ORCHESTRAL WIND INSTRUMENTS.

ORCHESTRAL WIND INSTRUMENTS

ANCIENT AND MODERN

BEING AN ACCOUNT OF THE ORIGIN AND EVOLUTION OF WIND INSTRUMENTS FROM THE EARLIEST TO THE MOST RECENT TIMES

Illustrated with plates specially prepared for this work, giving sixty-one examples of instruments described.

BY

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ANGEL WITH THE TRUMPET.
After Fra Angelico; Fifteenth Century.

"Love your instrument, but do not vainly suppose it to be the highest and only one."

Schumann.

The New Temple Press, Norbury Crescent, S.W.

PREFACE.

THERE are before the public a large number of volumes relating to special aspects of the history and general capabilities of the various wind instruments, but at present there is not a single book which attempts to trace, in a concise yet complete manner, the evolution of our orchestral wind instruments from the very earliest down to the most recent times. The present volume is designed to meet that requirement.

The amount of material available for such a work is immense, and a volume much more bulky than the present one could easily have been compiled. The writer, has, however, striven to keep before him the handbook ideal, which shall appeal more to the general reader, and perhaps encourage him to prosecute a personal enquiry into those aspects of the subject which may interest him most.

The knowledge that space was limited has perforce led to the ruthless rejection of a mass of interesting facts and theories, but it is hoped that, while striving to render the subject as brief as possible, nothing of vital importance or interest has been omitted.

For the sake of simplicity, as well as brevity, the history has been confined mainly to English, and after that to European sources of interest. Some details have been given of the instruments known in ancient Egypt because they are more or less closely connected with those of ancient Greece and Rome, but apart from this, no particular mention is made of the instruments of other Asiatic civilisations, those of China, Japan, India, etc., having had very slight, if indeed any real influence on the later products of the West.

Although an attempt has been made to keep each chapter separate and complete in itself, yet a better perspective of the subject will be obtained by regarding them only as convenient sub-divisions of an indispensable whole: and if descriptions have been given of

obsolete instruments which have had no particular bearing on the evolution of the modern survivors of the same family, it is because a more intelligent understanding will result from some knowledge of the complexities and numerous side-issues which have gone to develop the marvellous perfection of our modern orchestra. For the same reason, chapters have been included especially for those readers who are not familiar with the fundamental laws relating to sound, and the general *modus operandi* of wind instruments.

I am glad to have the opportunity of publicly recording my thanks to Sir George Donaldson for permission to photograph antique instruments in the Donaldson Collection, and to the authorities at the Royal College of Music for the very kindly manner in which they aided me in the work; to Messrs. Rudall, Carte and Co., Ltd., for their most courteous treatment, both in allowing me to photograph certain modern instruments of their manufacture, and for supplying a table of lengths of the modern wood-wind and brass; to Sir E. A. Wallis Budge, of the Department of Egyptian and Assyrian Antiquities, the British Museum; to Miss L. Bull, who most kindly supplied the practical information about the heckelphone; also to many others for valuable hints regarding modern instruments and their practical technique, as well as for the loan of several modern specimens for inclusion in the plates. Lastly, an expression of gratitude is due to my wife, for the interesting copy of the Fra Angelico angel, as well as for the drawings of the Cirencester corbels.

ULRIC DAUBENY.

Torquay, 1920.

BIBLIOGRAPHY.

AMONG the many books to which the author is indebted for information contained in this volume, the following are especially recommendable to those who require any further specialised information:

"THE WORLD'S EARLIEST MUSIC." HERMANN SMITH.

"THE RISE AND DEVELOPMENT OF MILITARY MUSIC." FARMER.

"THE STORY OF THE FLUTE." FITZGIBBON.

"THE FLUTE AND FLUTE PLAYING." BOEHM-MILLER. (Containing detailed accounts of Boehm's theories and inventions.)

"MUSICAL INSTRUMENTS." ENGEL. (Asiatic and other primitive instruments.)

"THE WIND BAND AND ITS INSTRUMENTS." CLAPPÉ. (Containing tables of notation and fingering for all instruments.)

"MODERN ORCHESTRAL INSTRUMENTS." SCHLESINGER.

"OLD ENGLISH INSTRUMENTS OF MUSIC." GALPIN. (A mine of detailed information on the older instruments.)

"THE STORY OF ENGLISH MUSIC." (Musicians' Company Lectures.)

"THE KING'S MUSICK." LAFONTAINE. (Extracts from the Lord Chamberlain's records—mainly seventeenth century.)

"INSTRUMENTATION AND ORCHESTRATION." BERLIOZ.

"A SHORT HISTORY OF MILITARY MUSIC." KAPPEY.

"HISTORY OF MUSIC." CHAPPELL. DITTO, NAUMANN.

"MUSICAL INSTRUMENTS, HISTORIC, RARE, AND UNIQUE." HIPKINS AND GIBBS. (Mainly illustrative.)

"THE STUDENT'S HELMHOLTZ." BROADHOUSE.

"INSTRUMENTS Á VENT—LE COR, LA TROMPETTE, LE TROMBONE." MAHILLON. (Brussels.) (Theory of scientific construction.)

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CHAPTER I.

THE THEORY OF WIND INSTRUMENTS.

THIS is a subject about which little can be said unless a whole volume is at one's disposal, but for a better understanding of the chapters which follow, a simple review of pitch, timbre and tone-production seems advisable, especially for those who are not conversant with the general laws which govern sound. Be it understood that the subject is so vast that little more than a *synopsis* of the principal features can be attempted, and that all technicalities not absolutely necessary have been avoided, both here and in the following chapters.

To begin with, sounds are nothing more or less than air vibrations which impinge on the delicate mechanism of the ear, and cause the hearer a sensation we call "sound." The human "ear drum" consists of about three thousand delicate fibres known as Corti's Arches, each one of which vibrates at its own particular period when set in sympathetic motion by similar external vibrations in the form of air waves. We can therefore hear about three thousand variations of pitch, some of this number, however, being outside the range of musical sounds.

Pitch—that is the relative height of a sound—depends on the frequency of vibration, the less the frequency the lower being the pitch. Thus the note B flat (high pitch) is produced by 479.3 vibrations per second, while A natural, a semitone lower, requires only 452.4 vibrations per second. Temperature also has an effect on pitch, the higher the temperature the greater being the resulting frequency, and consequently the higher the pitch.

Loudness depends solely on the amplitude, or, to use a simpler word, the strength of the vibration. This is illustrated very simply by beating a kettle-drum gently or strongly, or bowing a violin string lightly or the reverse: the pitch remains the same in both cases, but the degree of loudness does not.

Now everyone knows that a long pendulum vibrates slower than a short one, and similarly a long tuning fork gives fewer vibrations and therefore a lower note than a short one. It is the same with musical instruments, for the longer the string or the pipe, the lower will be its note.

We may take as a theoretically correct law the following: pipes of equal length at the same temperature give the same note. This, however, is not quite true in practice, for the width of the bore makes a slight difference to the pitch. For instance, to give the note *A* a pipe $\frac{7}{16}$ in. in diameter will need to be $41\frac{3}{4}$ in. in length, while a pipe of $\frac{1}{2}$ ($\frac{8}{16}$ in.) in diameter must only be $40\frac{1}{4}$ in. to emit the same note. In passing, it is of interest to note that while the theoretical lengths of all instruments of similar pitch are equal, the practical lengths are always slightly less, each instrument having a different length factor according to its bore and method of sound production. Thus the flute is somewhat longer than an oboe of similar pitch, yet both their theoretical and their proportionate lengths are the same. It may be added that in wood-wind instruments operated by tone holes, experiment has shown that such holes must be placed somewhat nearer the mouthpiece than would be the corresponding distance on an open tube sounding the same pitch, the air column apparently being less shortened by boring a lateral hole than by actually cutting the tube.

Let us now turn our attention to the much more complicated phenomena which affect tone-quality, tone-colour (French), timbre, or (German) klang faube, as it is variously termed. Before examining the structural peculiarities which go to produce the different tone characteristics of the various instruments we must look for a moment at the purely physical aspect.

Musical sound is very analogous to white light, for just as apparently colourless light is actually made up of all the different colours, and can be resolved into such in the form of a spectrum, so is any one musical note the outcome of a number of different notes

sounding at one and the same time, these also being resolvable into different sounds or *harmonics* by means of resonators. Resonators are hollow metal bodies which, if held to the ear, can be heard to vibrate and give resonance to the note to which they are tuned. Their inventor, Helmholtz, a great scientist, to whom we owe most of the modern theories respecting sound, constructed a large number of these in different sizes, and by their aid was able to analyse notes given by various instruments, and afterwards by sounding the resonators, to reproduce not only the notes but their actual timbre. Each instrument has its own peculiar composition of harmonics which give its characteristic tone, but perhaps the simplest and most easily tested instance is found in big church or clock bells. At a short distance many different notes can be picked out after the bell has been struck, while to an untrained ear, or at a great distance, only one pure note is audible.

This leads us to a definition of the difference between a musical sound and a noise: in a musical sound the constituent harmonics all bear certain definite relations to one another, in noise there is no such relationship.

But this is a subject far too complex to go further into here, and it must suffice to say that the differences of tone between, say, the flute and the oboe, or the bassoon and the trombone, are accounted for by the variations in the constituent harmonic sounds composing their timbres. Instruments whose tones possess a large proportion of the upper harmonics (termed "upper partials") are the more brilliant—the trumpet being a notable example—while those whose tones are dull and flat are found to contain very few of the upper and a preponderance of the lower partials—e.g., the bassoon and the lower compass of the flute.

See now the structural peculiarities which impart to the different instruments their varying compositions of harmonics, and, consequently, their diversity of tone-colour.

The usual orchestral divisions of wood-wind* and brass are very

* "Wood-wind" instruments have at various times been constructed from numerous different materials. As early as 1547, among the inventory of Henry VIII are found "three fflutes of glasse and one of woode paintèd like glasse"; other instruments of "blacke ebonie, iverie, woode, box, and two Base Recorders of Waulnuttre."

misleading, unless the term "brass" is distinctly understood to apply only to such instruments as are sounded by means of cup-shaped mouthpieces—the horn, trumpet, trombone, etc. "Wood-wind," too, must be taken to include metal flutes, brass saxophones and sarrusophones, and all mineral vulcanite instruments—most of which are made of "ebonite," a mixture of rubber, sulphur and lead.

Below are given two scientific classifications, the first and more satisfactory being according to the method of vibration employed.

WOOD-WIND.

Reeds.

Single reeds. The clarinet and saxophone families.

Double reeds. The oboe, bassoon and sarrusophone families.

Non-Reeds.

The flutes. *Obsolete*: the whistle (recorder and flageolet) mouthpiece.

BRASS-WIND.

Mouthpieces.

Hemispherical cup. Trumpets and trombones (nominal).

Funnel-shaped cup. Flugelhorns, French horns, saxhorns and Wagner tubas.

Hybrid. (Modified cup-funnel.) Euphoniums, bombardons, cornets and tubas, and (in practice) trombones.

The other and less satisfactory classification is according to the structure of the bore containing the air column.

Cylindrical Bores.

Flutes, clarinets, trumpets and trombones.

Conical Bores.

Oboes, bassoons, saxophones, sarrusophones and horns.

Hybrid.

Cornets and tubas.

These last being about midway between the restricted cylinders of the trumpet family and the wide cones of the horns.

To return to the first classification, we will now examine the various principles of the vibratory membranes or sound producing mediums employed.

(1) *Single Reed.*

This is held fast at one end while the other covers a kind of hollow mouthpiece, against the edge of which it is free to vibrate, and so set in motion the air column of the instrument.

(2) *Double Reed.*

Action somewhat similar to that of No. 1, but two reeds are used instead of one—that is, the edge of the mouthpiece is replaced by the second reed, so that both reeds vibrate against each other.

(3) *Non-Reed.*

Which in the flute is called the embouchure, or mouth-hole. The player's breath being deflected against the sharp edge of this orifice causes a kind of "flutter," and so serves to set in motion the air column contained in the tube.

The whistle, fipple, or flageolet-type mouthpiece, as it is variously called, is obsolete so far as orchestral uses are concerned, but its fundamental principle is still preserved to us in the tin whistle and in the organ pipe. The open-ended tube is partially plugged at one end, and a narrow transverse orifice cut a little below the end of the plug. The breath or wind is thus mechanically directed against the lower edge of the orifice (causing a "flutter") in a very similar manner to the lip's deflection of the air current against the edge of the mouth-hole in a transverse flute.

(4) *Mouthpieces of all Kinds.*

These are essentially in the form of a cup covering the lips, which in their turn are made to vibrate by the player's breath somewhat after the manner of the double reed. Perhaps a better simile would be the vocal chords of the human larynx.

Naturally the choice of vibrating agent affects the timbre to a great extent, and reed instrumentalists can testify to the variations in tone arising from a hard or a soft reed. Oboe and bassoon players also know how much the size of the aperture between the two reeds affects the timbre, as well as the emission of the higher and the lower notes.

Another detail which has an important bearing on tone quality is the shape and size of the internal bore, a wider bore favouring the emission of the lower notes and causing a fuller and broader tone. On brass instruments a conical bore gives the soft, dulcet

horn tones, while narrow, almost cylindrical, bores favour the trumpet* brilliancy of timbre. The width and acoustic proportions of the "bell" also have an important bearing both on pitch and timbre —compare the bells of the trumpet and cornet-à-pistons, or the trombone and euphonium.

But on brass instruments perhaps the most important factor is the mouthpiece, the deep V shape being characteristic of the horn, and the hemispherical, sharp-edged cup giving to the trumpet much of its brilliancy and clearness.

It is necessary now to examine another factor on which the characteristic timbre of an instrument largely depends—its material.

During the last fifty years the theory of tone-quality in wind instruments has undergone a complete change. As late as 1868 Theobald Boehm, the celebrated flautist and flute-maker, stated that "the molecules of the flute tube shall be set into vibration at the same time as the air column, and these shall, as it were, mutually assist one another" (this applying, of course, to all wind instruments). In other words, it was believed that the tone-quality depended largely on the vibrating qualities as well as the thickness of the material of which the instrument was made.

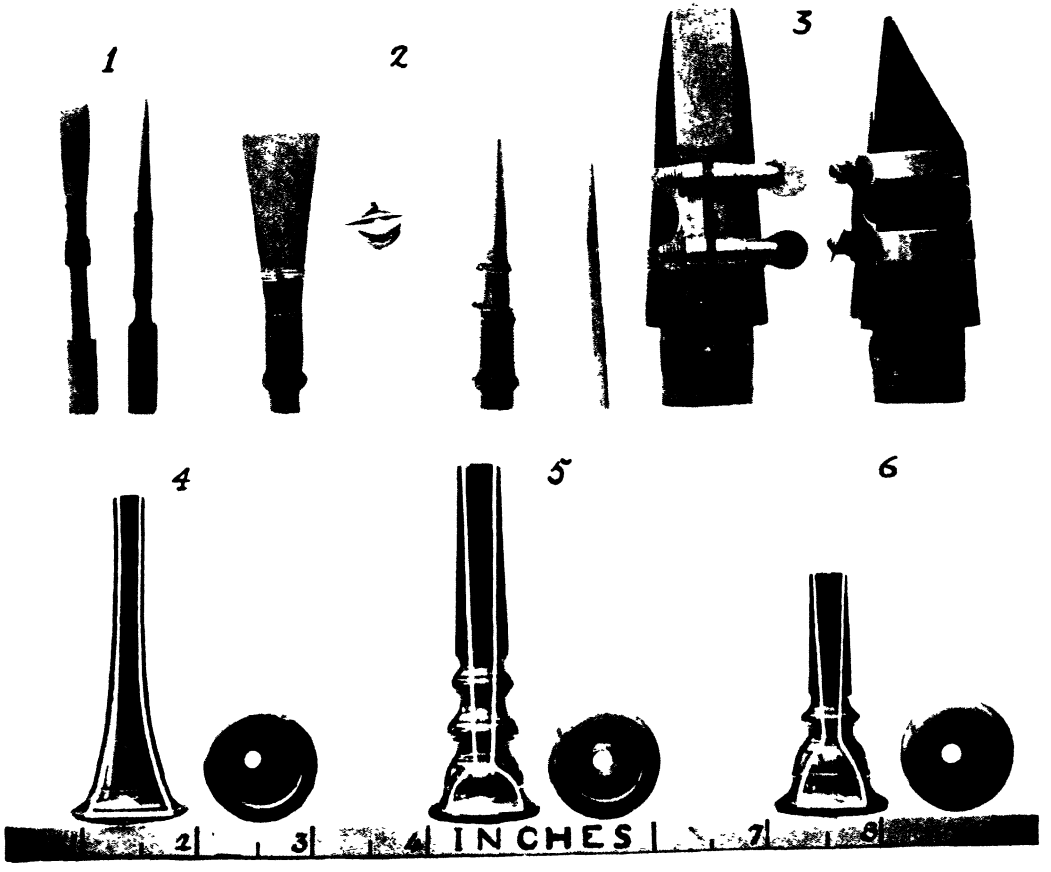
When writing the above, Boehm was either unaware of, or discredited, one of Helmholtz's chief discoveries concerning wind instruments, this being that the material does not itself vibrate, but only affects the timbre according to the elasticity or *resistance* it has to offer to the vibrating air column contained within it. That is to say, "pipes of different materials having the same proportions (bore, length, etc.) produce similar qualities of tone provided these materials are equally rigid or elastic."

