour of the old", meaning the nine-keyed models of the Dresden makers such as Grensel) that a remodelling of the instrument was necessary in order to preserve the original tonal ideals.

The firm of Heckel has achieved these tonal ideals while yet preserving the technical benefits but it has taken the work of two generations of Heckels to undo the damage to the tone of the Bassoon following Almenröder's work. Patient experiment and a gradual working towards a truly conical bore (as Triébert did with the Oboe) and general refinement of manufacture led to the finally perfected model which is said to have made its début at the Bayreuth theatre in 1879. Richard Wagner watched its progress with keen interest and was a frequent visitor to Heckel's workshop.

W. Heckel regulated the course of the bore to minute measurements and established the principle that in the Bassoon the three lateral holes (giving F, G and A) act as the guiding factor. Just as the A hole had been moved by Almenröder, Heckel changed the F and G holes further downwards and widened the bore evenly to the bottom.

W.H. Heckel claims that his father at this time established the correct position for the hole for L.I. Thereafter it was unnecessary to place the holes in their correct acoustical position, since in consequence of a correct cone the egress of the wind could proceed evenly. He abandoned the twin-headed G-Key for R3, moved the hole to a lower and more rational position and fitted a single large key. Almenröder's position for the A-Hole made it liable to fill with moisture and the double-headed key was difficult to pad with an adequate closure.

Heckel added the F sharp-G sharp Shake-Key in c.1870 and c.1880 the C sharp-D sharp Shake-Key. Formerly the F sharp-G sharp key had a shank-key (running in a length-wise direction) and later assumed the oblique form working transversely. Originally the C sharp-D sharp Shake was merely an interlocking of the ring-mechanism with the C sharp key so that simultaneous depression of the ring with the C sharp key opened the D sharp

auxiliary key. Heckel later realised that high b natural¹ and c² would be easier to play if the D sharp auxiliary hole remained open and he formed the coupling in such a way that the hole in question is also opened automatically on pressing the high C. This is the C sharp and D sharp shake mechanism standard on all German model Bassoons.

In 1901 Heckel produced the "Through-Bored" G Key for R.3 with the shank (like F sharp-G sharp shake) passing through the wall of the Butt. In 1902 he introduced the self-operating Ring-Mechanism for the High g.

Many different types of mechanism were tried in order to close the vent-hole in the crook. None were successful until the present mechanism was introduced in 1905. It is operated by the Right thumb and leads from the low E-plate on the Butt, over the Wing-Joint to the crook vent. This mechanism has been copied by other makers with a variety of supplementary devices for Right thumb or Left thumb.

The original Cork Plug closing the base of the Butt which allowed the air-column to pass round in U-fashion was replaced in the Heckel-Almenröder Bassoon with a semi-circular brass tube, soldered to a plate. This was later abandoned in favour of a broad plate fitted with cork as packing and held in place by springs. The modern device has a specially hardened rubber packing and is fastened by ingeniously contrived screws.

In 1904 a German Patent (No. 162092) was granted to Franz Fischer of Strasbourg for an improved water-outlet for the Bassoon.

In 1889 Heckel patented the vulcanised rubber lining (Ausfütterung) which is fitted as a sleeve for the bore of the Wing Joint and the narrow bore of the Butt. These are the only portions of the Bassoon which are liable to the attacks of moisture.

The interior of the Bore is less impervious to decay or splitting and the conical course of the bore remains unchanged and it is claimed that the instrument becomes no heavier in weight by reason of this lining.

The Vulcanite Lining is found on Bassoons by other makers and a Catalogue c.1870 of Laffleur mentions the Ebonite lining then being fitted by Morton of London.

Wilhelm Heckel was succeeded by his two sons, Wilhelm Hermann Heckel (1879 - 1952) and August Heckel (1880 - 1914).

		L		R	
		B \flat		E	
B \flat	•••	•••	F	•••	•••
B	•••	•••		•••	•••
C	•••	•••		•••	•••
C \sharp	•••	C \sharp		•••	•••
D	•••	•••		•••	•••
D \flat	•••	E		•••	•••
E	•••	D		•••	•••
F	•••	E		•••	•••
F \sharp †	•••	F \sharp		•••	•••
G	•••	•••		•••	•••
A†	•••	•••	A \flat	•••	•••
B \sharp †	•••	•••	B \flat	•••	•••
B	•••	•••		•••	•••
c	•••	•••		•••	•••

		L		R	
		C \sharp <th colspan="2">C\sharp </th>		C \sharp	
c \sharp	•••	•••	F	•••	•••
d	•••	•••		•••	•••
e \flat	•••	•••		•••	•••
e	•••	•••		•••	•••
f	•••	•••		•••	•••
f \sharp †	•••	•••		•••	•••
g	•••	•••		•••	•••
a \flat †	•••	•••		•••	•••
a	•••	•••		•••	•••
b \flat †	•••	•••		•••	•••
b	•••	•••		•••	•••
c	•••	•••		•••	•••

		L		R	
		C \sharp <th colspan="2">C\sharp </th>		C \sharp	
c \sharp	•••	•••	F	•••	•••
d	•••	•••		•••	•••
e \flat	•••	•••		•••	•••
e	•••	•••		•••	•••
f	•••	•••		•••	•••
f \sharp	•••	•••		•••	•••
g	•••	•••		•••	•••
a \flat	•••	•••		•••	•••
a	•••	•••		•••	•••
b \flat	•••	•••		•••	•••
b	•••	•••		•••	•••
c	•••	•••		•••	•••
c \sharp	•••	•••		•••	•••
d \sharp	•••	•••		•••	•••
e \flat	•••	•••		•••	•••
e	•••	•••		•••	•••

Chart for German-system bassoon. See text for the use of the crook key and of the alternative keys for the notes marked †. Note also the following trills (trill with fingers marked x):

e|f \sharp with trill key for II, or ••• | x ••• F \sharp
 f|g as French system
 e \flat |f' as French system
 e'|f' \sharp ••• | x x •••
 f'|g' ••• | x x •••

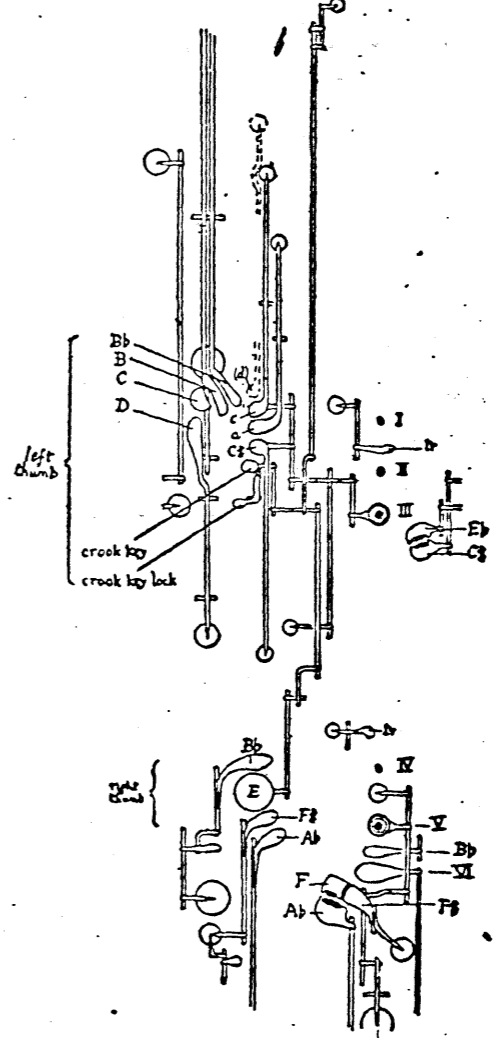


Diagram of the key-work of the Heckel System Bassoon.

(From A. Baines)

	Thumb			L	R
	L	R			
B \flat	B \flat	o	o
B	C	o	o
C	C \sharp	o	o
C \sharp	D	o	o
D	D, E \flat	o	o
D \flat			
E			
E \flat			
F			
F \sharp			
G			
G \flat			
A			
A \flat			
B \flat			
B			
C			

	Thumb			L	R
	L	R			
C \sharp	o	o			
d'	o	o			
e \flat	o	o			
e'	o	o			
f'	{o o o}	o	A \flat	(C \sharp)	
f \sharp	{o . . k}	o	F		
g	{o . . k}	o	F		
g \flat	{o . . k}	o	F		
a'	o	o	(a)		
b \flat	o	o	F		
b'	o	o	F		
c'	{o o o}	o	F		
C \sharp	o	o	F		
d'	o	o	(A \flat)		
e \flat	o	o	(A \flat)		
e'	{w o o}	o			
f'	o	o	C \sharp		

Chart for French bassoon. k: close the crook key. Keys, etc., indicated in brackets suggest ways of tuning notes (individual instruments differing in this respect). Note also the following trills (trill with fingers indicated by x):

- e/f \sharp .oo | xx.F (or o.o | etc.)
- f/g ox | x | ...
- e' \flat /f' xx | o | ...
- e'/f' x.o | ... A \flat
- e'/f' \sharp xx | o | ... A \flat
- f'/g' finger the F and trill with w (fig. 27).