Timbre is therefore affected only in an indirect way by the material, for, provided their interior finish and their density or power of resistance to vibration were the same, horn, plaster of Paris, gutta-percha, wood, leather, or brass would all give precisely similar tones. A trumpet has actually been made of acacia wood, on exactly the same proportions as a cavalry trumpet. When the wood is dry, the tone of the instrument is dull and utterly without

* Theoretically, the bore of the trumpet is cylindrical, but in modern practice it is a very restricted cone.

PLATE I. REEDS AND MOUTHPIECES

1. OBOE REEDS.
2. BASSOON REEDS.
3. CLARINET REEDS and MOUTHPIECES.
4. HORN MOUTHPIECE, showing section and end view.
5. TRUMPET MOUTHPIECE, showing section and end view.
6. CORNET MOUTHPIECE, showing section and end view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resonance, because, the wood being porous, the air column vibrates under very unfavourable conditions. If, however, the instrument is previously soaked in water, the tone becomes pure and brilliant, precisely similar, it is said, to that of a brass trumpet.*

There is yet another factor which has an all-important bearing on the resulting timbre of any instrument, and that is the personal ability of the performer.

A poor player will succeed in bringing forth hideous strains from a genuine "Strad" violin, while an artistic executant will produce divine ones. It is exactly the same when dealing with wind instruments.

Tone has to be built up gradually, and to accomplish this the player must study under good methods, and must, above all, learn to appreciate the performance of famous artists and strive to follow in their footsteps. Every good instrument is capable of producing a good quality of tone, and it only remains for the executant to draw it forth; whether he can do so or not depends entirely on his individual artistic skill and training.

Methods of tone production differ according to the instrument, and what is correct for one may be undesirable for another. For instance, a horn player will produce on a trumpet a kind of bastard horn tone, while a trumpeter will impart to the horn some of the characteristics of his own instrument. What is sauce for the goose is by no means sauce for the gander if the "goose" happens to be a trumpet and the "gander" a horn.

Before closing this chapter, it will be advisable to add a few words about the harmonics on which the playing of all wind instruments—especially the "brass"—so largely depends.

If, in a wind instrument or organ pipe, the air column vibrates as a whole from end to end, the resulting note is known as the *fundamental*, that is, the lowest sound producible from that particular length of tubing. An increase or deflection of wind pressure, or some alteration in the tension of the lips or reeds which act as vibratory agents, causes the air column, as it were, to break up and vibrate in two, three, four, or more, equal parts, the resulting air waves being in length half, a third, a quarter, of the funda-

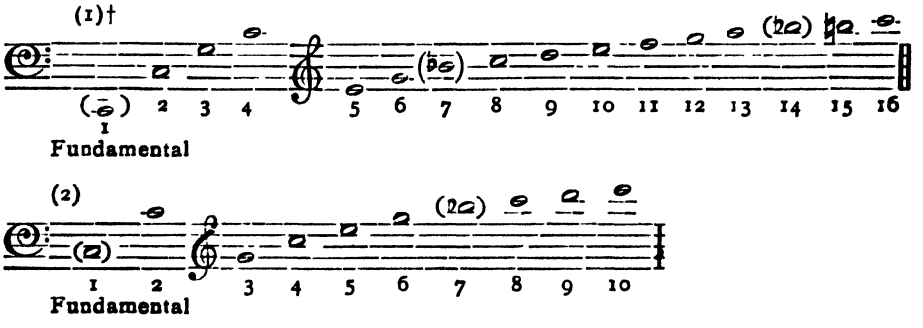
* "Instruments à Vent"—Mahillon.

mentals. Such sounds as result are known as "harmonics of the fundamental tone."

In wind instruments such as the flute or oboe, the fundamental tones are employed for the lowest octave, each note being a fundamental of its own particular wave length according as the tone holes are opened or closed. The only harmonics used are the octaves (except in certain "cross fingerings"), but there is an exception in the clarinet family, which sound the twelfth instead of the octaves.

On the smaller cup-mouthpieced instruments the fundamentals are rarely, if ever, used, being indeed all but impossible to obtain with the usual small mouthpieces and narrow bores and bells. An exception is found in the wide-bored, big-mouthpieced euphoniums and bombardons constructed especially to facilitate the production of their deep fundamental tones.

The following are the harmonics given by (1) the French horn, (2) the B flat trumpet or cornet, and known as the natural or "open" notes:



These different harmonics are sounded at will, simply by a variation in tension of the player's lips, the chromatic scale being completed by contrivances called valves, to which the next chapter will be devoted.

* The bracketed B flats are not in tune with our Tempered Scale. The upward compass limited only by the skill of the performer.

CHAPTER II.

KEYS, SLIDES AND VALVES.

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MANKIND'S most primitive instruments were capable of emitting but one note, and that of no particular musical significance. Later on these original bone whistles, chance animal horns and suchlike sound-producing mediums, gave place to stopped whistle pipes cut from lengths of reed, these in turn eventually developing into a chromatic instrument known as the Pan's-pipe (*see* Flute). Later still came the single pipe with finger holes, but unfortunately this could not be rendered chromatic, for although the correct number of holes might be made, man had not been provided with a sufficiency of fingers to cover them. The only method of obtaining the chromatic intervals lay in partially stopping the non-chromatic finger-holes or in stopping them out of sequence, thereby obtaining such sounds as lay between. As this is by no means easy to do with any accuracy of intonation, musicians naturally cast about for some method by which notes in a mode foreign to the key of the instrument could be obtained with a greater degree of certainty than heretofore.

The earliest known mechnical contrivance of the kind is seen on a Roman *tibia* discovered at Pompeii in 1876, and now on view in the Naples Museum. This instrument is made of ivory, and is provided with eleven lateral holes covered by sliding shutters, so that certain of them might be kept open and the others closed according as the scale or mode was changed. It is interesting to note that sixteenth century bassoons had extra holes fitted with movable pegs by which a similar variation in mode could easily be made.

As far as is known, many centuries elapsed before the advent of the key. A key primarily consists of a hinged lever carrying at one end a kind of lid which is normally closed (or normally open)

over a tone-hole, and can be temporarily opened (or closed) by the pressure of a finger on the other end of the lever. Keys were first adapted to the families of recorders, shawms and cornets to extend the compass downwards, but in later years they gradually came to supersede the primitive and imperfect method of partially stopping tone-holes with the fingers. This is to say that a closed key would be placed over an extra tone hole, bored in between two consecutive finger-holes giving notes differing by a tone in pitch, so that the pressure of a disengaged finger on a conveniently placed key lever would open the extra hole, and give the exact semitone without any further trouble on the part of the performer.

This is the basis of all modern key systems; in fact, the why and wherefore of keys can be given in a nut-shell—a sure and certain method of chromaticism.*

The gradual advance in key mechanism, and the names of various inventors of note have been detailed in the following chapters on the wood-wind, so we will now turn to that with which we particularly wish to deal, the means by which brass instruments are rendered chromatic.

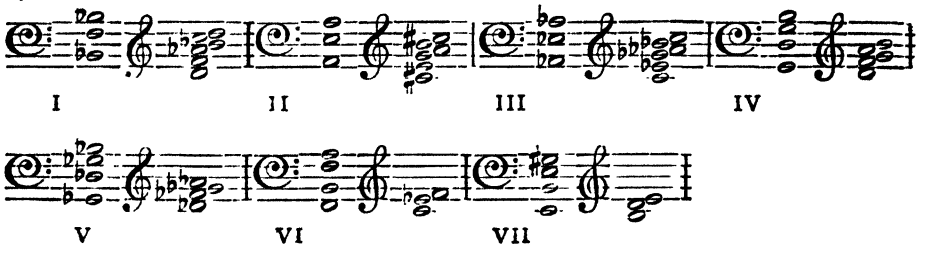
Until the early part of the fourteenth century cup-mouthpieced instruments—with the exception of the cornett or zinke—could only sound the natural harmonics proper to an open tube of their own particular length. It is, however, possible that before the introduction of the trombone slide in its present form, certain of the long straight trumpets or buzines were made with part of the tube telescopic, primarily to render them more portable. Were the telescopic arrangement only partially instead of fully drawn, the instrument would have a different air-column length, and therefore a different fundamental and series of harmonics, and this circumstance may have been the germ which later developed into the chromatic slide, introduced during the fourteenth century.

The characteristic trombone slide consists of two parallel tubes connected at one end, covering and closely sliding over two unconnected parallel tubes, so that the air column contained within these

* Prior to the middle of the eighteenth century, one or more sets of keys in duplicate were provided, as well as double-headed keys, thus allowing the performer a choice of using either the left or the right hand for manipulation of the lower notes. The latter method is the one now universally adopted.

tubes can be varied in length according as the outer slide is moved backwards and forwards. Sixteenth century instruments were provided with slides having a shift of about five "positions," but on modern trombones there are seven (six semitones), including the closed or "home" position of the slide. As the latter is pushed out, each successive position—judged by the player's eye and ear—lowers the pitch of the instrument, its fundamental and its harmonics, by a semitone.

The following are the notes given by each different position on the trombone:



Now, if we call to mind the law stated in the last chapter, *the lower the note the greater the length of tubing required to produce it*, it will be readily understood that the extra length of tubing brought into use with each successive semitone depression will in each case be slightly greater than the amount that was required to cause a similar depression in the preceding position.

As a matter of practice, it is found that for the second position on the B flat trombone the slide has to be drawn about $3\frac{1}{8}$ inches. For the third position, about $6\frac{1}{2}$ inches, that is another $3\frac{3}{8}$ inches, or an increase of $\frac{1}{4}$ inch on the length of the second from the "home" position, while the fourth position is about 10 inches from "home," an increase of $\frac{3}{8}$ inch on the second position, and so on. This variation in the length of tubing required for the depression of the pitch according as it is higher or lower, is a very important point to bear in mind, and reference will again be made to it later on in the chapter.

We must now turn from the slide, and consider some of the other means by which cup-mouthpieced instruments are rendered chromatic.

Long after the trombone had its slide, the trumpet and horn

were non-chromatic, the key of their natural harmonic series being varied by means of extra lengths of tubing known as crooks, which were attached to the instrument in order to correspond with the changes of key in the composition.

The first appliance which actually added to the chromatic compass was the key, similar to that which had been used for centuries on the "wood-wind." In the year 1760, a Bohemian musician named Kolbel placed one closed key near the bell of a horn or trumpet, the opening of which shortened the air column and raised the pitch a semitone, and therefore transposed the whole harmonic series by that amount. By 1801, Weidinger, of Vienna, had increased the number of keys to five, thus rendering the trumpet and horn practically chromatic, and during the early part of the nineteenth century these instruments, as well as bugles and ophicleides, were made absolutely chromatic by the addition of the sixth key. By this system each key, beginning at the one nearest the bell, successively *raised* the pitch a semitone, the air column being shortened instead of lengthened as in the slide trombone.

Keys were not very satisfactory, because only the one series of harmonics was emitted from the bell, the others coming from all parts of the instrument, and being poor in tone. This being so, the field was still open to any inventor who could bring forward some new device, and render perfect the chromatic scale of the brass-wind.

Undoubtedly the first constructed valve was the invention of an Irishman, Charles Clagget by name, who, in the year 1788, introduced a "chromatic trumpet and French horn" at a concert held at the Bath Pump Room. His arrangement was simply this. Two instruments differing in pitch by a semitone were constructed side by side and brought to a common mouthpiece. A rotary or tap valve was placed so that wind could be directed into either instrument at will, and as one gave its harmonics a semitone above the other, the same semi-chromatic compass was available as with Kolbel's single key. Dr. Burney thought highly of the invention, but feared that such innovations were too far in advance of the times, a surmise which subsequent experience proved to have been well founded.*

* "The Irish Inventor of the Valve Horn," by W. H. Grattan Flood, Mus.Doc. "Musical Opinion," December, 1918.

About the year 1813, an oboist named Frederick Blümel, a Silesian by birth, invented a single piston valve applicable to the horn, and sold his invention to Stolzel, a native of Breslau. The latter added a second valve, his object apparently having been simply to provide an easier method of transposing the natural harmonics than the old way of applying additional crooks. However, finding the rapidity and ease with which his valves worked, he awoke to the fact that, unknowingly, he had given to brass instruments a new method of chromaticism, and in 1815 he produced his first chromatic trumpet with two piston valves. Ten years later the same maker introduced the *Schub-Ventil*, a cylindrical valve appliance, lighter and more rapid than the original square model; while in 1827 Blümel brought out the *Dreh-Ventil*, a valve on the tap system, that is, a rotating cylinder or four-way stop cock, two ways being main channel and the other two by-path. This system is still preferred by some players, and is used in preference to piston valves in many European countries. The rotating valve is certainly lighter and affords greater rapidity and ease of execution than the piston, but the fact that the mechanism is more delicate and liable to get out of order mitigates considerably against its general use.

In 1833, Moritz, of Berlin, introduced large piston valves known as *Berliner Pumpen*, which in turn gave place to Perinet's pistons, contrivances very similar in size to our present-day valves, that is, about midway between the narrow *Schub-Ventil* and the clumsy *Berliner Pumpen*.

The celebrated instrument-maker and inventor, Adolphe Sax (known also as Antoine Sax) patented his saxhorns in 1845, instruments fitted with greatly improved valve mechanism, chiefly notable for the abolition of the abrupt twists and bends characteristic of the earlier valves, and consequently remarkable for their great improvement in rapidity of working and uniformity of tone quality.

Let us now consider the manner in which valves affect the length of air column, and consequently the pitch of an instrument. To begin with, there is the clear wind passage of the instrument, uninterrupted by the valves when in their normal position, and corresponding to the first, or "home" position of the trombone slide. To each valve is attached a U-shaped bend of tubing, through which

the air is deflected on depression of the valve, the normal air column being thus increased in length by the extent of this particular deflection. These bends of tubing vary in length, according as the valve to which they are attached is designed to lower the pitch by a semitone, a tone, a tone and a half, or even more in the case of bass instruments. In modern practice, but not in the early models, these bends are invariably constructed of tubes sliding within tubes, somewhat on the principle of the trombone slide, so as to admit of tuning.

With the three-valve system, universally applied to trumpets, horns, cornets, etc., the "open" note corresponds to the first, or closed position on the trombone slide. Bringing into use the valves:

Valve 2 depresses 1 semitone, corresponding to position 2 on a slide.

Valve 1 depresses 2 semitones, corresponding to position 3 on a slide.

Valve 3 (or 1 and 2) depresses 3 semitones, corresponding to position 4 on a slide.

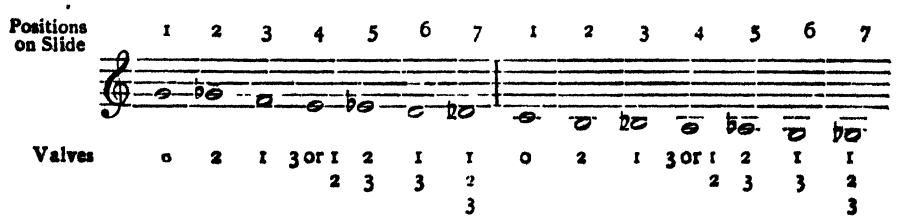
Valve 2 and 3 depresses 4 semitones, corresponding to position 5 on a slide.

Valve 1 and 3 depresses 5 semitones, corresponding to position 6 on a slide.

Valve 1 and 2 and 3 depresses 6 semitones, corresponding to position 7 on a slide.

So it will be seen that by the combinations of three valves, taken separately and together, seven "positions" corresponding to the slide positions are available, and thus complete chromaticism over the whole compass of the instrument is obtained.

The following table gives the fingering for the lower compass of the soprano trumpet (and cornet), with corresponding positions on the slide:



By reference to the law quoted above *(the lower the note, the greater the length of tubing required to produce it)*, and bearing in mind the effect this had in necessitating the gradual increase in length of each successive position on the trombone slide, it will be seen that the length of tubing attached to valve two, if constructed to depress the *open* note an exact semitone, will be of insufficient length to depress by a semitone a note *lower* in pitch than the open note, that is, a note produced by aid of the additional air-column length supplied by valves one or three; the inaccuracy will be still further intensified when it is attempted, with valve two, to depress a further semitone the pitch of the note formed by use of valves one and three *in combination*—a note five semitones lower in pitch than the open note, with which valve two is especially designed to combine. Fortunately, as regards the soprano instruments, in actual practice these inaccuracies are so slight as only to be noticeable when the tone-and-a-half depression in pitch supplied by valve three is brought into combination with the other valves, either singly or together, so that the difficulties are to a great extent overcome by the simple expedient of lengthening the tubing attached to the third valve, thus giving a fall in pitch of somewhat more than three semitones below the open note, the combination of valves one and two (only very slightly inaccurate) being available for production of the "fourth position."

This distribution of errors works very satisfactorily on short instruments such as trumpets and cornets, but on the longer euphonium and bombardon, and suchlike instruments, it is usual to provide a fourth, or even a fifth valve. Valve trombones sometimes have their third valve sounding four instead of three semitones below the open note, thus giving an accurate equivalent of the fifth position on the slide, the combination of the first and second valves taking the place of the fourth position, as in other instruments. In an attempt to reach perfect theoretical accuracy, Sax constructed certain of his saxhorns with six valves, some with six valves and seven separate and distinct air passages and bells, but the added weight and complexity prevented such inventions from becoming a commercial success. In 1874, Boosey patented his compensating pistons, a device which has since attained some degree of popularity, especially when applied to the lengthier in-

struments. The idea consists of having short, extra "bows" of tubing which are brought into use as part of the air passage only when two or more valves are used in combination, so that the theoretically correct length of tubing is always actually available.

On looking back upon the many imperfections in the earlier valves, little surprise can be expressed at the general outcry and opposition to the introduction of valved instruments for orchestral use. The first unfavourable opinion formed, musicians for long refused to recognise the gradual perfections wrought in valve design and construction, and even the wonderful improvements engineered by Sax received but a grudging and tardy acceptance on the Continent of Europe, despite the efforts and recommendations made by such men as Schumann and Richard Wagner. In "Tannhäuser" (1845) the latter composer scored for two natural, as well as two valved horns, solely in order to satisfy the prejudices of the older school. In England, the semi-chromaticism of the slide-trumpet and "hand-horn" for several decades held at bay the general introduction of valved instruments, and even as late as 1870, a prominent professor of music warned students against the use of valved trumpets and horns.

On modern instruments it is impossible to detect any difference at all between the timbre of valve or "open" notes, and this being so, it is difficult to imagine the workings of a mind which can raise objection to full advantage being taken of the perfect chromatic compass thus given to all "brass" instruments, excepting, of course, the trombone, which loses its characteristic tone with the loss of its slide. However, old superstitions die hard, so for the benefit of those who may still have their doubts, we will quote from Richard Strauss: "Reactionaries of an insufferable sort are, in my opinion, those who teach that it is vulgar to use a valve trumpet for melody —for no other reason than because Beethoven was of necessity obliged to confine his natural trumpet players to the tonic and dominant."

CHAPTER III.

THE FLUTE.

Flute. Piccolo.

Material.—Cocuswood or ebonite, occasionally silver.

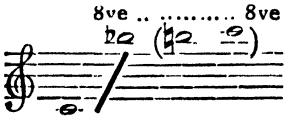
*Length of Tubing.**—Concert flute in C (sometimes called D), 26⅝ inches.† Piccolo, ditto, 12⅝ inches.†

Bore.—Cylindrical, with head joint a parabolic curve.

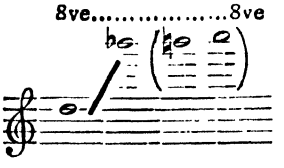
Mouthpiece.—Lateral "blow-hole."

Number of Tone Holes.—Usually fifteen. Piccolo, thirteen.

Compass (for orchestral purposes).—



Piccolo



Of flutes, two, sometimes three, are used in the orchestra, one of which is interchangeable with the piccolo.

* All lengths given at New Philharmonic pitch, A = 439 vibrations per second, at 60 degrees Fah.

† Including head joint and tuning cork.

CHAPTER III.

THE FLUTE.

FRENCH, FLÛTE. ITALIAN, FLAUTO. GERMAN, FLÖTE.

PRACTICALLY all the orchestral instruments in use at the present day can trace their descent back to very remote ancestors, and it is probable that, with the exception of the horn, the origin of the flute is of all wind instruments the most ancient.

Rude bone whistles belonging to the Neolithic period have been discovered, and perhaps even an earlier type of flute would have been the hollow reed, closed naturally at one end, and sounded by blowing across the open top. This gave one musical note, and several reeds of varying lengths held together in a row formed the most ancient musical instrument known to history, the Syrinx or Pandean pipes. Probably centuries elapsed before an all-important discovery was made, namely, that if holes were pierced at intervals in a hollow reed or stick, it would give different notes according as the holes were left open or closed by the fingers. It is on this most vital fact that the whole of the ancient and modern wood-wind construction is based.

Apart from the Pan's pipes, the historically oldest ancestor of the flute is seen in the *Sebá*, so often depicted on Egyptian monuments, and still to be found among the Arabs under the name of *Nay*. Its length was so great as to necessitate the arms being stretched to their fullest extent to reach the extreme finger holes; and instead of the lateral "blow-hole" mouthpiece familiar to us, it was sounded by blowing across the open top, in a manner very similar to the Pan's pipes. This type of flute, though technically known as a "vertical flute," was actually held transversely, but at

a very steep angle. Occasionally they are found with a deep V-shaped notch cut in the end to facilitate blowing.

Another Egyptian instrument which figures largely on monuments dating from the very earliest periods was the double pipes or *Mam*. Though reeds may sometimes have been used, this instrument was probably more often sounded by the fipple or whistle type mouthpiece, so universally used in ancient Egypt, and still to be found in Egypt and the Sûdân.

The Greeks and Romans were, of course, familiar with the Pan's pipes, besides which they had numerous wood-wind instruments known as *Auloi* and *Tibiæ* respectively. These terms (which are invariably translated *flutes*) were used indiscriminately for double and single-reeded instruments, as well as for those with whistle mouthpieces. It is highly probable that one variety of Greek *Diaulos*, or double pipe, was of the latter type, similar to the double pipes of the Egyptians.

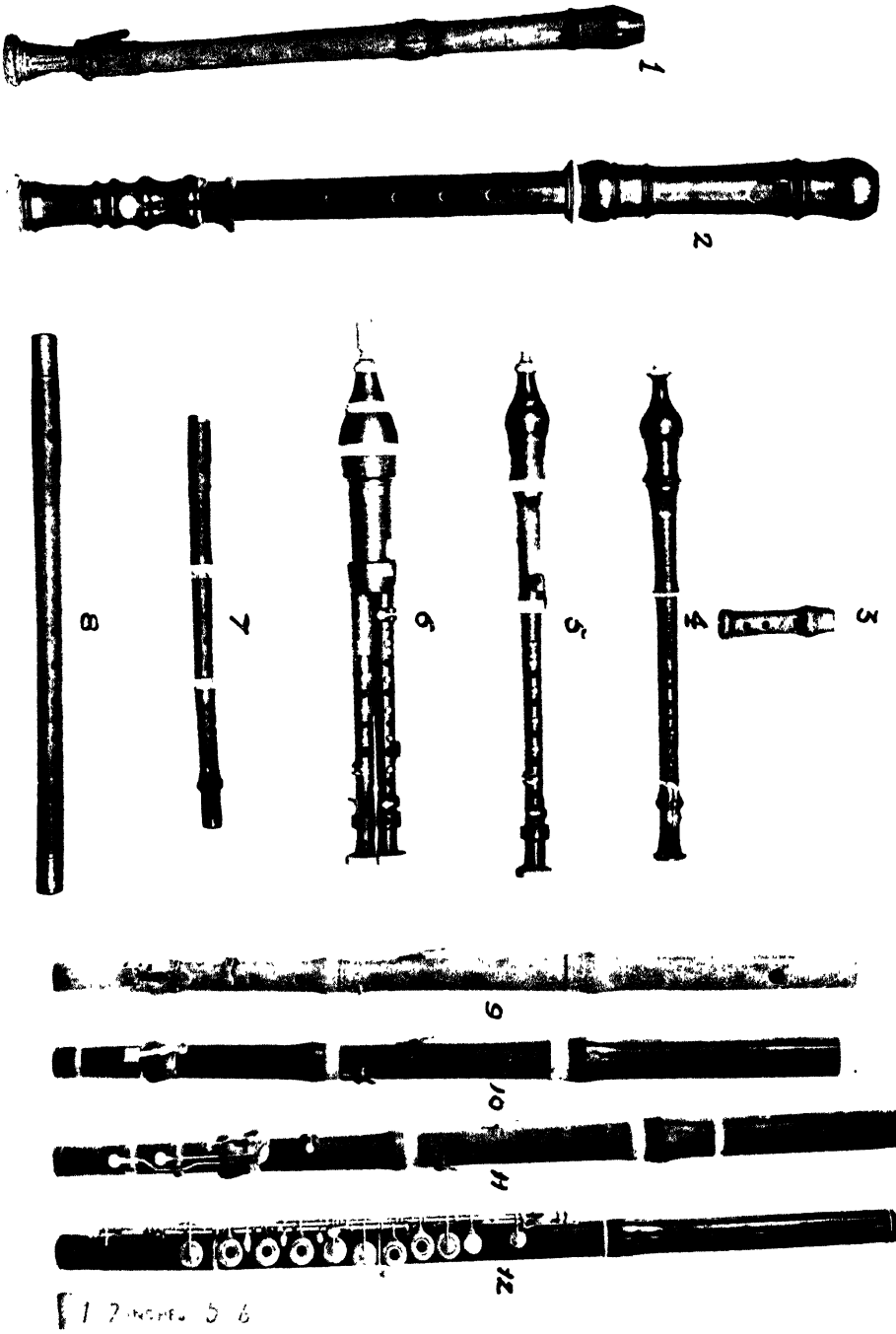
The principle of the lateral blowhole of the transverse flute *(Plagiaulos)* seems also to have been familiar to the Greeks, if not to the Romans; there are two fine specimens of ancient Greek bronze flutes in the British Museum, the lateral mouthpieces being raised above the tube, and carved in the shape of a mænad holding a bunch of grapes. Some writers claim these to be merely sockets for holding the double reeds by which the instruments were sounded, but, to say the least, this seems unlikely. These flutes are provided with five finger holes and one thumb hole.

Aristotle calls flute playing "bad and exciting," while Ælian tells us that the Greek armies marched to the sound of the flute, for it kept the men "cool and firm," and did not excite them as did the more martial trumpet. However, as we have pointed out above, the Greek word *aulos* and the Latin *tibia* were used in an exceedingly vague manner, and it is more than probable that at any rate the latter of these two passages refers to the shriller single or double-reeded instruments, and not to the comparatively rare "lip reed" flute.

Certain forms of pipes, possibly true transverse flutes, appear to have been looked upon as part of the insignia of harlotry, and both the instrument and the player were regarded with considerable contempt. Plato (circa 347 B.C.) went so far as to prohibit the use

PLATE 2.—FLUTES

1. FLUTE-A-BEC, in ivory, eighteenth century. *(From the Donaldson Collection.)*
2. RECORDER, seventeenth century. *(From the Donaldson Collection.)*
3. "PICCO PIPE"
4 and 5. FLAGEOLETS by Bainbridge. Late eighteenth century.
6. DOUBLE FLAGEOLET by Bainbridge. Early nineteenth century.
7. PICCOLO, eighteenth century.
8. Military FIFE, eighteenth century.
9. FLUTE in ivory, with four keys. Dated 1703.
10. FLUTE in boxwood, with three keys. Dated 1775.
11. FLUTE with SIX keys, early nineteenth century.
12. FLUTE. Modern, by Rudall Carte. Boehm system, Rockstro model.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of this instrument within the confines of his Republic, for he declared that no modest woman could listen to the strains of the Lydian pipe and remain pure! Ptolmey XIII, father of the great Cleopatra, and himself a pure Macedonian Greek, was scornfully nicknamed *Auletes*, or piper, in Alexandria, the centre of Greek culture and refinement of that period (B.C. 80-51).

The date of the origin or introduction of the Pandean pipes and whistle-flute into Britain is, of course, unknown; but we may be perfectly certain it was long before the coming of the Romans, these instruments being common to the Aryan peoples of Western Asia, who, in prehistoric times, immigrated all over Europe, and thus forming the bedrock of our present civilisation.

The earliest *record* of the Pan's pipes in this country is an illustration in a late Anglo-Saxon Psalter, dating from the eleventh century. Single pipes (fipple or whistle type) are depicted in twelfth and thirteenth century manuscripts, and early fourteenth century writings preserved in the British Museum give, besides the double pipes, long vertical flutes (sometimes called pilgrim's staves) played in exactly the same manner as the ancient Egyptian *Sebá*.

The twelfth and thirteenth centuries saw immense strides in the construction of musical instruments in Europe, chiefly owing to the Crusaders, who returned with specimens taken from the Saracens and other nations skilled in music, by whom double-reeded instruments, trumpets and drums were particularly favoured. Towards the end of the fourteenth century we find the whistle flute going under the name of recorde, or recorder, one of the earliest instances of the use of this name occurring in the early fifteenth century poem, 'The Squyr of Lowe Degre":

"Ther was myrth and melody

. . . . . .

With fydle, recorda, and dowcemere."

The exact origin of the name recorder is doubtful, but it has been suggested that the early whistle-pipes were used by snarers for imitating or "recording" the calls of birds. The later name, flûte-à-bec, came from the French, and was suggested by the beak-like shape of the mouthpiece. When the transverse or "German flute"

came into general use in England, the flûte-à-bec took the distinctive name of English flute—a term by which the tin whistle is known in France to the present day!

From the end of the fourteenth century onwards, recorders are mentioned very frequently in all contemporary literature, as well as being illustrated in manuscripts, books, and ecclesiastical carvings. Henry VIII, that most musical of all monarchs, who at his death left some two hundred and fifty-seven different wind instruments, was particularly fond of the flute tribe, for in the inventory (1547) of his huge collection were seventy-six recorders, seventy-two "fflutes" and six "phiphes" (fifes).