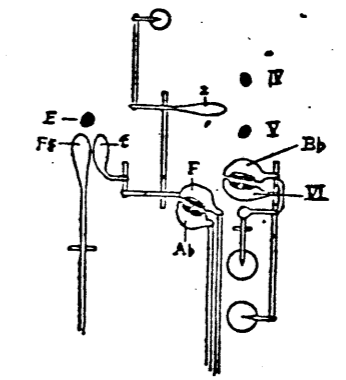
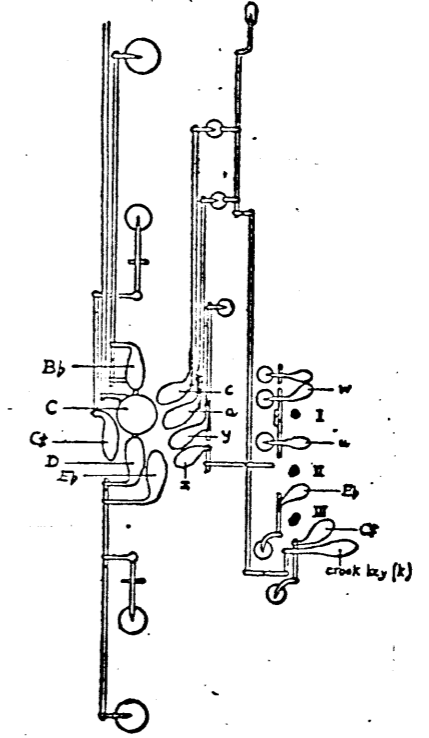


Diagram of French Bassoon Keywork (Buffet). Thumb-keys and holes shown on the left, Finger-holes and keys on the right.

From A. Baines.

CHAPTER XXXVIITHE BASSOON - FRENCH DEVELOPMENTS

Constant Pierre, a bassoonist and *Commis Principal au Secrétariat du Conservatoire National de Musique, Paris*, has recorded the development of the Bassoon in France in his two books "Les Facteurs d'Instruments de Musique" (Paris 1893) and "La Facture Instrumentale à l'exposition de 1889" (Paris, 1890).

Of the Nineteenth Century makers the name of Savary, more than any other, deserves to be remembered in connection with the French Bassoon. Savary Père worked in Paris (c.1788 - 1826) but has left few examples of his work (one marked "Savary Père at Brussels Conservatoire, No. 3120, of Maple with nine brass keys including two wing keys for a' and c' would seem to indicate that his son had by then commenced to make Bassoons.

Jean-Nicolas Savary (Jeune), 1786 - 1850 - devoted his life to the Bassoon, gaining Premier Prix in 1808 at the Conservatoire. He became Solo Bassoon at the Théâtre des Italiens and began to remedy the imperfections of the instrument.

In 1823 he opened a separate workshop from his father and made certain modifications including a tuning slide on the Wing-Joint controlled by a Rack Mechanism (Fr. "Crémaillère"). By this time he was "Fournisseur de la Maison du Roi, de l'Académie et de l'Ecole Royale". His Bassoons were very popular in England and Savary Bassoons were handed down from one generation to the next and some were in use until very reluctantly discarded when Orchestral Pitch was lowered in 1895, followed by Military Pitch in 1929.

Savary's death in c.1850 has not been recorded. His business was bought by Galander (1834 - 1855) who gave his name to a B flat Military Bassoon with a flared bell invented in 1853 - The Galandrome (a single surviving specimen is preserved in New

York, No. 1675).

Frédéric Guillaume Adler brought out certain improvements to the Bassoon in 1809. In 1827 he showed a Bassoon with Almenröder's fifteen keys and in 1834 he showed another fifteen-keyed Bassoon with rollers (Fr. Rouleaux) invented by César Janssen c.1823. He also included the tuning-slide and rack-work on the wing-joint invented by Winnen a few years earlier. Fétis in "Gazette Musicale de la Belgique" (15th May, 1834) criticises the defects in intonation and equality of tone.

In 1839 the report of the Paris Exhibition Judges stated that Adler's Bassoon was longer than normal, the Bell small and two new keys produced High d" and e". Since it appeared to excel in purity and evenness and the fingering was unchanged, many of the best-known players changed to Adler's model. He received a Bronze Medal in 1844 and a similar award for an orchestral Bassoon, Contrabassoon and a Bassoon of new design with a metal bell and a more powerful tone.

According to Pierre, Adler made a ten-keyed Bassoon without a low B natural and without any keys for the four Left-hand fingers, yet displaying innovations which others had introduced in the meantime (crook pin-hole, two harmonic keys on the wing for the Left thumb and a key on the Butt with its touchpiece between R.1 and R.2 to give the shakes B/C sharp, C/C sharp, C sharp/D sharp, D/E flat in the middle register and g/a and a/b flat in the high register.

Eugène Jancourt (1815 - 1900), soloist and Professeur at Paris Conservatoire (1875 - 1891) published his "Méthode de Basson" in 1847 and a supplement "Étude de Basson Perfectionné" in 1876. He deals specifically with new keys in the Preface of his "24 Exercices Melodiques".

No Fingering Chart of French Key-mechanisms is ever dated, so the sequence of progressive alterations is difficult

to follow. Apparently Jancourt, around 1845, began to collaborate with Buffet-Crampon, the noted Paris makers, regarding certain modifications::

- (i) Substitution of key-rods and pillars for former key-saddles;
- (ii) Addition of crook-key for L.4 closing pin-hole in crook.

(Where this hole existed formerly, there had been no means of closing it and the lower notes were consequently unsafe. The closing by this new crook-key made the lower notes much easier in the Piano.

Jancourt's Chart for his "Basson Ordinaire a 17 clefs" was included in his Méthode of 1847 and he mentions the skilful makers of the time - Savary, Adler and a new young maker "destined to develop further these improvements" - Frédéric Triébert.

In 1850 Jancourt and Triébert decided to move the A hole (as Almenröder had done in Germany thirty years previously). They fitted a plate for R3 giving greater accuracy and steadiness without undue stretch between L.2 and L.3. Triébert altered the bore and widened the cone, giving the lower notes greater fulness and fitted a metal tube in place of the base plug (an improvement also carried out in Germany).

In a later chart of 1875 we find nineteen keys and a ring (the extra key being a small vent-key B natural closed by R.2. This stage is seen in a "Method by Jancourt and Bordogni" (La Fleur, London) and a later addition was a half-hole plate for L.1 held down by a ring for L.2.

Jancourt later abandoned these rings when he became Professor at the Conservatoire in 1875. His final chart shows the "Conservatoire Model" with twenty-two keys which has become standardised.

These keys include two shake-keys on the butt giving g' - a' among a number of different shakes and another ingenious device of Buffet for low F sharp - G sharp but since for over a

century this trill had been described as impossible for the Bassoon, composers avoided it and the special key-work is left idle. It consists of an extra touch brought round the butt for the Right thumb and pressure on this, together with the F sharp key, closes the normally open F key. This releases R.4 to operate the touch of the G sharp key which, on rising, has a projecting clutch to open the F key with it.

P. Goumas et Cie, the makers who published Jancourt's final Chart, were succeeded in 1865 by Evette and Schaeffer, trading as "Duffet-Crampon et Cie", who are today the leading makers of the French Bassoon.

L. Letellier (Professeur, Paris Conservatoire, 1922-33) designed a new crook marked "L" which made ascending and descending passages easier (Lavignac Encyclopédie, p.1558). An Ebonite lining was introduced (as had already been done in England in 1875 and in Germany in 1889) and Letellier claimed that this gave greater sonority throughout the compass but more especially to the Higher register a - d.

The German Bassoon, as perfected by Heckel, has gained in popularity in every country except France, where Wind instrumentalists have always been conservative, possibly by reason of the Conservatoire tradition of teaching from one generation to the next. Assuredly some of the finest Bassoon players are to be found in France and the tone of the French Bassoon, especially in the hands of such artists as Fernand Oubradous and Dherin leaves very little to be desired. The higher notes are much easier to obtain and the tone quality is more subtle and vocal than on the German Bassoon. The primary impact of the German Bassoon in Britain was in 1899 when Richter was Conductor of the famous Hallé Orchestra in Manchester. Richter considered the local Bassoonists inadequate and brought Scheider from Vienna to take over the First Bassoon. Later a second player was

brought...../185.

brought from Vienna and a special scholarship was endowed at the Manchester College of Music with Scheider as Professor and Archie Camden, one of Britain's leading players at the present time, as the first scholar. The visit of Toscanini in 1930 to London with the New York Philharmonic Orchestra brought about a mass changeover to the Heckel Model by British players although some excellent Bassoonists of the present day in Britain have remained faithful to the French model.

The only British firm which manufactures Bassoons (Messrs. Boosey and Hawkes) no longer manufacture a French model. The leading makers of the German Heckel-Model Bassoon are Heckel, Mollenhauer, Mönning, Hiller, Adler and Kohlert. Cheap instruments are being made in Eastern Europe and even in China where the work is being supervised by technicians from Eastern Germany.

Bassoon players will readily agree that every single Bassoon has an individual character of its own as regards tone quality, intonation, difficult notes or easily produced notes and no two are precisely alike.

The German makers, following Heckel's example, supply crooks of varying lengths from "0", the shortest, to "1" and progressively longer to "2" and "3".

The ten-keyed Bassoon by Adler mentioned on Page 182 must have been the model used in "Der Freischütz" since Weber carefully inserts a rest for the Second player while the First is proceeding through the higher B natural in the passage played in octaves by the two Bassoons. (Bar No. 76).

The image shows a musical score for a passage from "Der Freischütz". The score is written for Flute (Fl), Oboe (Ob), Clarinet (Cl), Bassoon (Fag), and Piano (P). The Bassoon part is the focus, showing a complex passage with many notes and rests. The score is in a key signature of one flat (B-flat major) and a 2/4 time signature. The passage is marked with a forte (f) dynamic and includes various musical notations such as slurs, accents, and dynamic markings.



1. 2.
On Left, French Model:
1. Mahillon (Front View).
2. Buffet Crampon
(Back View).

3. 4.
On Right, German Model:
3. Heckel (Front View).
4. Heckel, descending to low A,
(Back view).

(From A. Baines).

Fig. 122.

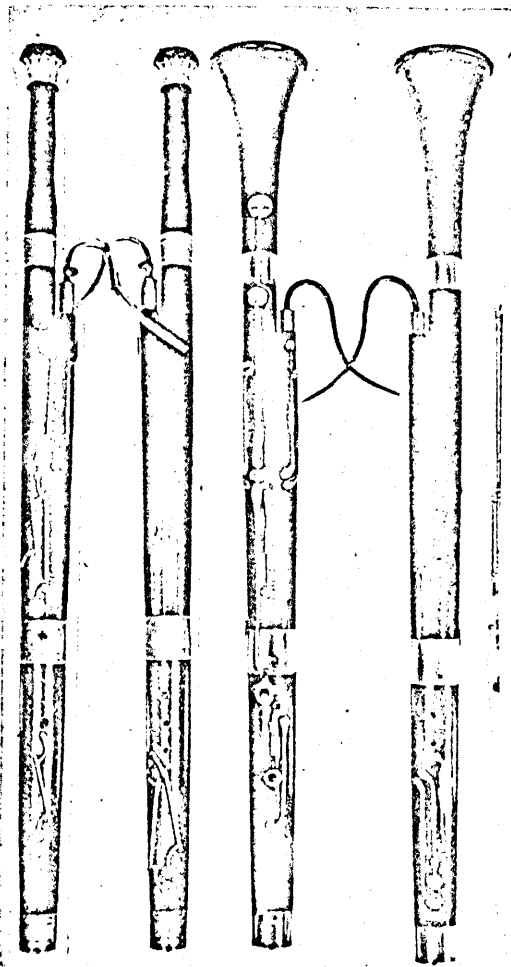


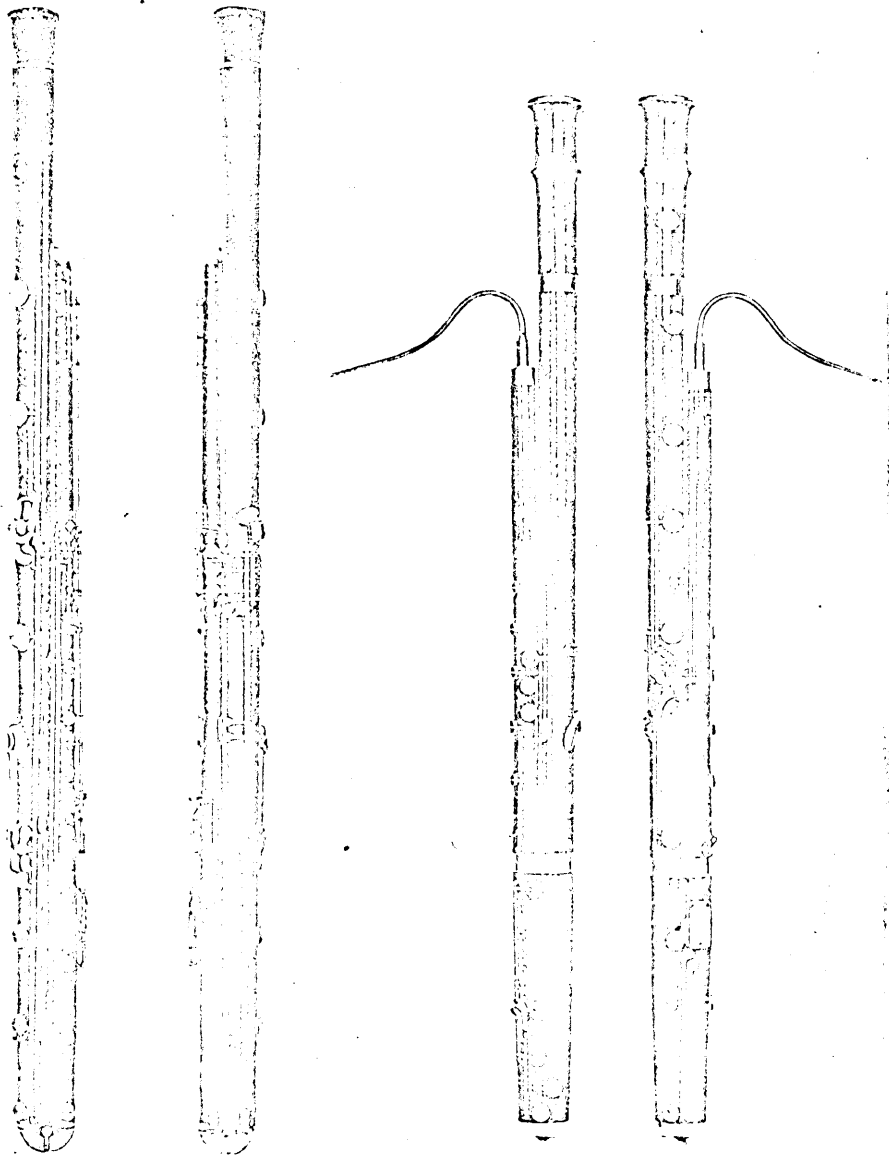
Fig. 1

Fig. 2

1 (*Back and Front*). Bassoon by Winnen, Paris, c. 1840. 7 keys—
one engraved 'Inventé par Félix, mécanicien à Paris'. The curious
lie of the keys is unique. Height, 1,270 mm.

2 (*Back and Front*). Bassonore by Winnen, Paris, c. 1844. Though
claimed to have four times the power of a bassoon, the instrument
was a failure.

Fig. 123.



LEFT: *Boehm-system Bassoon, Marzoli, Paris.* RIGHT:
Bassoon by Hasencier, Coblenz.

From the *Galpin Society Journal* XII,
May, 1958.

CHAPTER XXXVIIITHE "BOEHM" BASSOON

Charles Joseph Sax (1791 - 1865) was the first designer of a Bassoon with covered holes. This was exhibited at Haarlem in 1825 and after further experiments he constructed a metal Bassoon on this system, taking out a Belgian Patent (No. 1414) in 1842.

Probably this idea led Adolphe (Antoine Joseph) Sax to produce his twenty-three keyed metal Bassoon in Paris in 1851 (now in the Paris Conservatoire Museum, No. 1401). The instrument caused such a sensation in the London Exhibition of 1851 (A. de Pontcoulant writes in "Deux Jours à Londres", Paris, 1862, p.233) that Theobald Boehm, while passing through Paris, went to see the instrument and warmly congratulated the maker (Fig. 123).

J.B.J. Willent-Bordogni (1809 - 1852), the celebrated Bassoonist and Professor of Brussels Conservatoire, attempted to make a general reform of the Bassoon (Rapports du Jury, Exposit. Univ. de 1855, Paris, 1856, p.1326) and his "Méthode Complète pour le Bassoon" appeared in Paris in 1844. The Revolution of February, 1848, caused his return from Brussels to Paris where he became Professor at the Conservatoire in 1849 and gave up his intended improvements.

A different report from H. Lavoix Fils in "Histoire de l'Instrumentation Depuis le Sixième Siècle Jusqu'à Nos Jours" (Paris, 1878) pp.113-15 points out that Adolphe Sax, in 1840, had the first idea of making Bassoons according to an acoustical theory and regularising the bore. Sax Père in 1830 had already this idea and probably the work of Boehm had some influence on the work of the Belgian maker. In spite of this progress, together with simultaneous attempts by Sax and by Ward around 1851, most of the improvements still remained to be carried out up to 1878 and The Sax Bassoon remained at almost the same stage of development as seen in the "Méthode" of Willent-Bordogni.