Recorders were made in families or "nests" comprising treble, mean, bass and great bass, the latter (somewhat feeble in tone) descending to low F or even D, its length necessitating a bent metal crook to connect the player's lips with the whistle-type mouthpiece. Like the shawm, recorders were fitted with keys to extend the compass downwards,* and sometimes two instruments of equal or unequal length were placed side by side and played from a common mouthpiece in the form of the double recorder. The loquacious Samuel Pepys mentions the former in his Diary (1667): " . . . . two pipes of the same note fastened together, so as I can play on one and then echo it upon the other, which is mighty pretty." He also mentions that his wife was learning the flageolet (1666), a name given particularly to the treble recorder.†

Another instrument deserving of mention is the tabor pipe, so called from its close association with the tabor or side drum. Since about the twelfth century tabors and pipes had been common in England, just as in later years were the drum and fife bands. The tabor pipe‡ was originally some two feet in length, sounded by a whistle mouthpiece, and having three holes, two for the fingers and one for the thumb, placed close to the open end. It had a more or less chromatic compass of about two octaves, the notes being mostly harmonics, and therefore by no means easy to produce with any

* In 1511, Virdung gives one normally open key for the flute-à-bec.

† The flageolet properly had two holes at the back to accommodate both thumbs: the recorder but one hole for the left thumb.

‡ "A pipe for a Taberde in a case of blacke woode," figures in the inventory of instruments belonging to Henry VIII.

certainty. It was for long a favourite instrument at village dances and fairs, the player using one hand for the pipe and beating time on the tabor with the other.

An instrument approximating to this type was revived about the middle of last century by a blind Italian peasant named Picco, who gave remarkable performances on the "Picco pipe." In design a miniature tabor pipe, but only three and a half inches in length, the variations in pitch were mostly obtained by partially or wholly closing the open end with one finger, and by this means the player was said to have produced a compass of nearly three octaves.

The study of the growth of the transverse or "German" flute in England is rendered difficult by the indefinite, and frequently incorrect manner in which the word *flute** was used, just as the terms *aulos* and *tibia* leave us in doubt as to what was actually described in the writings of ancient Greece and Rome. In English MSS. of the Middle Ages, flute very often implies merely flûte-à-bec (recorder) and not transverse flute.

Some so-called authorities have dated the introduction of the transverse flute into England as late as the beginning of the eighteenth century by Lœillet, a contemporary virtuoso on the instrument, but evidence points to this being quite incorrect, for in many early instances we find the words *flute* and *recorder* carefully differentiated. As we have already seen, the inventory of Henry VIII mentions "fflutes and phiphes" as well as recorders, the "phiphes" (or small flutes) being introduced from Switzerland shortly before this time, and sometimes known as "Swiss pipes." A sixteenth century painting in the National Portrait Gallery ("The Marriage Festivities of Sir Henry Upton") shows a transverse flute, the performer holding it from right to left as was customary in those times. Elizabethan manuscripts distinguish between "flutes or fifes and recorders," and the left-handed transverse flute is again depicted in Spencer's "Shepherd's Calendar" (1579). Bacon, in his "Sylva Sylvarum" (1627), gives the following careful distinction between the transverse flute and the recorder, though it must be admitted

* Flute is said to come from the Latin *fluta*, a small Sicilian eel which has seven pits or gills on each side of its body, somewhat resembling the tone-holes of an ancient flute.

without any special mention of their use in England: "Some kinds of instruments are blown at a small hole in the side . . . . as is seen in flutes and pipes, which do not give sound by a blast at the end, as recorders do."

Such examples might be continued indefinitely, and there remains little doubt that the transverse flute has been used in England since very early times, though it failed to achieve anything like the popularity of the recorder until a much later date.* Since the fourteenth century Continental countries had prized the transverse flute much above the recorder, and it was probably the arrival of the Hanoverians and things Teutonic in 1689 that gave it an additional "boom" in England, and earned for it the title of "German flute."

With the growth of the new century (1700) the recorder gradually waned in popularity, to finally disappear from use after a short revival, in a slightly modified form, in the early nineteenth century, when Bainbridge "invented" the double and triple flageolets.

Transverse cylindrical flutes, as used in the early part of the eighteenth century, were constructed in one piece and provided with six finger-holes and one key (D sharp). In later years, Joseph Tacet, an Englishman, is credited with having added three more keys —F natural, G sharp and B flat (closed)—and three, or even four-jointed flutes† became general, while Quantz (1697-1773) and others added more keys and improved the bore which, excepting the head joint, eventually became conical, tapering small towards the open end. Among a host of other minor improvements may be mentioned

* Carvings representing the transverse flute found in certain churches (e.g., North Cadbury, Somerset, choir stalls, A.D. 1538) cannot be taken as fair evidence of the contemporary use of this instrument in England. They were frequently executed by foreign artificers, who naturally portrayed instruments familiar to them in their own country. Equal care must be taken when considering all other sources of evidence. For instance, on the crozier of William of Wykeham is an enamelled representation (circa 1367) of a man playing the transverse flute. Experts, however, pronounce this work to be of French origin, so we are absolutely debarred from bringing it forward as evidence of the instrument's use in England at that date. It is a recognised fact that the transverse flute was highly popular on the Continent a very considerable time before it found any footing in this country.

† Instruments were frequently provided with several interchangeable middle joints of varying lengths. By using these the intonation was more or less preserved when tuning up or down to the very arbitrary eighteenth century diapason.

the enlarged and oval mouth-hole, which, up to about 1720, had remained circular and very small.

In 1820, Nicholson, a very renowned player of the time, and flautist to Queen Adelaide, wrote: " . . . . the music of the present time requires a flute with seven keys, and many will find in some passages an advantage in the eighth or long F natural key. More than this number will only render the instrument complicated."

The modern flute, in fact, every modern wood-wind instrument, owes a very large portion of its perfection to the improvements effected by Theobald Boehm, a musician of the Bavarian Royal Court, who, in 1847, brought out his cylindrical flute with fifteen tone-holes and twenty-three keys and levers. Thanks to his ingenious mechanism, Boehm was, for the first time in the history of wind instruments, enabled to place the tone-holes in their acoustically correct positions, and the keys were so arranged that practically all the holes were normally open. This new mechanism is held by some to have been primarily devised by an Anglo-Swiss named Gordon, in 1830, but whether this was so or not, Boehm certainly took all the credit.

A very fierce controversy has raged from time to time around the Gordon-Boehm inventions, and perhaps out of fairness to Boehm this much should be said here. None of Gordon's original supporters made any claim whatever against Boehm's most vital discoveries and improvements, namely, those brought about by his very great practical knowledge of the science of acoustics. In his own words: "It is far easier to construct keys than to improve notes," and it is solely the key mechanism of Boehm's earlier model (namely, that of 1832) which was said to have been pirated from Gordon.

Boehm constructed his flutes with the internal bore of the head joint a parabolic curve, narrowing towards the closed end, while the bore of the middle and foot joints was cylindrical, and it is this model, with occasional slight modifications in key mechanism—notably, those of Carte and Rockstro—that is in practically universal use at the present day. A host of minor and more or less unimportant changes in key mechanism have been from time to time exploited as "epoch-making systems," but perhaps the most useful, yet humble, of all improvements, was the needle spring of Buffet

(1835), now universally used on all wood-wind instruments. One "last word" (in more senses than one!) in flute "improvements" was the invention of a certain Birmingham flautist of the early fifties. This nightmarish instrument was made of gold, silver and ivory, with an absolutely square mouth-hole, and no less than twenty-eight keys!

The piccolo, or octave flute, is made in two joints only, and its music is always written an octave below the actual sounds, in order to avoid an excessive number of ledger lines. It has derived the same benefits from the inventions of Boehm and others as has the flute, and while it has the distinction of being the smallest instrument in the orchestra, it is at the same time the most "telling."

The flute d'amour, corresponding to the oboe d'amour, was at one time popular: it stood a minor third below the concert flute, and had a sweet and mellow tone. Boehm constructed an alto flute a fourth below the concert flute, of such rich tone that he declares it was mistaken for the French horn! So-called bass flutes* have been used since the eighteenth century, and are still occasionally to be met with, pitched either in B flat or G, and having for lowest note the bass high G. Such instruments are met with in the scores of several modern composers, including Lalo, Glazounov, Weingartner and Joseph Holbrooke.

Another flute,† at one time considerably popular, stood a minor third *above* the concert flute, and was known in the orchestra as the third flute or tierce. It is interesting to note that Sir Henry Bishop originally allotted the famous *obbligato* to "Lo, Hear the Gentle Lark," to this instrument. Until quite recent times it has been customary to use flutes in D flat for military band work, but now the C, or concert flute,‡ is practically universal.

Flutes and piccolos are usually made of cocuswood or ebonite, the latter, which gives a sweet, rich tone, being proof against warping or cracking. The silver flute is used to a considerable extent

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* Mersenne gives a true bass flute an octave below the concert flute (1637).

† The so-called eunuch-flute, really not a flute at all, is noticed in Appendix II.

‡ Sometimes also called the D flute. Until the additional mechanism of open-standing keys was added, concert flutes had D as their lowest note, and in early days they took their name from this.

out of England, but it is somewhat harsh in tone,* and too powerful to blend well with the rest of the wood-wind. It has the advantage of requiring a looser embouchure than the wooden or ebonite variety, a boon to those amateurs who have but little time for practice. Flutes made of gold are said to have the most liquid and sympathetic tone of all, but owing to their great cost their use is confined almost entirely to Indian Rajahs and eccentric millionaires.

The flute and the piccolo are the only wind instruments requiring no adjuncts in the way of reeds, crooks, or mouthpieces, though in Boehm's time the crutch was fairly popular. It consisted of a projecting wooden or metal T-piece, which was attached to the flute and supported the weight of the instrument between the thumb and first finger of the left hand. Never really necessary, it was found to impede the action of the fingers, and has long since been discarded.

The tone of the flute, in common with that of all wind instruments, varies considerably over its different registers, besides being very dependent on the skill and the conformation of the lips of the performer. The lower notes, though not particularly powerful, are sonorous and reedy in quality; the middle register is sweet and mellow, the higher middle notes being of a remarkably pure and bird-like character. Florid passages have a fine effect in this compass, but the extreme high notes are shrill and harsh, and are but seldom used except in *double forte*. The characteristic innocent, somewhat hollow tone of the flute throughout its entire compass is accounted for by the paucity of upper partial harmonics composing its timbre.

The piccolo is sweet and plaintive in its lower register, but the tone is weak, and it is the middle and upper compass which is generally employed. The extreme high notes, as on the flute, are, or ought to be, very rarely used, for of them it may be truly said "a little goes a long, long way." Both instruments lend themselves admirably to the performance of rapid and complicated music, arpeggios, runs and trills, as well as double and triple staccato tonguing, being comparatively simple. All wind instruments are

* A story is told of the introduction of silver flutes into the orchestra at Bayreuth. Wagner detected the harshness of timbre at once, and exclaimed angrily: "Those are not flutes. They're cannons!"

sounded by expelling the breath with the syllable *tu* or *du*, or some such monosyllabic *t* or *d* sound. This is technically spoken of as tonguing. When a sequence of very rapid staccato notes is to be performed, double or triple tonguing may be used. Double tonguing is effected by substituting the double syllable *tu-ku* (or *du-gu*), triple tonguing by *tu-tu-ku* (or *du-du-gu*), the *k* or *g* sound in each case giving the tip of the tongue a momentary rest, and allowing of a very much more rapid and clear performance than if all *t* or *d* sounds were used.

The literature for the flute is exceedingly extensive, more music having been written for this than for any other wind instrument. Among the more important classical solos may be mentioned a concerto by Mozart, and sonatas by Haydn and Hummel.

As regards orchestral writings, the flute found great favour with Bach, and he often allotted to it *obbligati* with soprano or other voices. Both he and Handel lived in the transition period when flûtes-à-bec as well as transverse flutes were used in orchestras, so that naturally both kinds are to be met with in their scores. Handel was not particularly fond of the flute, and used it more grudgingly than did the senior master: even in "The Messiah" it only finds a place by favour of Mozart's additional accompaniments! In his earlier works he almost exclusively wrote for the flûte-à-bec.

Haydn used the flute with greater freedom than any previous composer, and since his time it has been an indispensable feature of the orchestra. At the present day it frequently has the most fully scored and difficult part of all the wood-wind.

As regards the "octave flute," in all probability the flauto piccolo of Handel was merely a treble flûte-à-bec, but the piccolo proper was used somewhat extensively by Gluck. Mozart appeared to have more liking for it than he had for the flute, though it finds no place in his symphonies. Beethoven scarcely ever used the piccolo, although he was the first composer to introduce it into a symphony. It is not very greatly used in the better class of modern works, being regarded more as an extra instrument, and usually played as such by the second flute. Its frequent employment tends to vulgarise; in fact, Berlioz writes: "When I hear this instrument casting its squeaking voice into the midst of a religious harmony, or strengthening or sharpening (for the sake of noise only) the high


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part of an orchestra, I cannot help feeling that this mode of instrumentation is one of platitude and stupidity. The piccolo may, however, have a happy effect in soft passages, and it is a mere prejudice to think that it should only be played loud."

In conclusion, the flute is a great favourite among amateurs, its extreme ease of blowing, its adaptability to moderate differences of pitch, its simplicity of operation, and its great suitability for both chamber and orchestral music, giving it a distinct advantage over other wind instruments.*

* An opportunity of hearing a drum and flute band was recently afforded by Messrs. Rudall Carte and Co. to a number of critics and music-lovers, who were charmed with the effect of the combination of the flutes in the different keys. At the invitation of this firm, which is the most eminent maker of flutes in the world, well-known flautists gathered to test the quality of the new flutes the house had made to fill a special order from St. Michael's Band, in Belfast.

There are twenty-five flutes in the band, divided as follows: one E flat piccolo, fourteen B flat flutes, three in F, four in E flat, and three bass flutes. Mr. E. Sharpe, who is connected with the firm, conducted a programme well designed to display the quality of the instruments and the superior musical value of their combination.

Among those who took part in the performance were: Messrs. D. Wood, London Symphony Orchestra and professor of the R.A.M.; H. Warner Hollis, Royal Opera; W. O. Carrodus, Royal Opera; F. Orcherton, Secretary, National Orchestral Association; Geo. P. Monk, His Majesty's; W. G. Smith, Empire; Charles A. Souper, Queen's Hall Orchestra; George Sleight; W. Valentine; Jasper and James Vale-Lane; G. H. Genever; W. Boschmans, and others. Mr. Eric P. Little played the drums.—"The London Musical Courier," July 17, 1915.

CHAPTER IV.

THE OBOE.

CHAPTER IV.

THE OBOE.

FRENCH, HAUTBOIS. ITALIAN, OBOE. GERMAN, HOBOE.

THE origin of the oboe cannot be of much later date than that of the flute, for since the beginning of history there have always been known double-reeded instruments of the oboe type. This characteristic double reed is defined as "two very thin segments of reed uniting to form a tubular aperture at one end, the other end being splayed out and flattened, so as to leave a narrow opening in shape like the section of a double-convex lens."

The discovery of the double reed as a vibratory membrane or sound producing medium probably came about in a fortuitous manner. Reeds found with the ancient Egyptian pipes are primitive in the extreme, for the most part being merely barley straws pressed flat for an inch or so at one end, the resulting double reed being quite sufficient to sound a small pipe. These Egyptian reed-pipes were provided with three or four finger-holes, and were made in varying lengths: a set has been found in a tomb of the fourth dynasty (B.C. 3733-B.C. 3566), comprising a treble, tenor and a bass. When two pipes were brought together in a common mouthpiece, as with the double pipes, they were generally of unequal length, the longer acting as a kind of drone bass. Early examples of Egyptian flutes and pipes were made of reed or wood, but in later times bone, horn, ivory, silver and gold were used.

Mention has been made of the Greek and Roman pipes in the preceding chapter, but it will be of interest to draw attention to a wall painting discovered some years ago on the Via Appia near Rome, and now on view in the British Museum. It depicts a youth

The Oboe.

Material.—Rosewood or ebonite.

*Length of Tubing.**—Oboe, 1 ft. 11½ ins. (reed extra). Cor anglais, 2 ft. 7½ ins. (crook and reed extra).

Bore.—*Conical.*

Mouthpiece.—Double vibrating reed.

Number of Keys.—From sixteen to nineteen.