Georges Chrétien Bachmann (b. Paderborn, Prussia, 1804, d. Brussels 1842) was one of those craftsmen who contributed most to the good construction of Woodwind instruments. He was a maker at Brussels and Professor of Clarinet at Brussels Conservatoire and it is due to him that Belgian clarinetists have a distinctive quality of sound. He taught a large number of excellent pupils and his manufacturing business was continued by Charles Mahillon from 1836.

The Bassoons made by Bachmann for Willent Borlogni on a new system are claimed to have given Sax the idea of redesigning his Bassoons.

E. Jancourt (*Méthode Théoretique et Pratique de Basson*, Paris, 1847) had attempted, with the help of Buffet, to apply the Boehm system to the Bassoon but had to renounce the attempt since it denaturalised the timbre. In 1854 Boehm, assisted by Triébert, attempted to do for the Bassoon what he had already done for the Flute and Oboe. He made an accurate instrument but the system of rods and rings made a disagreeable clicking and, moreover, needed frequent adjustment. Only a few of these Boehm-type Bassoons were made. One is in the Brussels Conservatoire Museum No. 3119, marked "Brevete Triébert à Paris", another, No. 166, formerly owned by Canon Galpin, is now in the Boston Museum of Fine Arts (No. 151) marked "A. Marzoli à Paris" and there is another by F. Triébert in the Paris Conservatoire Museum (No. 510).

The Contrabassophon made in 1849 by Heinrich J. Hasencier of Coblenz embodied certain principles of Boehm. The bore was unusually wide and truly conical and the holes were bored vertically and of exceptionally large diameter. All holes were covered by keys operated by an ingenious system of rods. This instrument was introduced at the Handel Festival in London (June, 1871) by Dr. W.H. Stone and was the only Contrabassoon in use in Britain until Alfred Norton made a few copies around 1875. Stone

mentions the instrument in Grove, 1st Edition (1877 - 1889) under "Double Bassoon" and asserts that it had been considerably improved by Herr Hasencier. Hasencier's model (Leipzig, Meyer Collection, No. 1403) was copied by C. Geipel of Breslau (Ann Arbor, Stearn Collection, No. 684), G.F. Doelling & Sohn of Potsdam, 1850 (Berlin, Sachs Cat. No. 1067) and one in Papier Mâché c.1875 by G. Berthold & Sohne of Speyer-am-Rhein (Meyer Collection, No. 1407).

A Bassoon by Hasencier was described by R. Allison in "Woodwind" (October, 1953). This instrument is fully four inches shorter than the Modern Buffet Bassoon. It has a wide, squat bell, a very short butt and the bass and wing joints are unusually long. There are twenty-one keys, chromatic on the bass joint. Fingerplates for G, A, B and c, d, e. L.H.1 alone gives E flat and L.H.2. alone gives c. R.H.1. gives B flat and L.H.2. alone gives B. These four fingerings are convenient and give notes of good and even quality with the minimum of "humouring" which is so necessary on certain notes of many bassoons. This type of German instrument might well have been generally adopted, had it not been for the Heckel Bassoon which has swept all before it in all countries except France and Spain.

In England attempts to improve the Bassoon were first sponsored by Giuseppe Tamplini (1817 - 1888) from Milan who became First Bassoon at Her Majesty's Theatre under Costa in 1847. Tamplini resided for some time with Cornelius Ward, a clever Flute-maker of 36, St. Titchfield St., Marylebone, London. Ward made a model Bassoon with twenty-three covered holes under Tamplini's guidance and this was exhibited at the Great Exhibition of 1851 (as also was Adolphe Sax's Metal Bassoon, before mentioned). It was patented in 1853 (B. Patent No. 140). In 1855 Tamplini called on Frédéric Triébert in Paris to show him Ward's model, only to learn that Boehm had already visited Triébert, then in partnership with A. Marzeli (First Bassoon at the Théâtre Italien), and
 promised...../189.

promised to design a Bassoon upon the Boehm System. Tamplini served as Bandmaster in the British Army and retired to Bologna in 1888 where he exhibited Ward's Bassoon at the International Exhibition held in that same year.

Such is the record of over a century of attempts to improve the fingering of the Bassoon. Tamplini himself complains in his Treatise of 1888 of the conservatism of players, teachers and manufacturers and we find this vexing state of affairs in almost every instance of new and radical improvements to existing key-systems.

Ref. G. Tamplini "Brevi Cenni sul Sistema Boehm e Della sua Applicazione al Fagotto" (Bologna, 1888).

Lindesay G. Langwill,

Galpin Society Journal (Vol. XII, May 1959).



TWO RECENT IMPROVEMENTS TO THE BASSOON

The straight crook and spike.

Devised by William Waterhouse, these allow the player greater freedom from tension caused by the weight of the bassoon on the hands and neck. The spike is adjustable to the player's build and the straight crook gives better response, while during rest the reed remains near the player's mouth, ready for instant playing position.

L.G. Larwill - "The Bassoon and
Contrabassoon".

CHAPTER XXXIX

THE CONTRABASSOON

Ludovico Zacconi's "Prattica di Musica Utile et Necessaria si al Compositoresi Anco al Cantore" was published in Venice in 1592 and reprinted in 1596. The second part appeared in Venice in 1619. The contents are divided into four books and Chapter 56 of Book IV gives a table of instruments which supplies information unobtainable elsewhere on the musical instruments of the Sixteenth Century. This work is extremely rare and no facsimile has yet appeared.

One copy exists in the Reid Music Library at Edinburgh University and another in the Royal College of Music in London. The table in the concluding chapter shows a great stave of eleven lines, giving the compass of "The Instruments which are usually employed in making Concerti".

On p.219 the compass of the Fagotto Chorista is given in the old Bass Clef:



adding the remark: "The Fagotto Chorista goes from the octave of C Fa Ut of the Bass to B Fa ð mi above. They call it Fagotto Chorista because there are other which are not of its pitch but a little higher or a little deeper". He refers to the Doppel Fagott, a fourth lower (G) or a fifth lower (F) and to the Piccolo Fagott, a fifth higher (G) which are 1, 2 and 4 in Praetorius' Table (Fig. 115).

Praetorius' "De Organographia" (1619) gives a detailed account of deeper-pitched Bassoons which were actually two-keyed

Dulzians...../191.

Dulzians, differing merely in size -

Quint-Fagott F, -eb (or, possible, g)

Quart-Fagott G, -f (or, possible, a)

Two superb specimens of Doppelfagott, of probable Sixteenth Century Italian workmanship, are preserved with six contemporary Dulzians in the Kunsthistorisches Museum, Vienna (J. Schlosser : Catalogue Vienna 1920, Nos.198 and 199). Each has two brass keys and are four feet, five inches in length.

Another Seventeenth Century Doppelfagott is in the Hoyer-Leipzig Collection (No. 1361) which is supposed to have been an instrument of the type employed by J.S. Bach in 1715 (Cantata No. 31).

Burney in 1785 reports the earliest recorded use of the Contrabassoon in England in Handel's Orchestra at the Coronation of George II in 1727. This instrument was made by Stanesby Senior, and played by Lampe, but for want of a proper reed or some other cause, no use was again made of it. The "London Daily Post" of 6th August, 1739, gives an account of two Grand or Double Bassoons by Mr. Stanesby, Junr., in a concert in Marleybone Gardens. One of these is still preserved in the National Museum of Ireland in Dublin (Fig. 125,1.) It has four brass keys in saddles, giving B flat₂, D₁, F₁, G sharp₁. The bell has an outward bulbous shape, expanding slightly at the top and the long brass crook is recurved downwards, parallel to the wing for nearly three-quarters of its length before bending out and upwards to receive the reed. The finger holes are necessarily smaller than acoustic demands require and although bored obliquely in the usual manner are so far apart as to cause inconvenience to the player.

Handel employs the Contrabassoon in "Fireworks Music" (1749) and in "L'Allegro" (1740) it is scored in two choruses (Nos. 42 and 53). Handel avoids the notes below F which must

have...../192.

have been uncertain or of bad quality. Burney's account of the Handel Commemoration of 1784 in Westminster Abbey mentions the Double Bassoon.

The only English attempt to construct a practical Contrabassoon in normal Bassoon shape was that of J. Samme, London (c.1855) whose eight-keyed Quart-Bassoon of Low G is preserved in the Donaldson Collection at the Royal College Music in London.

In Belgium the Tuerlinckx Family had exercised their craft as makers of woodwind and brass instruments for four successive generations (R. van Aerde "Duoletin, Cercel Archéologique de Malines" Tome XXIV) and at least one Contrabassoon with the family mark is preserved. Made of Maple, five feet, eight inches high, with five brass keys for D₁, E flat₁, F₁, F sharp₁, G sharp₁, it is of normal bassoon shape with a long coiled brass crook and descends to C₁.