Compass (for orchestral purposes).—

Cor anglais (actual sounds)

Of oboes, two are generally used in the orchestra, one of them being interchangeable with the cor anglais.

* A = 439 vibrations per second at 60 degrees Fah.

holding two pipes fitted with double reeds remarkably similar in shape to the modern oboe reed. Curiously enough, no finger-holes are shown on either instrument, but this is probably an omission on the part of the artist. It may have been to an instrument of this kind that the Roman writer, Lucien, alluded when he told of a young "flute player" who, wishing to create a great impression at his first public appearance, blew such a terrific blast that he fell dead on the spot.

No doubt rude double-reeded instruments of a kind were known among the inhabitants of Britain from very early times, but with the advent of the Romans these prehistoric forms must have gradually given place to the various "tibiæ" of the more highly civilised race. Somewhat similar reed pipes to the latter are occasionally found sculptured on Irish crosses of the tenth and eleventh centuries, but of their use in post-Roman England nothing definite can be said.

Various carvings of the twelfth and thirteenth centuries depict short double-reeded instruments of conical bore and with wide bells, which became known in Crusader times as schalmuses, shalms, or shawms. Instruments of similar type were highly favoured among the Saracens and other Eastern races, so it is probable that the returning Crusaders revived interest in the instrument, and helped it towards popularity. In the thirteenth century double shawms were used, very similar in appearance to the *tibiæ pares* of the Romans.

During the reign of Henry III (1216-72) night watchmen first made their appearance, these being armed men who carried rude kinds of shawms for signalling purposes. After a while their instruments became known as wayghts, wayts, or waits, this name originating from their use by those who watched or *waited*. In later times the instrument by way of exchange lent its name to those itinerate musicians who played on it to earn a living, hence arose the term "Christmas waits."

A somewhat different reed-pipe to the shawm was the krumhorn, the best specimens of which, according to Mersenne in his "Harmonie Universelle" (1636) were to be found in England, and still in use there in his time. It is only fair to add that there are neither contemporary specimens nor engravings extant to corroborate this statement. The bore of the krumhorn, or cromorn, as it

was sometimes called, was nearly cylindrical, and it was sounded by a double reed enclosed in a kind of cover, and therefore not under direct control of the lips. It had from seven to nine finger-holes and keys, and was made in choirs ranging from soprano to bass, just as now we have families of saxophones and sarrusophones. Henry VIII has in his collection no less than twenty-five crumphorns and seventeen shalmes.

In the fifteenth century, shawms, like krumhorns, were made in various sizes, and the great musical historian, Prætorius, in his "Syntagma Musicum" (1619), gives no less than seven examples ranging from alto, which ascended to b_2, to Gross doppel Quint-pommer, which had for lowest note F^1.

The direct ancestor of the modern oboe was known as the discant shawm, and had for its lowest note d_1. In the fourteenth century the larger shawms, the ancestors of the bassoon, were known as bombards—in Germany as pommers—while the acuter varieties sometimes went under the name of bombardinos, or little bombards. In the early seventeenth century the word howboye or hoeboy, afterwards oboe, was applied to the bombardino or discant shawm, the name having originated in France in the form of *hautbois*, or "high-wood." A contemporary manuscript illustrating a shawm gives the legend, "a howboye, or a wayte, or a shawm," showing that the three different names were used synonymously to describe one and the same instrument.

For some hundreds of years past, bands of shawms had been common amongst travelling musicians and others, but it was not until the latter part of the seventeenth century that the oboe (hoboy or hoeboy, as Shakespeare wrote it) was employed in a British military band. In France, regimental drum and fife bands had given place to bands of hautbois players as early as the year 1588, and Kastner, a French musical historian, opines that this custom had even then been copied from the Germans. England seems to have lagged behind, for it was not until nearly a century later (1678) that the Horse Grenadiers acquired six players on this instrument. In 1671, Cambert had employed an oboe (and a bassoon) in the orchestra for his pastoral play, "Pomone," produced at Paris that year, but nearly fifty years had elapsed before the instrument received general acceptance in English orchestras.

Oboes of the early eighteenth century were provided with extra long top joints which enabled the performer to flatten the pitch by a quarter of a tone; they also possessed two keys which dated from the end of the preceding century. Hoffman, of Rastenburg, in 1727 added two more keys (G sharp and A sharp), and about fifty years later the bore was considerably altered and improved by one Délusse, of Paris.

The oboe's privilege of giving the tuning "A" in the orchestra dates from pre-Handelian times, when it was frequently the sole wind instrument, but at the present time it would be preferable were this duty transferred to the more untunable clarinet. This procedure has, in fact, been tried with marked success by several important organisations, notably in the renowned Crystal Palace orchestra of the seventies.

Early oboes were chromatic only so far as partially, or irregularly, stopping the finger-holes would allow, and the reeds used were almost as wide as our modern bassoon reed. According to Mersenne, such an instrument was shriller than all others with the exception of the trumpet, and this state of affairs was little, if at all, improved even so late as Mozart's time. Mozart used clarinets whenever they were available, for he is said to have remarked that the "impudence of tone" of the oboe was so great that no other instrument could contend with it in loudness!

The effect can therefore be better imagined than described when one reads of twenty-six oboes being used against some forty violins at the first Handel Commemoration (1784), though oboists are said to have plugged the bells of their instruments with cotton wool in order to subdue the harsh and noisy tone! Large numbers of oboes were invariably scored for by seventeenth and eighteenth century composers. Handel's orchestral parts are frequently marked "violin or oboe," while Bach was in the habit of making his oboes play in unison with the violins.

But Bach's favourite was the oboe d'amour, an instrument of rich yet subdued tone, standing in the key of A, that is, a minor third below the ordinary oboe. This beautiful instrument was originally constructed in a curved form, on account of its length, and it had a hollow globular bell: it fell into disuse after the death

PLATE 4.—ANGEL WITH KRUMHORN.

Detail from the picture, "The Presentation in the Temple" (Carpaccio), in the Academy of Venice. (*Anderson Photo.*)

Anderson Photo

of Bach, but has since been revived by Richard Strauss in his "Symphonia Domestica" (1903).

Handel wrote six concertos for the oboe, and Mozart, who used it sometimes to the exclusion of all other wind instruments (perhaps because they were unavailable!) composed a concerto especially for G. Ferlandi, a renowned player in the Salzburg band, but all trace of this particular work has been lost. Haydn made great use of the instrument, and usually allotted to it the minuet and trio of his symphonies, answered by its natural bass, the bassoon. Beethoven employed the oboe to perfection, and besides scoring freely for it in most of his orchestral works, left a trio for two oboes and cor anglais.

Almost since the later mediæval times it has been customary to make certain of the oboe finger-holes in twins, that is, two small holes bored side by side, so that by covering only one the semitone could be obtained. This method is still sometimes to be met with. By the year 1825 the oboe had nine keys, including the octave key, the fingering of these older instruments being very similar to that of the flute and bassoon.

Until fairly recent times, oboes were usually made of boxwood. This is a hard material, does not easily crack, and gives a good tone, but it has one great objection—its liability to warp. In so delicate an instrument as the oboe the very slightest deviation from truth in its bore is enough to seriously affect the tune and intonation of some of the notes, and it is on account of this that the more reliable rosewood came into use. For hot climates and careless usage, ebonite is strongly to be recommended owing to its complete freedom from either warping or cracking.

Boehm's system has not been adapted to the oboe to any great extent, though certain modifications have become popular. Barret's system is the most generally used at the present day, and it is remarkable chiefly for the large number of alternate fingerings possible for any given note, thus greatly reducing the difficulty of certain rapid or inconvenient passages. Barret was ably helped by a Parisian manufacturer named Triebert, probably the most famous maker of oboes that ever lived. Another very renowned maker was the late Mr. Alfred Morton, of London, and his instruments are now looked upon as models of the perfect oboe.

The cor anglais, or tenor, is a fifth below the oboe, thus being in the key of F. It is readily distinguished by its globular bell, and the short metal tube to which the reed is attached. The fingering is similar to that of the oboe, and all music for it has to be written a fifth above the actual sounds required. This instrument is by some considered to be the modern form of the oboe di caccia, but the latter was more probably similar to the now obsolete tenoroon (that is, a tenor bassoon and not a tenor oboe), for further particulars of which see the following chapter.

The baritone (or bass) oboe stands an octave below the ordinary oboe, and is of similar shape. Its lowest note is B natural instead of B flat (an octave higher) as on the oboe, and it is played with a reed slightly larger than that of the cor anglais. The use of the baritone oboe is excessively rare, and even that threatens to be ousted by the new Heckelphone, an instrument of similar pitch (except that it descends to A instead of B), invented to meet the requirements of the composer, Richard Strauss.

The tone of the Heckelphone is pure and of good quality, it is louder than that of the baritone, partly because it is played with what is practically a large bassoon reed, partly because the tone-holes are larger than those of the older instrument. The bell is of peculiar shape, being spherical with a circular mouth cut clean out of the front face. On the bottom is a knob which is rested on the ground, and helps to support the instrument.

Delius, in scoring for the Heckelphone, mistakenly writes the parts in the bass clef actual pitch, a most confusing procedure to the oboist, who probably plays the Heckelphone as an extra instrument. The correct method would be to write the notes in the treble clef, an octave higher than the actual sound.

As the instruments of the double-reeded conical bored oboe type are so numerous, it may be helpful to tabulate, and so avoid confusion:

Oboes.

Oboe in C.
Oboe d'amour (a third below) in A.
Cor anglais (a fifth below) in F.
Baritone oboe (an octave below) in C.
Heckelphone (an octave below) in C.

Bassoons.

Bassoon quint or oboe di caccia, or tenoroon (a fifth above the bassoon) in F.

Bassoon quint (a fifth above the bassoon) sometimes in E flat.

Bassoon (two octaves below oboe) in C.

Double bassoon (three octaves below oboe) in C.

The generally accepted statement that the bassoon stands in pitch two octaves below the oboe, may be subjected to a somewhat pedantic correction. Comparison of the fingering gives the drop in pitch at *a twelfth*, the closing of the finger-holes producing d_1 on the oboe and G on the bassoon. The lower notes of the bassoon, which bring its compass to two octaves below the oboe, are all produced by closing additional open-standing keys. The extended compass, down to low B flat, dates from the middle of the seventeenth century.

The oboe, which has been called the "coquette of the orchestra," is highly favoured in solo passages, and lends itself to somewhat greater variety of tone and distinction of *piano* and *forte* than does the flute. While capable of rapid execution and floridly written passages, it has more often allotted to it dreamy pastoral melodies and dances—though as a matter of fact the chalumeau register of the clarinet would be more historically correct.

Slow melodies on the lower octave of the oboe sound exceedingly tender and melancholy—an effect still more pronounced on the cor anglais—and yet brightly-written passages played on the upper notes create an atmosphere of spontaneous and overflowing gaiety. It is an interesting fact to note that the upper notes, together with violins playing *forte*, have an effect very similar to that of a high trumpet. The comical, "cheeky" aspect of the oboe should not be overlooked: this is ably illustrated in the "March of the Apprentices" in the "Meistersinger" overture.

The tone should be eminently reedy, and free from any trace of coarseness. On the Continent, oboe reeds are still made considerably wider than in England, and the tone is therefore more powerful, but at the same time coarse and musette-like. That fine attenuated timbre peculiar to the modern oboe, and the delight of all musicians, is dependent far more on the adoption of the small

narrow reed than on any mere mechanical improvements in manufacture and construction.

With the oboe the question of breathing is an extremely important one, for the aperture leading from the reed into the body of the instrument is only sufficiently wide to admit an extremely fine stream of air. This naturally keeps a quantity of breath constantly held in suspension, a very fatiguing circumstance, and one which, if unskilfully managed, will result in a disagreeable sensation of suffocation. Some players have experimented with success in taking breath while actually playing, in somewhat the same way as is possible when using a blowpipe.

In conclusion, a word should be said about that most important factor in the tone-quality of the oboe—the reed.

Players of reed instruments always experience more or less difficulty in obtaining suitable reeds, and out of a dozen perhaps only half are really satisfactory to the individual performer. Reeds should neither be too soft nor too hard, for if the latter, the tone is hard and unsympathetic, and if too soft, an equally undesirable timbre results. A spongy reed is also to be avoided, and care should be taken to see that double reeds are not made with too wide an aperture, for this fault often gives rise to unsatisfactory tone-quality.

Where possible, it is a good plan for oboe and bassoon players to get some instruction in reed-making, for often a reed otherwise discarded as useless can, with a little judicious adjustment, be renwered perfectly satisfactory.

CHAPTER V.

THE BASSOON.

Bassoon.

Material.—Rosewood, ebonite and maple.

*Length of Tubing.**—Bassoon, 7 ft. 4½ ins. When put together, stands 4 ft. 3½ ins. Contra bassoon, 10 ft.

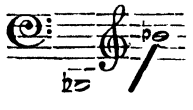
Bore.—Conical.

Mouthpiece.—Double vibrating reed.

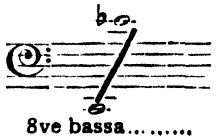
Number of Keys.—Seventeen to twenty-two.

Compass† (for orchestral purposes).—

Bassoon



Contra bassoon.



Of bassoons, there are usually two in the orchestra. The use of the double bassoon is rare.

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* A = 439 vibrations per second at 60 degrees Fah.

† In common with most wind instruments, the upward compass is limited only by the skill of the player. High B flat is the usual orchestral limit, but considerably higher notes are written in solos and concertos.

CHAPTER V.

THE BASSOON.

FRENCH, BASSON. ITALIAN, FAGOTTO. GERMAN, FAGOTT.

IN the last chapter something of the origin and derivation of the shawm was shown, and it was pointed out how, in the fourteenth century, families of shawms ranging from treble to bass had come into general use. The discant shawm has evolved into the modern oboe, while the bassoon can claim for ancestor the bass shawm, known in England also as the bombard, in Germany as the brummer or bass pommer.*

Mention is made of the instrument in an old English poem, "The Squyr of Lowe Degre" (circa 1400):

"Ther was myrth and melody

. . . . . .

With pypes, organs and bumbarde."

These instruments were of very considerable length, for they were perfectly straight and had a metal crook fitted into the smaller end, in shape very similar to our modern bassoon crook, to which was attached the broad double reed. Prætorius gives as the largest of the family of seven different shawms the gross doppel quint pommer, or great bass shawm, which had for lowest note F_1. A slightly different variety of shawm were long and narrow-bored, and became known as pilgrim's staves, probably on account of their staff-like appearance rather than that such unwieldy instruments were used by pilgrims to enliven their journeys, as is sometimes suggested.

But the unique feature of the later bassoon family lies in its

* For comparative pitch of oboe and bassoon, see page 43.

peculiar construction, the tube being bent back upon itself, and this particular shape in all probability owes its invention to one Alfranio, canon of Ferrara, who brought out his "Phagotum" in the early part of the sixteenth century. The term phagotum probably arose from the fanciful resemblance of the folded instrument to a faggot, and the same word remains in use in Germany and Italy to this day. The derivation of bassoon is simply *bass-oon*, or big bass.

It must be distinctly understood that Canon Alfranio was merely the inventor of the bassoon shape, not of the bassoon itself, as is so frequently mis-stated. Proof of this fact is afforded in the preface to a work on the Chaldean language written by Alfranio's nephew in 1539, where the following particulars of the instrument are given: (1) the phagotum was of the cornamuse or bagpipe type; (2) its bore was cylindrical; (3) it was sounded by a single-beating reed of metal; whereas the bassoon is not a cornamuse, has a conical bore and a non-metallic double reed. The phagotum was improved by Gianbattista Ravalio, also of Ferrara, and some thirty years later (1569) Tcheltzer, of Nuremberg, did away with the cornamuse bag and adopted a conical bore. During the sixteenth and seventeenth centuries a type of cylindrical-bored bassoon was constructed, known as rackett or sausage bassoon, the tubing being folded back upon itself several times, to gain compactness. The Brussels Conservatoire of Music exhibits a rackett, the tubing of which is bent into no less than nine parallel branches.