Around 1785 the Malines makers had ample opportunity to familiarise themselves with the new types of instruments used in the Hanoverian Infantry Bands and later from the Regimental Bands of the Allies in Belgium (German, Swiss, French, English and Austrian). Tuerlinckx is credited with certain improvements in the tone and compass of the Contrabassoon; possibly that of adding two extra notes - C₁ (Left thumb-hole) and D₁ (Left thumb-key) which would not be possible on the German Quint-Fagott in Low F with E flat, sounding as its lowest note. By making the Contrabassoon in C, one octave below the Bassoon, all difficulty regarding transposition was removed and fingering became uniform on both types of Bassoon.

Up until 1850 the inclusion of a Contrabassoon in scores appeared to depend entirely on whether it was locally available. Vienna seems to have been the centre where it was always procurable and we find it in the scores of Haydn and

Beethoven...../193.

Beethoven although it received little attention from either Mozart or Schubert.

F.S. Gassner, "Partiturkenntnis" (Carlsruhe, 1838), states that the Contrafagott, including the low Quart-Fagott, was then very rarely used in Germany (since the Serpent and Ophicleide had been improved) and then only in Military Bands. When the Ophicleide became obsolete the Contrabassoon underwent improvement and reconstruction until the early years of the present Century (Fig. 126, 127, Nos. 3 - 12).

The limited use of Contrabassoons in France is confirmed by Nineteenth Century French records. By 1825 it was much in demand in French Military Bands, following the custom of German and Austrian Bands where Bassoons and Contrabassoons were supplemented by Serpents. This practice continued in France until 1846, when the Saxhorns supplanted all the other Bass instruments. Only in 1863 did the Société des Concerts du Conservatoire acquire the only Contrabassoon made in France (made by Goumas and later improved by his successors, Evette and Schaeffer) according to Constant Pierre ("La Facture" pp. 31-33).

The use of the Contrabassoon in Military Music among German-speaking nations led their makers to a series of attempts to construct a satisfactory metal Contrabassoon. Evidence is somewhat conflicting as to which of these makers led the way.

Johann Stehle's Metal Contrabassoon:

H. Mendel in "Musikalisches Conversations-Lexikon (Berlin 1872), states that the Wooden Contrabassoon was weak in tone and this fact led Stehle, a Viennese instrument-maker, to make a Contrabassoon of Brass in the 1830s. (Fig. 126, No. 7). The instrument was five feet, six inches high. All the holes were covered by keys, fifteen in number. It had a compass of two octaves and the technique was difficult but the tone is said to

have...../194.

have been three times as strong as that of the usual Contrabassoon.

W. Wieprecht ("Reisebriefe" in Berliner Musikzeitung, Jhg. 1856, No. 43) states that Carl Wilhelm Moritz (1811 - 1855) invented his ingenious Claviatur-Contrafagott in 1845 in order to simplify the difficult technique of Stehle's Contrabassoon. In 1838 Wieprecht's reformed German Infantry Bands included two Bassoons and two Contrabassoons. In 1848 Austrian Infantry Bands had four Bassoons and two Contrabassoons. The popularity of the Contrabassoon in Germany and Austria in the first half of the Nineteenth Century may be contrasted with the complete absence of the instrument in France and Britain.

Schöllnast's Tritonikon:

Invented in 1839 by Schöllnast und Sohn of Pressburg, this brass Contrabassoon called the "Tritonikon" or "Universal-Kontrabass", had a tube-length of fourteen feet, eleven and a half inches, folded upon itself five times and with fifteen large keys of which only the first was open. This arrangement facilitated fingering which resembled the Pianoforte and gave a chromatic compass of sixteen notes from D₁ to F. The volume of tone was restricted and intonation was imperfect.

Červeny's Metal Contrabassoon.

V.F. Červeny (1819 - 1896) produced his fourteen-keyed Tritonikon in E flat in 1856. G. Pierre ("La Facture", p.34), has given a description of this instrument which is shaped like a slender Tuba - the form adopted for the lower Sarrusophones. Červeny made another model in B flat (a fourth lower than the model of 1856) which was exhibited at the Paris Exhibitions of 1867 and 1889. It had a compass of two octaves and could be played without fatigue but although the tone was very powerful

it...../195.

it was very vibrant and had little analogy with that of the true Contrabassoon.

Charles Mahillon gave it the name of "Contre Basse à Anche".

Červený invented his "Subkontrafagott" in 1873 and C. Sachs in his "Real-Lexikon" describes it as having "an unbelievable depth of pitch". The instrument was in B flat (one octave below the Contrabassoon) and from this one may conclude that it was intended for Military Band use. No known specimen survives. Lyndesay G. Langwill ("The Bassoon and Contrabassoon", London 1965) states that he believes Sachs has erred in giving the compass as B flat_{III} to B flat (i.e., three octaves). Pierre heard the instrument in 1889 and, as a more reliable authority, informs us that the compass was two octaves. Červený's Catalogue of 1897 shows the upper limit as B flat in the Bass Clef. B.flat_{II} and not B flat_{III} would be the note two octaves lower which would then prove to be a metal Contrabassoon with the modern normal downward limited of B flat_{II}.

The "Contrebasse-à-Anche".

Charles Mahillon invented this instrument Fig. 127, No. 8) in 1868. Its lowest note was D instead of B flat_{II} but in other respects it was identical in appearance, mechanism and arrangement as Červený's Contrabassoon. It had seventeen keys, of which two were octave-keys and all except the first were closed. The first four notes from D to F were not overblown; the remaining notes from F sharp to C were overblown, using one octave-key and the remaining notes from C sharp to f with the second Octave-key. Pierre states that the timbre was not so good as that of Červený's Contrabassoon, possibly due to insufficient thickness of the metal. Both Mahillon's and Červený's instruments had the disadvantage of a particular mechanism. Neither were true Contrabassoons since they...../196.

they did not reproduce the notes of the Bassoon in the Lower Octave with the same fingering as the Bassoon. The difficulty arose therefore in persuading Bassoon-players to adopt them.

K. Schlesinger in "Instruments of the Orchestra" (1910, Vol. I, p.p. 25 - 28) specified Mahillon's Brass Contrabassoon and Heckel's wooden Contrabassoon but adds that the Hasencier-Morton-Stone Contrabassoon was almost exclusively used in British Orchestras. Cecil Forsyth in "Orchestration" (1935, pp.247-8) included all three types:

- (i) Mahillon-Schöllnast
- (ii) Hasencier-Stone-Morton and
- (iii) German, which he correctly forecasts as "likely to oust both the above".

H.J. Hasencier's Contrabassophon:

H.J. Hasencier of Coblenz designed a wooden Contrabassoon of an entirely new type in 1847 (Fig. 127, 9), now in the Heyer-Leipzig Collection. An account of this instrument, known as the "Contrabassophon" appears in the "Neue Zeitschrift für Musik" (Leipzig 1850 p.154).

His model was copied by several makers, e.g.:

- (i) C.H. Geipel, Breslau (Seventeen keys. Ann Arbor Stearns Collection No. 684).
- (ii) C. Fr. Doelling & Son, Potsdam (Twenty keys. Berlin Collection, No. 1067).
- (iii) Georg Berthold & Söhne, Speyer-am-Rhein (founded in 1849 by Georg Jakob Berthold 1824 - 1904, who endeavoured to reduce the weight of Hasencier's wooden model by making the tube of papier-mâché. At least two specimens survive, one in the Heckel Museum (Biebrich) and one in the Heyer-Leipzig Collection (No. 1407).

(iv)...../197.

- (iv) An anonymous improved model, c.1855-60 with only three-fold tube but taller and descending to sub-contrabass flat (Meyer-Cöln Catalogue, No. 1405).
- (v) Alfred Morton (1827 - 1898) made a copy of Hasencier's model c.1875 lent to the Royal Military Exhibition (No. 172). Morton, formerly an apprentice to Joseph Uhlmann und Söhne, Vienna, made three or four of these instruments, one being used in the Crystal Palace Concerts, Richter's Concerts and at the Opera, while two were used by the Coldstream and Scots Guards. Another in F was lent by Sullivan to the Royal Military Exhibition of 1890 but in his works "The Martyr of Antioch" (1880) and "The Golden Legend" (1886), the Contrabassoon parts do not indicate a transposition for the instrument in F.
- (vi) W. Bradka (1822 - 1907) made a Contrabassoon on the Hasencier model in 1888 (Fig. 127, No. 10) with a fourfold coil, twenty-two keys and descending to Contra C.
- (vii) M. Fontaine-Besson manufactured instruments on Morton's model to meet French requirements, patented in 1890. Pierre describes and depicts Besson's model which descends to Sub-Contrabass flat. (Pierre, "La Facture" pp.38-40).

The Contrabassoon (The work of Dr. W.H. Stone).

Dr. W.H. Stone (1830 - 1891), an accomplished performer on the Tenoroon, Bassoon and Contrabassoon, contributed articles to the first and second editions of Groves Dictionary of Music. He states that the Contrabassoon had been considerably improved by Herr Hasencier of Coblenz and subsequently improved by himself who actually introduced it into English Orchestras as made on his own design by Hasencier.