But the bassoon itself is descended from a far older form, for meanwhile the excellent idea of shortening unwieldy instruments by doubling back their tubing was applied to the larger shawms or bombards, the new form of the old instrument becoming known in Germany as fagott, in England as curtall or corthol, an Anglicised version of the French name *courtaut*, which signifies simply "short form." By the year 1550, Schnitzer, of Nuremberg, a celebrated musical instrument maker, became recognised as an expert manufacturer of corthols, his instruments being provided with two keys.

As was the custom of the time, curtalls were made in various sizes. Prætorius enumerates a family of five, but the only members that need be detailed here are the single and double curtalls.

PLATE 5.—BASSOONS

1. POMMER, circa 1600. *(From the Donaldson Collection.)*
2. TENOROON, circa 1775.
3. BASSOON, with five keys. Late eighteenth century.
4. BASSOON in pearwood, with six keys. Circa 1800.
5. BASSOONS (Modern) in ebonite, with seventeen keys, by Rudall Carte and Co.


1
2
3
4
5

The double curtall (or doppel corthol, as Prætorius calls it) was apparently very similar to our modern bassoon in pitch, and may be considered as the direct ancestor of that instrument. Prætorius tells us that the "fagotto piccolo" or treble bassoon, was known in England as the single curtall, corthol, dolciano, or dulcian, as it was variously called. (Henry VIII possessed thirteen "dulceuses.")

The single corthol was pitched in F, a fifth above the ordinary bassoon, and in later years became known as the tenoroon, or oboe di caccia. The latter name is often erroneously given to the forerunner of the cor anglais, but, according to Dr. Stone, an eminent authority, the oboe di caccia was "a bassoon raised a fifth in pitch," and therefore a tenor bassoon, not a tenor oboe. In all respects a miniature bassoon, the tenoroon was sometimes constructed in the key of E flat, and Haydn, in his "Stabat Mater," scores for it as "fagotto in E flat."

The tenoroon was a most charming instrument, its tone being somewhat similar to that of the higher or vox humana notes of the ordinary bassoon. Bach made important use of it, and even as late as Rossini's time it must have been known, for it is allotted an important and beautiful solo in the "William Tell" overture—now played, in the absence of the original instrument, on the quite different toned cor anglais. But since Rossini's time the instrument appears to have entirely dropped out of use, though we believe the quint bassoon is still occasionally met with. This is in F, and is in all respects an up-to-date tenoroon.

Let us now retrace our steps, and consider the growth of the double bassoon, contra-bassoon, or contra-fagotto, as it is variously called.

Writing in 1619, Prætorius mentions a gross doppel quint pommer with four keys, all placed so as to extend the compass downward. A hundred years later, a grand or double bassoon was in use in England, an octave below the ordinary bassoon, and therefore a few notes deeper than the largest instrument known to Prætorius, which descended to F^1. Handel scored for a double bassoon in his opera, "L'Allegro," 1740, and the instrument is said to have been used at the coronation of George II, and again at the Handel Commemoration in 1784. Haydn employs the double bassoon with unconscious humorous effect in "The Creation," where he illustrat-

the tread of "heavy beasts" by the lowest B flat *double forte!* Its use, however, seems in the early days to have been confined more to military bands than to the orchestra.

Double bassoons were originally constructed in the same form as the ordinary bassoon, that is, with the tube folded back once upon itself. The excessive unwieldiness of such an arrangement will at once be realised when we point out that the length from butt to bell would pan out at about eight feet!* Modern instruments are folded back three times, that is, they consist of four parallel tubes, and are therefore approximately four feet in height.

The double bassoon requires a considerable quantity of wind, but its fingering is similar to, though less complicated than that of the ordinary bassoon. Its music is always written an octave higher than the actual sounds in order to avoid the excessive use of ledger lines, and the part is frequently doubled an octave higher by the bassoon, so as to give it additional clearness and carrying power. Owing to its very slow-speaking reed, rapid passages are impracticable, especially on the lower register.

When we come to consider the modern seventeen-keyed bassoon with its numerous alternate fingerings—there are as many as four for certain notes—we are struck with wonder at the vast improvements that have come about within the past century, for, in common with other wind instruments, the growth of the application of keys to the bassoon was very gradual.

By the end of the sixteenth century, bass shawms were provided with four keys to extend the compass downwards, and naturally some of these were adapted to the new form, the curtall. In the earlier models extra holes which could be temporarily stopped with pegs were provided, the pegs being drawn out or replaced according to the key of the music. But the adaption of keys to the bassoon was slow, for the instruments used in the production of "Pomone" (1671) had only three (including a B flat), and by 1750 only one more (G sharp) had been added, none of the keys being on the tenor or "wing" joint. It was not until the beginning of the nineteenth century that the maximum number became eight, one

* A fine specimen is exhibited in the Donaldson Collection, R.C.M.

on the tenor, three on the butt, and three on the bass joint, besides the octave key on the crook.

Bach employed the bassoon freely, but Handel used it, with exceptions, more as a ripiano than as a solo instrument. Not so with Haydn and Mozart, who made it one of the chief melody-carrying voices of the lower orchestra, the latter master also writing for it a very beautiful though little-known concerto with orchestral accompaniment.

As a rule, the number of bassoons (and other wind instruments) used in eighteenth century orchestras was far greater than at the present day. In 1750, the Electorate Orchestra of Dresden, at that time looked upon as a model of perfection, numbered sixteen wind instruments and twenty-five strings. Of these five were bassoons and five were oboes—against the present custom of two, or at most, three, of each, with a greatly increased number of strings. At the Handel Commemoration of 1784, twenty-six oboes and the same number of bassoons (not counting a double bassoon) were used against forty-eight first and forty-seven second violins, while in the same orchestra we find the number of flutes was only six!

Bassoons of the eighteenth and nineteenth centuries were usually made of maple, sometimes of pearwood, but for modern instruments rosewood is usually employed, as it gives a clearer and brighter tone than maple, though unfortunately the lower notes lose some of the mellow fullness peculiar to the latter wood. Ebonite is to be recommended for tropical climates, because of its complete immunity from cracking. Sometimes the wing joint—which is exposed to the maximum amount of moisture—is constructed of, or lined with, ebonite, but by using two different materials to form the walls of the air column, the timbre appears rather inclined to become dulled and heavy.

Bassoons made by the late M. Savary are in great request, and those of the late Mr. Morton, who was looked upon as the true successor of Savary, are also extremely fine. Other well-known manufacturers of the near past were Triebert and Buffet, both of Paris.

Of all the wood-wind the bassoon possesses the most varied and useful range of tone quality, in fact, it vies with the trombone as the most versatile and sympathetic instrument of the whole wind band.

The low notes of the bassoon, while hardly attaining to nobility of tone, are deep, grand and inspiring. This compass is frequently scored for in unison with, or in some cases to take the place of, the 'cello. These notes also fulfil another very different function, for it is by their unexpected employment that the bassoon has earned the nickname of the "clown of the orchestra." In Mendelssohn's "Midsummer Night's Dream" overture is now allotted to the bassoon the braying of the ass, Bottom, and equally grotesque effects are obtained by Dukas, in his "L'Apprenti Sorcier," and Grieg in the "Peer Gynt" suite.

The middle compass is somewhat weak, and has a cold, almost poverty-stricken tone, admirably suited for certain effects. The upper notes are very similar in timbre to the French horn, and in small orchestras two bassoons are often employed in combination with two horns to give the effect of a horn quartet. (See andante of Schubert's B minor Symphony.)

The upper register is perhaps the most beautiful of all, its sympathetic, singing-quality causing it to be named the *vox humana* register. Besides its resemblance to a high tenor voice, it has somewhat the same quality as the 'cello. Altogether, the bassoon is one of the most useful of instruments, for in addition to its frequent employment in solo passages it is invaluable as an accompanist, being, as it is, the natural bass of the wood-wind quartet.

It is of interest to note that the bassoon is the only wind instrument that, like the violin family, is considered to improve with age, those by M. Savary especially being regarded somewhat in the same manner as violinists look upon a Guarneri or a Gagliano.*

* What is probably a unique epitaph appears at Ashover, in Derbyshire, wherein a certain David Wall, who died in the year 1796, is extolled: "His superior performance on the bassoon endeared him to an extensive musical acquaintance."

CHAPTER VI.

THE CLARINET (OR CLARIONET).

Clarinet.

Material.—Cocuswood or ebonite.

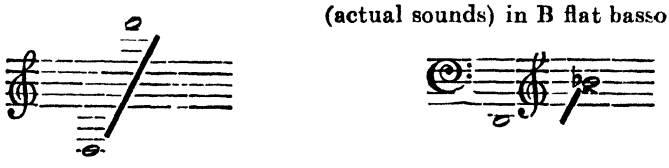
*Length of Tubing.**—Clarinet in B flat, 2 ft. 2½ins. Clarinet in A, 2 ft. 3½ ins. Clarinet in B flat, basso, 4 ft. 6½ ins.

Bore.—Cylindrical.

Mouthpiece.—Single-beating reed.

Number of Keys.—Usually thirteen to fifteen, but some systems as many as twenty.

Compass (for orchestral purposes).- Clarinet in B flat (actual sounds) in B flat basso.



Two clarinets are usually employed in the orchestra. The use of the bass clarinet is rare.

* A = 439 vibrations per second at 60 degrees Fah.

CHAPTER VI.

THE CLARINET (OR CLARIONET).

FRENCH, CLARINETTE. ITALIAN, CLARINETTO. GERMAN, KLARINETTE.

THE honour of inventing the clarinet is often wrongly ascribed to a Nuremberg instrument-maker, John Christopher Denner, but there is not the slightest possible doubt that our modern clarinet is merely the development of an instrument of extreme antiquity.

The single-beating reed peculiar to the clarinet family is possibly of later origin than the double-reeded oboe type, and amongst the ancients its use appears to have been comparatively rare. There are no instances of the single reed in Egyptian sculpture, but cylindrical pipes of great age, fitted with single-beating reeds, have been found in Greece, and they have also been known and used for centuries in Persia and India.

An instrument used by the Celts, and known as the hornpipe or pibcorn, answers to much the same description. This was usually made out of animal bone—occasionally from the tibia of a deer—and was provided with seven finger-holes, six in front and one behind. It had a kind of bell made from animal horn which justified its name, pibcorn or pipe-horn. Chiefly used in Cornwall, Wales, Ireland, and the Scottish Lowlands—the later abodes of the Celts—it was even said to have been occasionally found among the peasantry within the last hundred years. Somewhat similar rude single-reeded pipes are still used by the Italian shepherds and Roman pifferari, besides being found among other of the remoter European peasantry.

In the sixteenth century a single-reeded cylindrical instrument

called the chalumeau (from Latin *calamus*, a reed) came into popular use in Europe, and soon found a place in the orchestra. Prætorius gives no illustration of the chalumeau, but there is a specimen extant dating from the end of the sixteenth century, so that the instrument must have been known some appreciable time before Prætorius wrote.

The chalumeau had eight finger-holes, six in front and two behind for the thumbs, and also two keys. Gluck used instruments of this kind in many of his operas.

Between the years 1690 and 1700 Denner discovered that if one of the top finger-holes was only imperfectly closed, the instrument would overblow, not the octave, but the *twelfth* higher. This led him to add a special key near the mouthpiece which would open a minute "overblowing hole," a contrivance which served to double the register of the original chalumeau. Flutes, oboes and bassoons all sound the octave when overblown, and the interval of the twelfth —so puzzling to the beginner—is quite peculiar to the cylindrical bored clarinet, and it is no doubt the discovery of this characteristic which led to Denner being credited with the invention of the whole instrument.

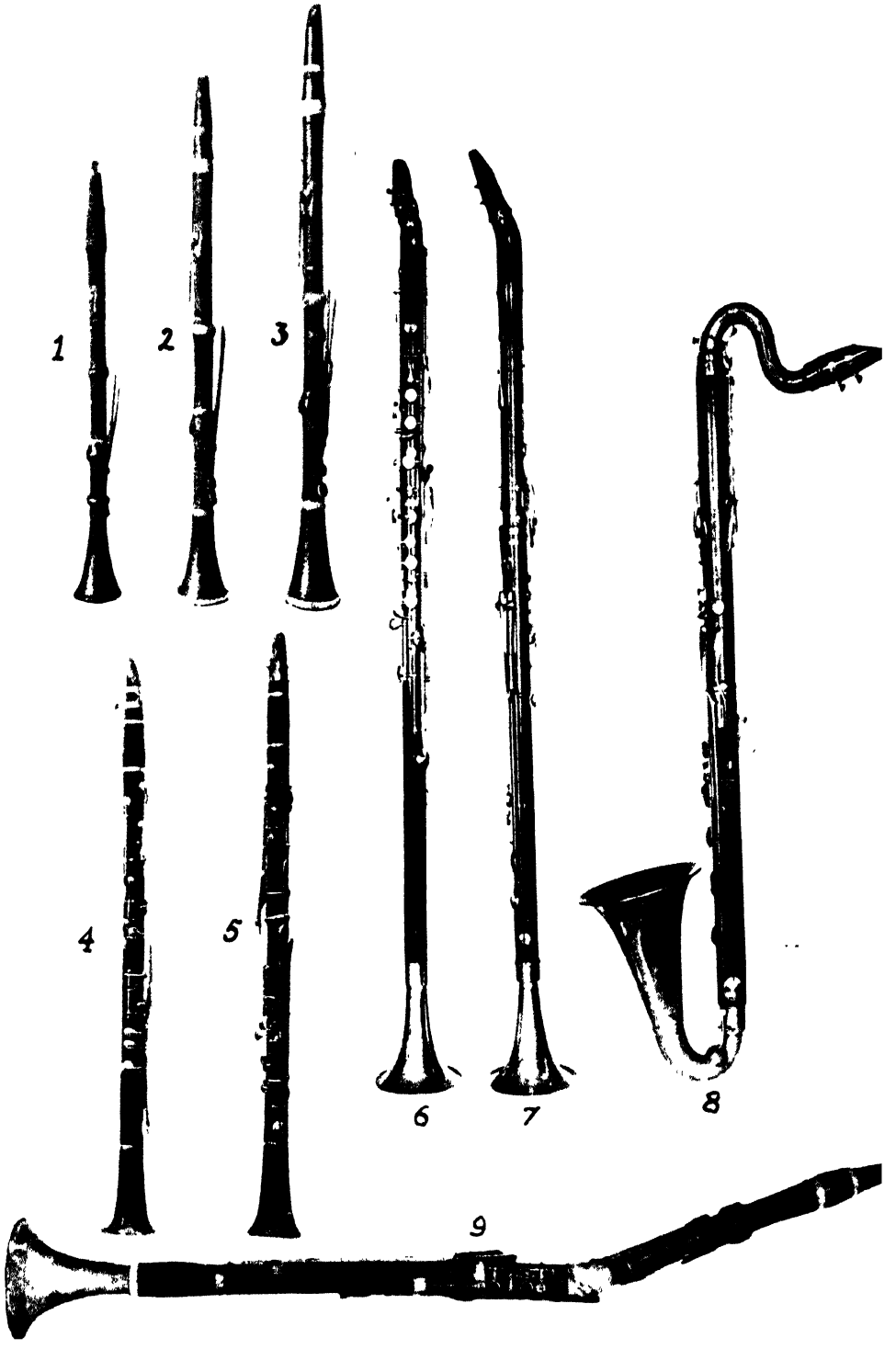
It is of interest to note that the lower compass of the clarinet still goes by the name of chalumeau register, for its tone, produced as it is without using the overblowing hole, is very similar to that of the ancient instrument of similar name. The full mellow tone of the chalumeau register is, in comparison with other birds, somewhat suggestive of the blackbird's call.

The name clarionet—now usually spelt clarinet—was applied to the chalumeau when it began to take the place of the clarion—a narrow-bored trumpet much favoured by Bach and Handel, but since become obsolete—whose timbre the higher notes somewhat resemble. Mozart rewrote many of Handel's clarion parts for the clarionet.