Stone indicates that the Contrabassoon had gone completely out of use since the Handel Festival of 1871 where, presumably, he

played..../198.

played it. Lyndesay G. Langwill has examined the Contrabassophon owned and played by Dr. Stone and remarks on the very large size of its reed (c.1690) as compared to the modern German instrument.

Dr. Stone's details given in the first Edition of Grove's Dictionary describe the Contrabassophon as having a tube sixteen feet four inches long, truly conical in bore, enlarging from a quarter-inch diameter at the reed to four inches at the bell and curved four times on itself so that the height of the instrument is four feet, eight inches, only a little more than the ordinary Bassoon, and the total weight some eighteen pounds. The extreme compass is three octaves from C to c' (middle c) but g is recommended as the upward limit. The scale, which is chromatic throughout, is produced as follows:

- C, to F, : A single sound is obtained by each key.
- F, to F : The fundamental scale is repeated in the octave Harmonics by simple overblowing and change of embouchure.
- f sharp to c' : Seven semitones which are twelfths of the Fundamentals from B natural, with further increased wind pressure, carry the scale up to middle C.

The sound-holes, all covered by keys, are of graduated size, increasing (from $1\frac{1}{2}$ " Diameter to $2\frac{5}{8}$ ") downwards with the size of the bore and placed as a rule in their correct positions so as to cut off the appropriate tube-length. The key-mechanism is very ingenious and solid and incorporates a device to distinguish "open" from "closed" holes. The touches of the open holes (i.e., those covered by keys) operated by the first three fingers of each hand, are saddle-shaped, whereas the keys for the two little fingers and the thumb have cushion-shaped touches. Dr. Stone who was a physician as well as a musician with profound acoustical knowledge,

remarks...../199.

remarks that this device not only facilitates technique for the performer accustomed to the ordinary Bassoon but, by the saddle-shaped touches "serves to support the upper joints of the finger and to throw the labour of closing the hole more on the powerful muscles of the forearm than on the weaker fabric of the hand itself".

D.J. Haikley in the Second Edition of Groves Dictionary, mentions the objections made against Dr. Stone's Contrabassoon, that its tone is too "open" lacking the characteristic "closeness" of Bassoon tone and the difficulty in obtaining a good piano quality.

W.H. Heckel ("Der Fagott", Second Edition, p.21) describes the tone as more like an Ophicleide than a Bassoon.

Dr. Stone's name is coupled with Haseneier's and Morton's in the description of "The Haseneier-Morton-Stone" Contrabassoon mentioned by K. Schlesinger ("Instruments of the Orchestra", 1910, Vol.I, pp.25-28) and Cecil Forsyth ("Orchestration", 1935, pp.247-8).

Fig. 125.

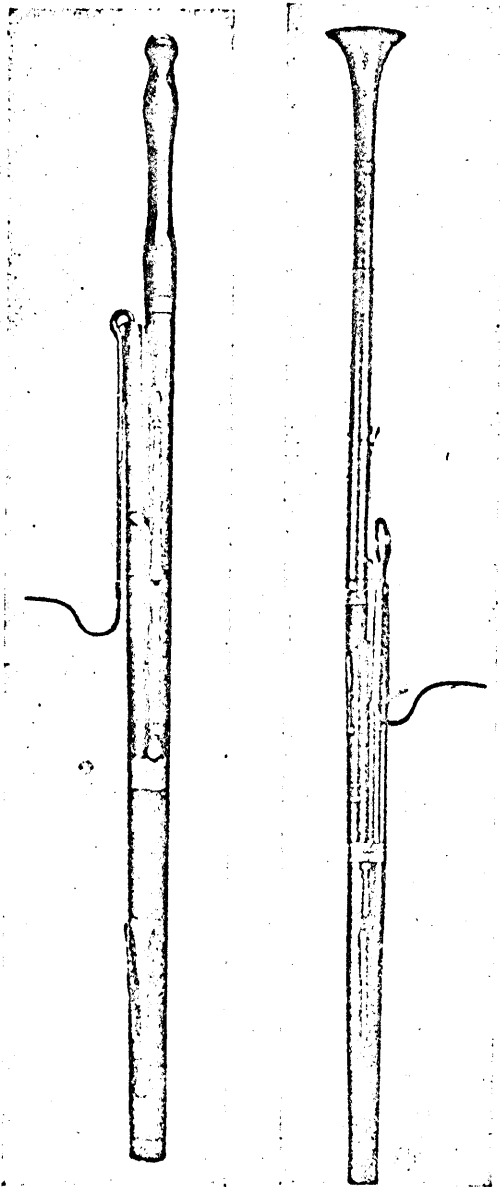


Fig. 1. Contra by 'Stanesby Junior, London, 1739'. Height, 8' 4". 4 brass keys in saddles. Brass crook. Bulbous bell. Lowest note: Sub-contra B \flat . (In National Museum of Ireland, Dublin.) [Vide Chap. 8. p. 115.]

Fig. 2. Contra by 'Stehle, vormals Küss, Wien', c. 1840. Height originally 6' 6" but now 8' 4". Originally 8 brass keys and brass bell giving Contra C. The Rev. Canon Galpin owned this instrument formerly and had the bell extended and a 9th key added to give Sub-contra B \flat . (In Museum of Fine Arts, Boston, U.S.A.) [Vide Chapter 8, *passim*.]

Fig. 1

Fig. 2

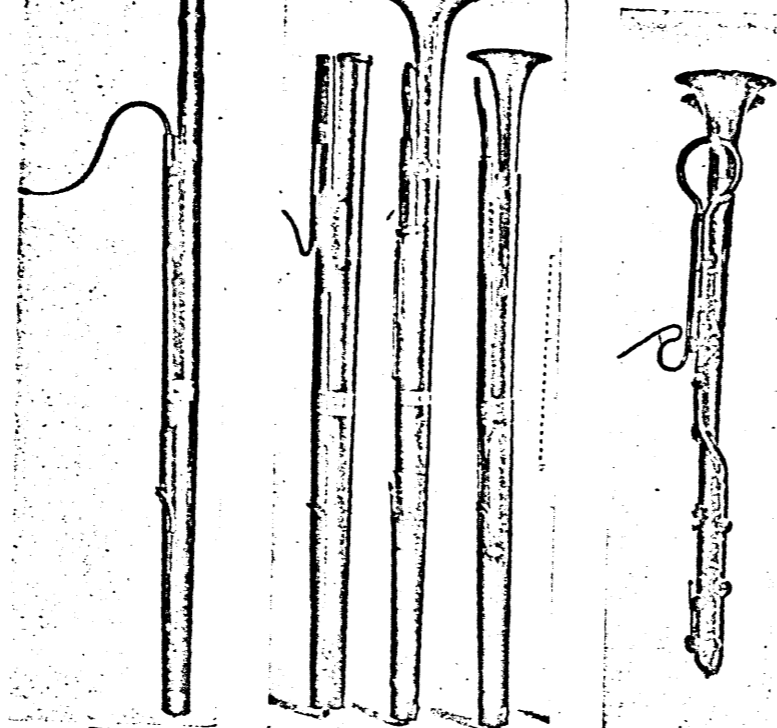


Fig. 3

Figs. 4, 5, 6

Fig. 7

PLATE 18

- Fig. 3. Contra by Doke, Linz. Late eighteenth century. Height, 5' 8". 6 brass keys. Large crook. Lowest note: Contra C.
- Fig. 4. Contra by W. Horák, Prague, c. 1830. Height, 5' 1". 5 brass keys. Double butt. Entirely of wood. Lowest note: Contra C.
- Fig. 5. Contra by unknown Austrian maker, mid-nineteenth century. Height, 5' 6". 10 brass keys.
- Fig. 6. Contra by Schöllnast, Pressburg. Early nineteenth century. Height, 5' 2". 6 brass keys.
- Both Figs. 5 and 6 have a coiled brass crook, flared brass bell, and lowest note Contra C.
- Fig. 7. Brass Contra by Johann Stehle, Vienna, c. 1850. Height, 5' 6". 15 keys. Ophicleide shape. Heyer-Leipzig Coll., No. 1404.

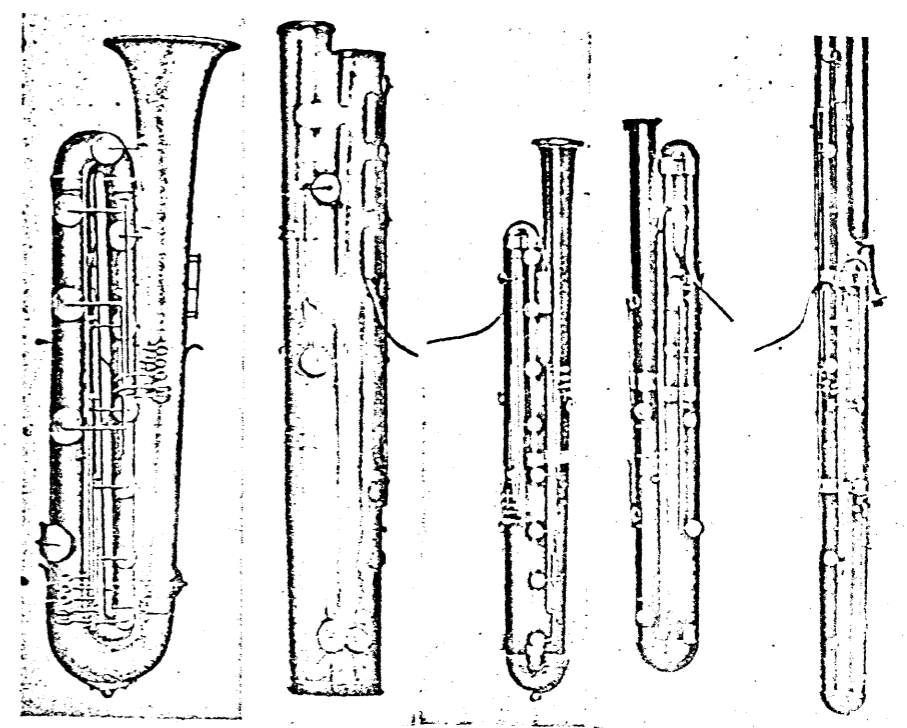


Fig. 8

Fig. 9

Fig. 10

Fig. 11

Fig. 12

PLATE 19

- Fig. 8. Contrebasse-à-anche as designed by Mahillon, Brussels, in 1868. 17 keys. Lowest note D. Entirely of brass.
- Fig. 9. Contrabassophon by H. J. Haseneier, Coblenz, c. 1849. Height, 4' 8". 19 brass keys. Wide bore and large holes. Lowest note: Contra C. (Heyer-Leipzig Coll., No. 1403.)
- Fig. 10. Contra by W. Bradka, Vienna, 1888. Height, 4' 5". Fourfold coil. 22 keys. Lowest note: Contra C.
- Fig. 11. Contrabassoon by Heckel, Biebrich, c. 1877. Height 4'. Stritter System: played right hand above left, but usual fingering. Lowest note: Contra C. (Heyer-Leipzig Coll., No. 1406.)
- Fig. 12. Contra by Heckel, Biebrich, c. 1909. Height, 6' 4". Wood with inverted metal bell. Five-coil model descending to Sub-contra B \flat . (Heyer-Leipzig Coll., No. 1408.)

Two Plates from Lyndesay G. Langwill, "The Bassoon and Contrabassoon".

CHAPTER XLTHE CONTRABASSOON - GERMAN DEVELOPMENTS AFTER 1860.Stritter System.

J.A. Heckel (1812 - 1877) and his son, W. Heckel (1856 - 1909), in imitation of the outward shape of the Contrabassophon, commenced to transform the Contrabassoon in 1876. Up until this time the Heckel Contrabassoon had been of Bassoon-shape and descended only to Contra D. The tube was divided into three parallel tubes, the shape of the crook was altered and a curious arrangement was adopted by which the player held the instrument on the left side with the left hand undermost where the wing, finger-plates and keys lay on the underside. The fingers of both hands had, however, the same movement as on the regular Bassoon and the hands differed only in the manner of holding the instrument. This type descended to Contra C and the design was termed "System Stritter" (Heckel "Der Fagott" and "Zeitschrift Für Instrumentenbau", 1898 - 1899, pp.340-341) (Fig. 127, No. 11)

Friedrich Stritter had been a young workman in the Heckel Factory at Biebrich 1871- 1877 and patented the left-handed instrument in his own name after J.A. Heckel's death. Few instruments bearing Stritter's name are known and no text-book mentions his system which was, in any event, quickly superseded by the later Heckel improved types.

Brauenlich's Contrabassoon.

Professor Adolf Brauenlich of Dresden made an attempt in 1886 to improve the Contrabassoon. "Musical Opinion" of 1st May, 1886 gives a translation of an article by Hermann Starcke in the "Deutsche Musik Zeitung" which gives interesting references to the Contrabassoons of Bassoon-shape by Bradka (Fig. 127) and those of fourfold shape by Heckel of Biebrich, in which a relatively small bore was maintained. The original Contrabassoon, on account of

its...../201.

its narrow bore, had been regarded simply as an octave to the smaller instruments with no characteristic passages of its own, possessing the form and scale of the smaller, excepting the lowest B₁ and B flat₁, which no manufacturer had until then been able to produce. Up until 1886, Hasencier's instruments and Heckel's "Stritter System" had been accepted as the best and most practical.

Long and persevering experiments with Hasencier's instruments in the Dresden Hoftheater led to the conclusion that the bore was too large, making the lower register imperfect and preventing a piano such as that required in the Opera.

The Stritter System too, was criticised on account of its narrow bore and consequent dull tone with weakness in forte passages. Brauenlich's tube for 16 ft. C was exactly once again as large as that required for 8 ft. C on the ordinary Bassoon made by Meyer in Hanover and with this exact measurement the faults of the other systems disappeared.

The compass was from B flat₁ to c' or d', great emphasis being laid on the availability of B flat₁ and B₁ - of such undoubted value in works such as Haydn's "Creation", Beethoven's "Missa Solennis" and the later works of Wagner, such as "Parsifal". No specimen of Brauenlich's Contrabassoon exists in any collection, so far as is known.

The Heckel Contrafagott.

A series of Heckel Contrabassoons from c.1834 until 1879 are depicted in Heckel's "Der Fagott" (p.16) and are as follows:

- (i) Circa 1834 : A contrabassoon of normal Bassoon shape but over five feet high with an unusually long butt-joint and a large looped crook. Such instruments were normally stamped "B. Schott" but were the work of J.A. Heckel. The lowest note was Contra D.
- (ii) Circa 1849 : Bassoon shape but even taller than (i) and stamped "Heckel-Biebrich". The compass was chromatic down to Contra D.

(iii)...../20

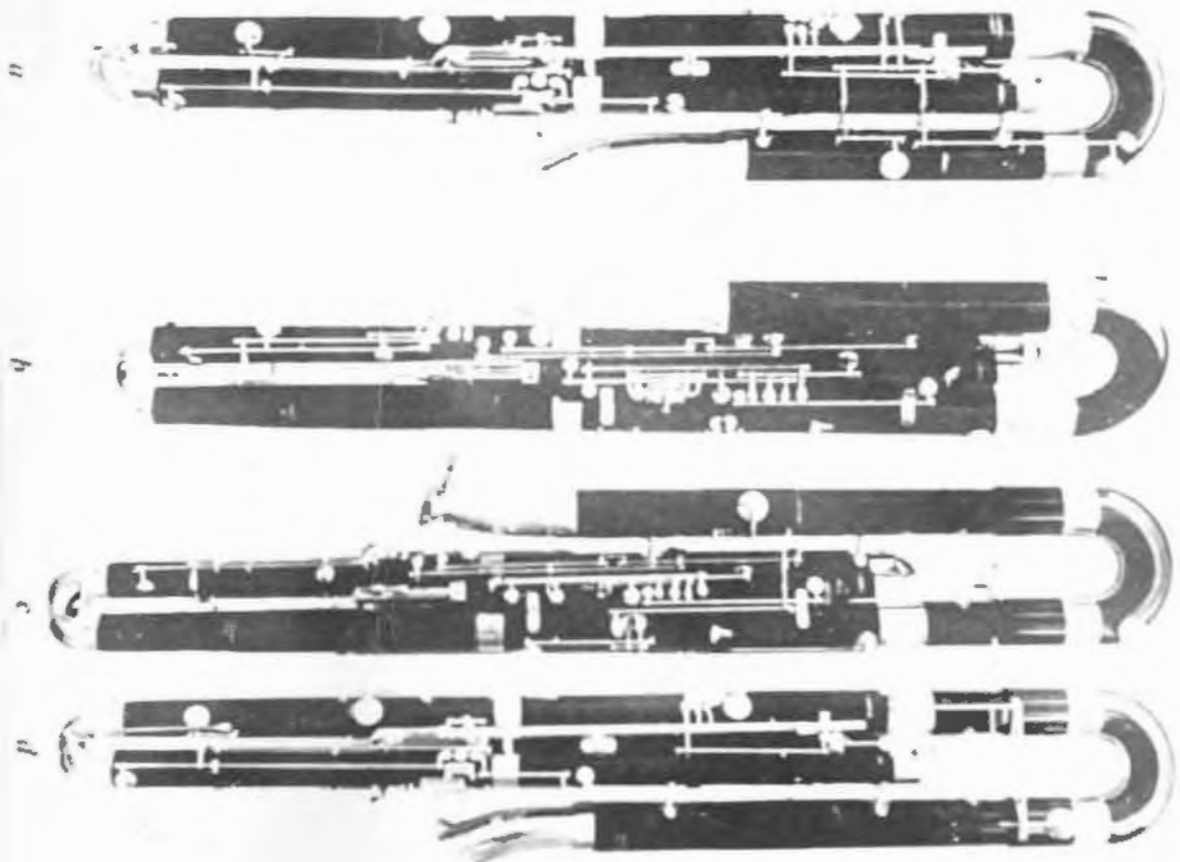
(iii) Circa 1876: A Left-handed Contrabassoon, coiled to reduce its height to that of the Bassoon but played Left-handed and descending to Contra C. (Stritter System, stamped "Heckel-Biebrich").