The clarinet, which was originally played with the reed against the upper instead of the lower lip, was used in military bands as early as 1720-30, but was not properly introduced into the orchestra until the year 1751, when Rameau produced his pastoral play, "Acante et Cephise," in Paris. A contemporary document, just re-

PLATE 6. CLARINETS

1–3. CLARINETS in E flat, C and A. Eighteenth century.
4 and 5. CLARINETS. Modern, in B flat and A.
6 and 7. BASSET-HORN, in E flat and F.
8. BASS CLARINET.
9. BASSET-HORN, early nineteenth century. *(From the Donaldson Collection.)*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cently discovered in the archives of the Paris Opéra, declares that the clarinet was used in Rameau's "Zoroastre," in December, 1749, but as neither the score published in that year, nor the orchestral parts, nor even the orchestral score of 1756, includes parts for clarinets, the accuracy of the statement remains open to very considerable doubt.

The original instruments had but one key, and the many imperfections made it impossible to play with any accuracy of intonation in keys having many sharps or flats. For this reason players provided themselves with extra joints which they could fit on to change the key of the instrument itself, and later on came the use of several instruments, each built in a different key. To a certain extent this custom obtains to-day, each player in the orchestra always being provided with two instruments, one in B flat and the other in A.

The application of keys for the purpose of rendering the instrument more reliably chromatic proceeded very slowly, and it was not until the middle of the eighteenth century that a second key came into use. In 1766, Barthold Fritz, of Brunswick, added two more (C sharp and D sharp), and the G sharp key was introduced about 1790. By the year 1810, thirteen-keyed clarinets were being made by Müller, of Paris, a great artist and exponent, whose playing did much to bring the instrument into popularity. The bore and key-mechanism were afterwards considerably improved by the elder and younger Sax, the latter, amongst other improvements, extending the lower compass by a semitone, thus giving E flat as the lowest note. Buffet, of Paris, Mahillon and Albert, of Brussels, further developed the key-mechanism, and Klosé, in 1843, adapted, with several important improvements, the Boehm system. In order to obtain a complete chromatic scale on the clarinet, at least eighteen tone-holes are necessary, and the simplest modern thirteen-keyed instrument has twenty tone-holes.

In 1770, Horn, an instrument-maker, of Passau, in Bavaria, brought out a tenor clarinet in F called the basset-horn, an instrument bearing the same relation to the clarinet as the cor anglais does to the oboe. This instrument apparently takes its name from the inventor, Horn, a circumstance not generally realised, for the

surname, Horn, has itself been translated, and so in France we find it under the name cor de bassette, and in Italy, corno di bassetto.

The tone is remarkably full and reedy, and it is to be regretted that this beautiful instrument completely dropped out of use. Mozart took a great liking to the basset-horn, and sometimes wrote parts for it to the exclusion of other clarinets, notably in the Requiem. The famous basset-horn *obbligato* to the song, "Non piu di Fiori," in his opera, "Clemenza di Tito," is still sometimes heard on the concert platform, though players on the instrument are but few and far between. Certain modern composers have attempted to revive the basset-horn, but at the present day it is known as the alto (or tenor) clarinet, and is built in the key of E flat.

The bass clarinet, an octave below the B flat clarinet, was not much used until the year 1836, when Meyerbeer employed it in "The Huguenots." Prior to this, a simpler form of instrument had already been constructed by Gresner, of Dresden, as early as 1793. Dumas, a goldsmith attached to the court of Napoleon I, brought out a new model in 1805, and in 1838 Adolphe Sax, who was particularly fond of the instrument, introduced an improvement on the earliest model in the shape of the bass clarinet with twenty-two keys. Since that date the instrument has benefited by most of the improvements originally applied to its treble relatives.

The tone of the bass clarinet is exceedingly rich on the lower notes, having somewhat the same quality as the chalumeau register of the ordinary clarinet. In his later works Wagner made it a regular constituent of the orchestra. He sometimes wrote parts for bass clarinet in A instead of the usual B flat.

Sax also constructed a bass clarinet in E flat, an octave below the alto clarinet, and the latest addition to the family is the pedal clarinet invented by M. Besson in 1891. Some such instrument had already been devised by the versatile Sax, but proved a failure. The modern instrument is in B flat, two octaves below the B flat clarinet. Its tube, which is some ten feet in length, is doubled back upon itself for part of its length to give portability, and it has thirteen keys and two rings. The fingering is practically identical with that of the treble instrument.

To avoid confusion, it may be as well to tabulate the clarinet family:

Clarinet in E flat (alt). Used mostly in military bands.

Clarinet in D. Sometimes found in the works of Liszt, Wagner and Richard Strauss ("Till Eulenspiegel" and "Symphonia Domestica").

Clarinet in C. Almost obsolete.

Clarinet in B flat. The usual orchestral instrument.

Clarinet in A. The usual orchestral instrument.

Basset-horn in F. Obsolete.

Alto (or tenor) in E flat.

Bass in B flat.

Wagner bass in A. Now practically discarded.

Contra-bass or pedal clarinet in B flat.

Haydn was very sparing in his use of the clarinet, but Mozart wrote parts for it in a large number of his works, and probably only omitted it from some of the important symphonies because no players of the instrument were at that time forthcoming. "Ah, if we had but clarinets too!" he once wrote. "Just imagine the splendid effect of a symphony with flutes, oboes and clarinets!" Beethoven regularly employed the clarinet, mostly using the upper register, Mendelssohn, on the other hand, being especially attached to the chalumeau notes. But it was Weber who really loved the instrument and employed it in a way that no other composer has ever excelled. His two clarinet concertos with orchestral accompaniment, which display the quality and compass of the instrument to perfection, are still frequently performed. Since Weber, all composers have, of course, given the greatest prominence to this all-important instrument in their works.

The clarinets in B flat and A are almost without exception invariably used in the orchestra, those in other keys only very rarely being employed for special effects. Until comparatively recent times clarinets in F alt, in D, D flat, C—even one in "H" (B natural) appears in Mozart's "Idomeneo"—were frequently scored for orchestral purposes, but the general timbre was harsh and piercing, and such instruments are now regarded more or less as "freaks." The E flat military clarinet is, of course, exceptional, that being necessary to carry up the register of the wind band in the rendition of violin passages.

Clarinets are transposing instruments—the first we have met so far—that is, notes formed by any given fingering on any clarinet, no matter what its key, go by the same name.

For instance, the note produced on the B flat clarinet by a fingering corresponding to that required to produce, say, C, on the clarinet of that key, is still designated C, though in reality its actual sound is B flat. Similarly on the clarinet in A the note called C by the player is in actual pitch A. To compensate for this, the orchestral parts have to be transposed, those for the B flat clarinet a tone higher than the actual sounds required, those for the instrument in A a minor third higher, while music for, say, the clarinet in E flat *alt*, is written a minor third *lower* than the required pitch. The B flat instrument is the more usually used, especially for concertos and solos, its tone having more resonance and brilliancy than the clarinet in A. Both are, however, employed alternately in the orchestra, the player changing instruments according to the key of the music, so as to avoid the necessity of playing in a key having a large number of sharps or flats.

The clarinet is singularly susceptible to changes of temperature, becoming considerably raised in pitch as it is warmed by playing. The breath naturally heats up the top portion of the tube first, and it is the notes dependent on the higher tone-holes which are chiefly affected, until the whole instrument attains an equal temperature, and stands at a pitch considerably higher than at tuning when it was cold. It will at once be seen that considerable difficulty arises when changing from one instrument to another, if the performer neglects or has not time to breathe into the tube and warm it up before making his entry. Several ineffectual attempts have been made to overcome this difficulty, and in 1867, M. Buffet, of Paris, exhibited an instrument interchangeable from B flat to A. Mr. Clinton, an Englishman, has also patented a somewhat similar instrument, which can be pulled out at the three joints (top, middle and bell) sufficiently far to throw the B flat instrument into A. Unfortunately, any arrangement of this kind is incompatible with absolute accuracy of intonation, for to obtain acoustic correctness of proportion, and therefore true intonation, each *separate* tone-hole in the A natural instrument must be slightly farther apart from its neighbour than would be the case on the B flat instrument.

Thoughtful players sometimes ask, why is it that a clarinet approximately the same length as the flute sounds an octave lower than that instrument? The answer is this. The clarinet acts in the same manner as a stopped organ pipe, the flute as an open pipe, and a stopped pipe gives a note similar to that of an open pipe *double* its length.

In the early part of the nineteenth century seven and eight-keyed boxwood clarinets with ivory fittings were in great vogue, but neither their timbre nor their intonation would meet with approval at the present day. At the present time, thanks to the improvements made by Buffet, Prof. Klosé, Sax, Barret and others, the intonation is as perfect as on the flute, while the timbre is greatly improved by the use of a more reliable material, cocuswood. Ebonite also gives a lovely, liquid tone. It is light, does not warp or crack, and is preferred by many players to cocuswood. Wooden clarinets usually have the mouthpiece made of ebonite—sometimes of glass—for the accuracy of the "lay" of the part against which the reed beats is of extreme importance, and being subjected to so much heat and moisture, no wood could be safely guaranteed against warping.

One of the great difficulties of the clarinet is the attainment of a good tone on the upper register, such notes being very prone to sound harsh and shrill. The chief factor in tone production is, of course, the degree of skill of the performer, but much is also dependent on the lay of the reed against the mouthpiece, and on the condition of the reed itself. A reed which is too hard gives a harsh tone, and militates against smooth and easy execution, while if it be too soft the tone is thin. With either, a faulty intonation is sure to result, especially on the upper register.

Reeds are manufactured generally from the outer layer of a tall shrub known as Sativa Grass, or Arundo Donax, found in Southern Europe, and on the shores of the Mediterranean. Everything depends on the skill with which the reed is shaped, and pared down to the thinness of paper at the vibrating end.

The clarinet is suitable for the most rapid execution, especially quickly flowing scales and arpeggios, but double and triple tonguing are by no means impossible. Of all the wood-wind, it lends itself best to marked *crescendos* and *diminuendos*. The ex-

treme high notes are seldom used, except when a "piercing shriek" is required for a special effect. The upper middle register is clear and penetrating, but it is the chalumeau notes which form the clarinet's chief distinction. When played *double piano* they have a weird and melancholy effect—well illustrated in the opening of the "Tannhäuser" and "Der Freischütz" overtures—while the *double forte* is full and majestic to a degree, being somewhat akin to the C string tone on a good 'cello. It is the slow melody on this chalumeau register, unsurpassed as it is for extreme beauty and melting liquidity of tone, that has rightly gained for the clarinet the title of King of the Wood-wind.*

* Mr. R. H. Whall, of Stroud, sends me an interesting note on the requirements of orchestral players. "It is not necessary to have *four* clarinets, in order to play at either high or low pitch (i.e., two in B flat and two in A natural). Manufacturers are perhaps unwilling to admit the fact, but the instrument in B flat (low pitch) can quite well be made to serve as the A natural (high pitch), the difference being considerably less than a semitone. It is necessary to have either a tuning slide, as in the flute, or to insert rings so as to make the inner surface of the tube continuous, otherwise the middle notes will sound flat."

CHAPTER VII.

SAXOPHONES AND SARRUSOPHONES.

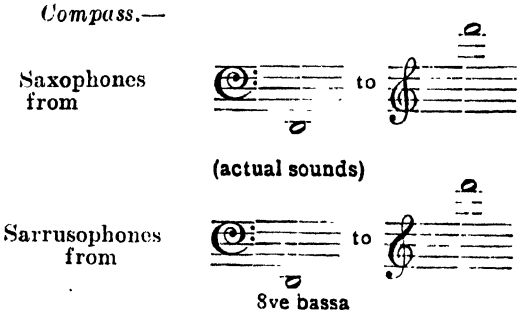
Material.—Brass.

Bore.—Wide conical.

Mouthpiece.—Saxophone, single clarinet-type mouthpiece and reed. Sarrusophone, double bassoon-type reed.

Pitch.—Saxophone: soprano in B flat, alto in E flat, baritone in E flat, bass in E flat (or B flat). Sarrusophone: soprano in B flat, alto in E flat, tenor in B flat, baritone in E flat, bass in B flat, contrabass in E flat.

Compass.—



CHAPTER VII.

SAXOPHONES AND SARRUSOPHONES.

SAXOPHONES are practically brass clarinets, except that their bore is conical instead of cylindrical, while sarrusophones may be likened to brass bassoons.

Both these are comparatively modern instruments, as yet not having been employed to a sufficient extent to justify their being classed as belonging properly to the orchestra, but the growing use —especially in France—of the saxophone family in particular cannot be ignored in any work on orchestral instruments professing to be up to date, and hence their inclusion in the present volume.

The saxophone family consists usually of four members: soprano, alto, tenor and bass. The idea of a conical bored instrument sounded by a single reed is by no means novel, for it is seen in the late eighteenth and early nineteenth century dolciano,* which was frequently played with a single instead of the usual double reed in military bands of the period, though of course these instruments were made, like bassoons, of wood, and not of brass, as are the saxophones.

The actual idea of the brass saxophone is said by some to have been suggested to their inventor, Antoine Sax, by the ophicleide, by others as the result of a discovery while striving to construct a clarinet which would overblow the octave instead of the twelfth, but however this may have been, the saxophone was patented by Sax in 1840, and used in the orchestra four years later by Kastner in his opera, "Le Dernier Roi de Juda."

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* These were simply bassoons, or more usually tenoroons, fitted with adjustable small mouthpieces, like miniature clarinet mouthpieces, sliding on to the end of the crook. One such mouthpiece is shown fitted to the tenoroon in the plate.

Originally the saxophone family comprised seven members, but at the present time the four mentioned above are the only ones in general use. Unlike the cylindrical-bored clarinet, the saxophone overblows the octave, and its fingering is practically identical on all members of the family, being somewhat akin to that of the flute and oboe. Saxophones are all transposing instruments, music for them being written accordingly, and for all members the treble clef notation is used.

The employment of saxophones in the orchestra has been mainly confined to French interest, such as Meyerbeer, Massenet, Bizet and Saint-Saëns, but several other modern composers, including Richard Strauss ("Symphonia Domestica") and Joseph Holbrooke ("Les Hommages") have scored for it, the latter work being remarkable for the use of the full quartet.

In French and Belgian military bands the saxophone has long occupied an important position, indeed, to a great extent, it has ousted clarinets and bassoons. In England and America, however, and to a less degree in Germany and Russia, it is still regarded with some suspicion by military bandmasters, the E flat alto and B flat tenor being the only members of the family represented, and even these comparatively rare.

The tone of the saxophone is peculiar, and very difficult to describe in words; Berlioz's description as having "vague analogies with the 'cello, clarinet and cor anglais, with, however, a brazen tinge," being perhaps the simplest and most accurate. In general, it may be said to be a bridge between the wood-wind and brass, or the clarinet and the cornet.* Saxophones all permit of great rapidity of execution, but, like the clarinet, the legato style is best suited, though staccato is by no means impossible.

The sarrusophone is the invention of Sarrus, a French bandmaster (circa 1856), though brass instruments sounded by double reeds were not unknown before that date, a double bassoon of brass having been constructed by Stehle, of Vienna, in 1835. There are several points of similarity between the saxophone and sarrusophone families, the individual compass of each instrument being the same in both (two and one fifth octaves), and the fingering simi-

* This applies, of course, only to the soprano instrument.

lar, the main distinguishing feature being that one is sounded by a clarinet-type and the other by a bassoon-type reed, the resulting tone-qualities being correspondingly distinctive.

The sarrusophone is practically free from the somewhat nasal quality peculiar to the saxophones, but while its tone is sonorous it is at the same time a trifle rough and coarse, having neither the delicacy of the oboe nor the mellow sweetness of the bassoon. In the orchestra the use of the sarrusophone has been extremely rare, and even that restricted to the distinctive contrabass, which has been employed instead of the double bassoon by Saint-Saëns, Massenet, and a few others. The same instrument finds a place occasionally in military bands, where its harsh tones are of less objection than in the orchestra.