(iv) Circa 1879 : Original type of the modern Contrabassoon, Right-handed and having a vertical wooden bell rising above the coils of the tubing. Descending only to Contra C, this type was the work of Wilhelm Heckel, which was played to Wagner at Bayreuth in October, 1879 when the Composer was much impressed.

It is not known when the Contrabassoon was enlarged to descend to Contra B Flat but Heckel refers to improvements in the bore and the introduction of two octave keys to facilitate fingering in the Middle Register.

Wagner advised Heckel to construct a Bassoon with an extended bell to produce Contra A, and about 1900 the Contrabassoon was produced which was able to descend to Sub-Contra A (the lowest note on the Pianoforte) for the downward extension from Contra C. The bell is made either of long upright shape (Fig. 127 II) or with a large wooden bend terminating in both cases with an inverted metal bell. There are, however, half a dozen variations in shape and all bells to A_{III} or B flat_{II} are detachable and may be replaced by an additional wooden bell rim for Contra C (Fig. 128).

The large metal crook has a tuning-slide to regulate the pitch, as the Contrabassoon, on account of its large dimensions (19 ft. 5 ins. to sub-Contra A) is sensitive to variations of temperature.



REED CONTRABASSONS

Left: Descending to a Flat" (a) Back (b) Front.
Right: Descending to A" (c) Front (d) Back.

(From Synthesy G. Langstl.)

CHAPTER XLI
THE SARRUSOPHONE.

The 1846 Patent of Adolphe Sax of his Saxophone of seven sizes alternately in E flat and B flat, may have suggested a similar family of double-reed brass instruments to Sarrus, a Bandmaster of the French Thirteenth Regiment of the Line. His idea was that a group of six such instruments should replace Oboes and Bassoons in Military Bands and the Paris maker, P.L. Gautrot named them Sarrusophones and took out a French Patent (No. 16212, 9th June, 1856).

Gautrot published a Tutor in 1867 and the group was extended to nine Sarrusophones. Written compass for all Sarrusophones was from b flat to g^{''}:

Sopranino in High E Flat)	}	Straight Tubes without crook.
Soprano in B flat)		
Alto in E flat)	}	Two U-Bends and crook.
Tenor in B flat)		
Baritone in E flat)	}	Three U-bends and crook.
Bass in B flat)		
Contrabass in E flat)	}	Three or more U-bends and crook.
Contrabass in C		
Contrabass in BB flat)		

The bore of the Soprano Sarrusophone in B flat measures three-sixteenths of an inch at the narrow end and steadily increases to nearly one inch at the wider end, while the bell then expands to over two inches in diameter. The rate of expansion of the bore is even greater on the larger sizes (e.g. On the E Flat Contrabass it ranges from half an inch at the crook end to approximately four inches at the bell).

Only the Contrabass in E flat (Fig. 130) and another Contrabass in C have survived for present day use. The Orchestral Contrabass in C has a compass of two octaves and fifth from sub-
Contra B flat and Saint-Saëns was the first Composer to use it to play the Contrabassoon part in his "Les Noces de Prométhée" in

1867.../204

1867. Later, in 1879, he had one made at his own expense for performances of "Etienne Marcel" at Lyons.

Massenet employed it in "Esclarmonde" in 1889 and Jancourt, while serving as a Bandmaster in the Garde Nationale (1867 - 1870) acquired an E flat Bass Sarrusophone which was at first played by Coyon (author of a Tutor for Sarrusophone) and later by Eugène Bourdeau (First Bassoon at L'Opéra Comique).

In 1889 Couesnon et Cie, of Paris, were striving to popularise the instrument. It has a wide bore and large note-holes which give it a powerful but unrefined tone and while it is valuable in the Military Band, it has been very rarely used in the Orchestra (e.g. Ravel's "Rapsodie Espagnole", 1907, Delius' "Dance Rhapsody", 1908, "Eventyr", 1917 and Holbrooke's "Apollo and the Seaman", 1908).

The Sarrusophone is used to a larger extent in U.S.A., being first made there by Messrs. G.C. Conn for U.S. Government use in Military Bands. The fingering is similar to the Saxophone and this may account for this American adoption. Pierre accounts for the difficulty in introducing a new instrument into the Orchestra since composers do not write for an instrument which is not played and a player is not interested in practising an instrument which is not required ("La Facture" pp. 40-47).

Fig. 130.



Fig. 129.



Klaviaturkontrafagott von C. W. Moritz in Berlin.

Klaviaturkontrafagott by C.W. Moritz, 1845.

15 keys were actuated by a keyboard.

Patented in 1856. No surviving specimen is known.

(L.G. Langwill)

Tenor and Contrabass Sarrusophones (Gautrot)
Inset above, Contrebasse à Anche (Rampone)

(From A. Baines)

C O N C L U S I O N

The majority of musicians who reach a high degree of accepted academic musical standards are usually players of keyboard instruments (i.e. Pianoforte or Organ). The busy orchestral player, whether in the Symphony or "Commercial" world of professional music has for the most part of his student life directed his studies to the acquisition and perfection of his individual playing technique in order to meet the exacting demands of present day conditions in the Profession. For this reason it is rare to find a successful orchestral player who is able to find the time to acquire degrees or diplomas which demand a profound study of Musical History and the theory of Harmony and Counterpoint over many years. Conversely, it is rare to find the excellent keyboard performer well versed in the highest points of Academic Musical ability who is able to appreciate, even remotely, the technical hazards of handling a woodwind instrument under professional circumstances. True, only one staff may be dealt with in the score of a Wind instrument and we have seen, throughout this Survey, that on modern orchestral Wind instruments only one single note may be emitted at one given moment.

In the case of the Flute or Piccolo the single notes may be required to follow each other in rapid sequence, sometimes giving the impression of chordal playing by one individual instrumentalist. This may be a fairly simple matter to achieve in the Fundamental register or even in the next Octave, but on reaching the uppermost Harmonic Register, the finger-changes required, even upon the most advanced key-system, compel the player to alternate pairs of fingers in both hands which makes for a difficulty comparable in the case of a pianist with trilling rapidly in "Double-Thirds". Bearing in mind that the player has

at the same time to perform with a good tone and perfect intonation, both requiring skillful management of the lip muscles and correct articulation, involving absolute co-ordination of fingers and tongue, not to mention the hazards of respiration and good musical phrasing, perhaps the Pianist may realise that the lot of most professional Woodwind instrumentalists is anything but a happy one!

We may reflect too that almost every major development of a woodwind instrument, however expedient or necessary, has met with a hard core of opposition through the conservatism of players who were unwilling to relinquish the technique acquired, perhaps by many hard years of practice on one system, in order to embrace a revolutionary change to (often, admittedly) a superior one.

It is seen in Boehm's inventions of 1832 and 1847, it is seen in the widely differing national characteristics of the French and German musicians of the Nineteenth Century and it is seen again today in the very latest and most logical development of Boehm's System in the Murray-Cooper Flute, or yet again in "Le Rationnel" Saxophone of Charles Houvanaghel and in the reluctance by some Bassoon players to change to the Heckel Bassoon.

For years in London, where the "English School" of flute-playing was paramount (a hard unyielding tone played upon a wood flute) it was reckoned "professional suicide" for a Flautist to even appear in public with a metal flute. This remarkable prejudice has largely disappeared in Britain since 1946 and a gradual change in favour of the French style of playing on a silver or metal flute has now resulted in almost an opposite state of affairs. Similar changes seem to have taken place in Germany, while the United States in true Cosmopolitan spirit has embraced the finest national schools of each instrument, to blend them together in the world's finest orchestras - French flutes and oboes, English or French clarinets, German horns and bassoons.

It is reported, in spite of the French reputation for conservatism, that French players are enthusiastic for American-made instruments, while the American players are equally enthusiastic for the French-made ones. This is especially true of Oboes and Flutes. New schools of playing are yet beginning to make their presence felt in the Concert World, while in the world of Commercial Music, the free-lance musician has by now become accustomed to meeting the newest and strangest instruments ordered by the Composer or Arranger for some desired special effect.

The Nineteenth Century, described by one French Professor as "l'Age d'Or", was veritably a wonderful and exciting one. It saw the rise and development of many wonderful inventions and discoveries which are taken for granted today, not the least of them the rise and development of Woodwind instruments. Some of these have fallen by the wayside without a trace or else to the cul-de-sac of Museum Collections, while others have progressed (some rapidly and some more gradually) towards their ultimate places in Musical Society where they stand, as did their predecessors - at the Cross-Roads.

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