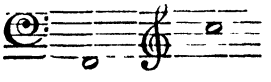
Neither the saxophone nor the sarrusophone families give much promise of a brilliant future as orchestral instruments, as in tone-quality they are too reminiscent of instruments already in general use, at the same time being inferior from an artistic point.

CHAPTER VIII.

THE HORN (OR FRENCH HORN).

The Horn.

*Length of Tubing.**—(In F), 12 ft. 4½ ins.
Bore.—Conical.
Mouthpiece.—Deep funnel-shaped.
Number of Valves.—Three.
Compass† (for orchestral purposes).—

(actual sounds). 

Of horns, four are used in the orchestra, two in the "small orchestra."

* A = 439 vibrations per second at 60 degrees Fah

† As with all cup-mouthpieced instruments, the limit of the upward compass in particular depends very largely on the individual skill of the performer.

CHAPTER VIII.

THE HORN (OR FRENCH HORN).

FRENCH, COR. ITALIAN, CORNO. GERMAN, HORN.

THE horn is probably the most ancient of all wind instruments. Consisting originally of crude animal horn cut off square at the smaller end, it is common to most nations, and must have been known thus to the ancestors of men at a very remote period.

The first *historic* record of the use of the horn in the nearer Eastern civilisation is found in the Hebrew *schofar*, an instrument constructed, according to the Bible, from ram's horn. This *schofar* is additionally interesting as being the oldest musical instrument still preserved for its original use, for to this day it is sounded at the various Jewish festivals, including the New Year and the Feast of the Atonement.

There is considerable difficulty in disentangling the early histories of the horn and trumpet, owing to the lack of intelligent distinction between the two made by early writers. It is the same at the present day, for comparatively few people can distinguish and correctly place strange instruments as belonging either to the horn or trumpet family—witness the astounding blunders made in the descriptions of Eastern brass instruments in our own South Kensington Museum!

Horns are conical in bore, trumpets cylindrical, or very restricted conical. Horn mouthpieces are deep and characteristically funnel-shaped, those of the trumpet flat and hemispherical. Many Eastern instruments have trumpet mouthpieces attached to bores characteristic of the horn tribe, and vice versa, in which case classification must be made according to the shape of the bore.

In dealing with ancient Egyptian, Greek or Roman instruments, of which very few actual specimens are extant, our knowledge depends almost solely on pictorial representations and carvings, many of which are very indistinct, and in some cases offer conflicting evidence.

The Greeks appear to have had horns both straight and curved, corresponding to the Roman instruments, the tuba and the cornu or buccina (see Chapter XII). The tuba was straight, about three feet long, the cornu varied between forty-five and sixty-four inches, the buccina, a longer form of cornu, being as much as eleven feet in length.

In passing, it is of interest to note that the Romans, as well as other contemporary nations, played all their instruments with the cheeks distended, a method which led to the wearing of a bandage or *capistrum* over the lower part of the face, in spite of which cheeks were often rent and blood vessels burst. The higher harmonics are impossible to produce with this method of blowing, so that in early times these must have been unused, if not unknown.

There is a popular fable that horns, trumpets, and other instruments, were first introduced into Western Europe by the returning Crusaders, but quite putting aside the fact that the Romans must have brought with them their military, and later, their domestic instruments, there is other and stronger evidence which can be brought to disprove this idea. Horns at least two thousand years old, and quite unlike anything belonging to the Romans, have been dug up in the peat bogs of Ireland and Denmark. In fact, nothing exactly similar to some of the Danish horns has been found elsewhere, for these instruments—used by the so-called Vikings—were cast in a number of separate pieces, and joined together by interlacing rivets. Some specimens are in so good a state of preservation that they may still be sounded, but, as might be expected, the tone is dull and not over-loud.

In 1639, two Danish golden horns belonging to the bronze age were discovered, some thirty-three inches in length, and inscribed with early runes. The National Museum at Dublin possesses a very fine collection of early Celtic horns, varying in length between two and three feet, some of which have the mouthpiece placed at the side of the instrument, in manner similar to the Ashantee war horns.

PLATE 7.—HORNS.

1. POSTING HORN. Seventeenth century.
2. COR DE CHASSE, circa 1600. *(From the Donaldson Collection.)*
3. HAND HORN. Eighteenth century.
4 and 5. Orchestral HORNS (Modern) with three and two valves.

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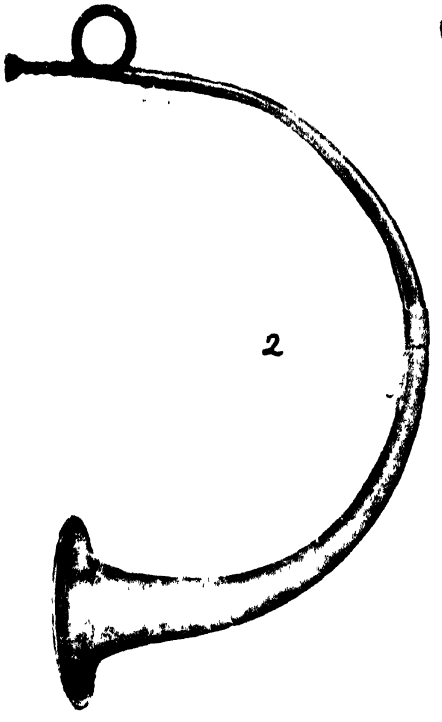

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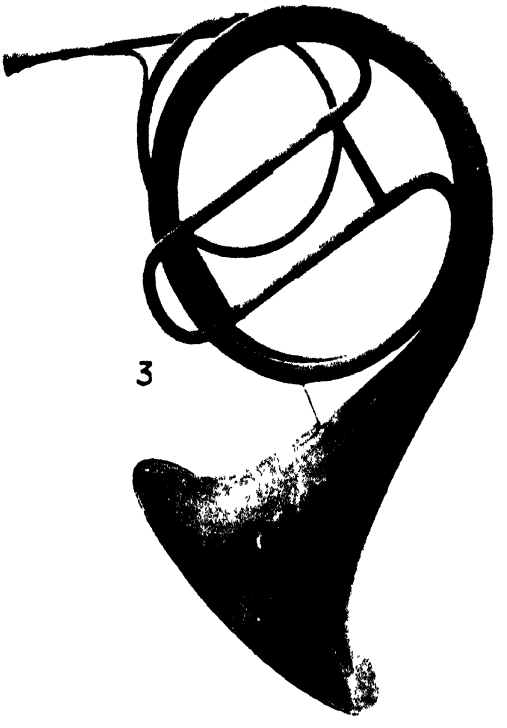

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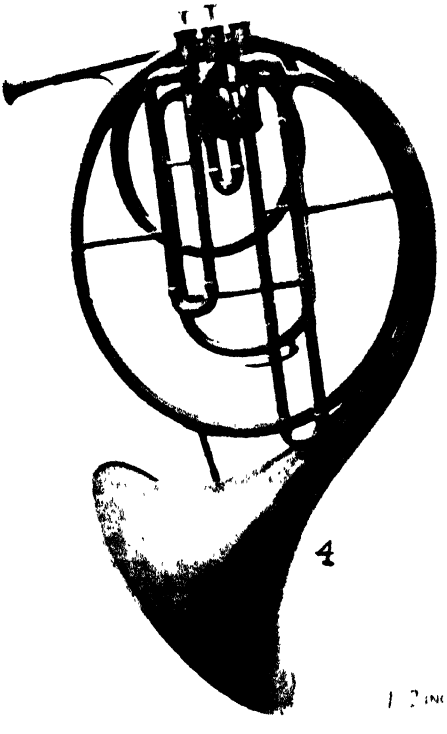

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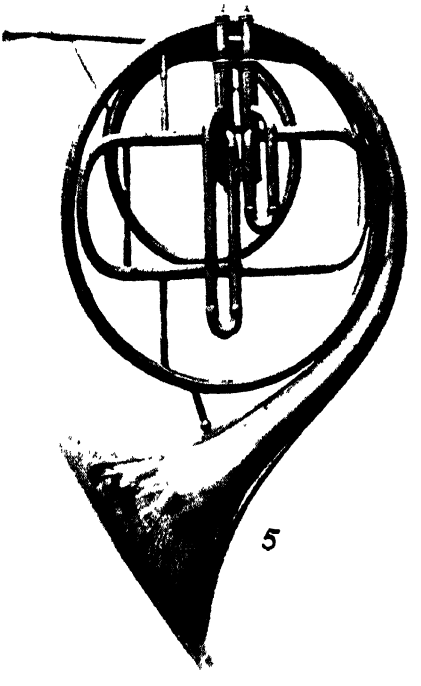

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Many of these Celtic horns are at least two thousand years old, and it is interesting to note the different methods of construction used in early times: (1) hollowed out of a single piece of wood; (2) two hollow pieces of wood held together by ropes of twigs or by metal bands; (3) metal cast in one piece; (4) a thin plate of metal hammered into shape and riveted.

It was evidently with some such rude instruments as these that the Celts received the invading Romans, for historians of the period relate how the terrible din of the horns and trumpets momentarily struck fear even to the hearts of the legionaries.

In early English times horns were known as "bemes," and were used in war, in the chase, and for signalling the arrival of visitors, the serving of meals, etc., in castles. Later on they became the symbols of tenure of land, also for municipal purposes, the latter being termed Burgmote horns. Several English towns, including Dover, Canterbury and Folkestone, still preserve Burgmote horns dating from the thirteenth century. Amongst other uses these were employed to call the Mayor and Corporation to council. Horns were also used for sounding the curfew, and occasionally formed part of the night-watchman's equipment—as illustrated comically in the second act of Wagner's "Die Meistersinger von Nürnberg." The hunting horns of nobles were usually of silver or ivory, while those used by the keepers and beaters were of plain animal horn—usually ox-horn—after the fashion of the very earliest times. Henry VIII had twenty-two horns of various kinds in his huge collection of instruments.

In order to produce a greater number of notes (harmonics) the metallic hunting horns were gradually increased in size, in the sixteenth century being as much as three feet or more in length, and made semicircular instead of straight for the sake of portability. In France, this was carried to extremes, the tubing eventually being bent into a complete circle of one or more turns, and of such a size that the instrument could be worn round the body.

The jager trommet of Prætorius (French trompette de chasse) was constructed on this principle, also the similar instrument mentioned by Mersenne, but both were considerably shorter than the later French horns, and therefore possessed a more limited series of harmonics. The bore, too, was practically cylindrical, and the

bell small and restricted, and it was not until the latter part of the seventeenth century that it came to be superseded by the trompe de chasse or cor de chasse. This was considerably longer; the bore was conical, and the bell was greatly widened out and increased in size, a peculiarity to which the soft, mysterious tone of the French horn is partly due.

Instruments of this type are said to have been first used in a French orchestra by Lully (1633-87), and again by Campra, in his "Achille et Déidamie" (1735), but they did not become a regular feature in French opera until 1749, when Rameau employed two horns in his "Zoroastre." In England, the French horn was first used in Handel's "Radamisto" (1720)—though horns of similar shape appear to have been known at a much earlier date, for one such is depicted on a fourteenth century choir-stall in Worcester Cathedral.

On introduction into Germany by Count von Spörken, at the end of the seventeenth century, the cor de chasse took the name of waldhorn, and in 1711 we find two of these instruments included in the orchestra of the Theatre Royal, Dresden. The waldhorn soon achieved great popularity, for in 1713 a German writer says that at that time it was in great demand in churches, theatres, and for chamber music.

Since the days of Lully the French horn had been played in a harsh and noisy manner, being held with the bell on a level with the player's head, and pointing upwards—in fact, an old print depicts horns still held in this manner at the Handel celebrations of 1783. In order to subdue this tone, better suited to the hunting field than to the orchestra, mutes of wood or cardboard were sometimes inserted into the bell, but it was due to German influence that the horn was first held bell downwards, and the soft *cooing* timbre familiar to modern concert-goers cultivated.

In 1753, Hampel, a Dresden musician, invented a means of applying movable slides of various lengths to the body of the instrument in place of the system of crooks which, for considerably over a century, had been used to transpose the key of the instrument to that of any particular composition—by the beginning of the nineteenth century the number of additional crooks had reached sixteen! Such crooks, inserted as they were at the mouthpiece end of

the tubing, had ill effects on the intonation, an objection which Hampel's device claimed to overcome, at the same time affording a convenient means of tuning to any desired diapason. In Germany this instrument was known as the "inventions horn."

Seven years later, Hampel made the discovery that the whole sequence of harmonies could be lowered by half a tone if the hand were introduced in a certain manner into the bell. This is known a "stopping" (bouché), and if the hand be inserted still further the pitch is lowered by a whole tone, in which case it is called "double stopping." Stopped notes are of duller timbre than open notes, the double-stopped ones being correspondingly inferior to those only single-stopped.

In spite of these defects, this discovery—which greatly increased the chromatic compass—together with the timely influence of Haydn, ensured once and for all the popularity of the horn (or hand horn, as it was known in England) and secured for it a recognised place as the most important "brass" wind instrument of the orchestra.

The same year (1760), Kolbel, at that time hornist at the Chapel Royal of Russia, placed a key on the bell of the horn, the opening of which mechanically raised the pitch a semitone, thus giving in another way the extra compass obtainable by half-stopping. This was the commencement of the vogue of keys, which in turn gave place to valves.* No special appliance has been invented exclusively for the horn, though a slide similar to that of the slide trumpet has been tried, not to meet with much approval, probably on account of the rapid strides made in valve construction. For some years after the acceptance of valves, first horn players favoured instruments having only two pistons, but at the present time the three-valved horn is universally used.

As has been explained in a former chapter,* crooks were applied to brass instruments in order to transpose their natural harmonics to the key most suited to the composition in which they were required to take part, but since the introduction of valves and the chromatic horns and trumpets this necessity has ceased to exist. The modern tendency for the horn is, as is the case with the trum-

* See Chapter II.

pet, to do away with clumsy crooks—which only serve to confuse the player and to ruin the timbre and intonation—and to keep the instrument always in one key. The horn in F seems to produce the most satisfactory tone, and modern horn parts are always written in that key. Classic and other parts written for horns in keys ranging from B flat alt to B flat basso are transposed at sight and rendered on the "F" horn, except in certain very high parts, when a crook in A is sometimes used.

The horn owes its characteristic soft tone to three peculiarities: first, to its deep V-shaped mouthpiece; secondly, to its particularly wide bell; thirdly, to its conical bore. The latter, however, has not nearly so important an effect on the timbre as the shape of the mouthpiece and bell, for were the bell cut off at a place where it is only a few inches in diameter, and a trumpet mouthpiece used, it would be difficult, except to a trained ear, to distinguish the tone from that of an actual trumpet.

The horn permits of several accomplishments not possible on the wood-wind, the most important being *stopping*, the discovery of Hampel, as we have seen above. When producing stopped passages, the player reads a semitone above the written notes,* depressing the pitch to normal by inserting the hand into the bell, fingertips together. The resulting timbre is employed for echo effects; it is of a weird and mysterious quality, and much favoured by modern writers. In England, notes produced in this manner are known as *brassed notes*, and they are marked in the score by a cross, or the German term, *gestopft*, or the French *bouché* or *cuivré*.

Another method of obtaining a somewhat similar effect is to introduce a wooden or metal mute into the bell, the score in this case being marked *con sordino*. No alteration in pitch occurs when using the mute, but the tone is of a less valuable quality than that obtained by hand stopping.

Handel, Mozart, and other eighteenth century composers sometimes wrote shakes for the horn. It should be borne in mind that this was in the days of the hand horn, long before valves were invented, so such shakes had to be made in another way than is the

* In all cases the horn sounds an octave below the written notes, except when bass clef notation is used.

general practice now. The shake executed without employing the valves is still as practicable as it ever was, and when well executed it is extremely effective, being clearer and more rapid than the valve shakes. The mode of procedure is difficult to explain, for it is accomplished more by a movement of the throat, as in singing, than by the lips. Many such shakes are possible on the horn, the only requisite being that the natural harmonics are sufficiently adjacent to permit of a trill.

Weber wrote chords in his Concerto (Op. 45), these being produced according to the theory of differential tones discovered by Helmholtz, i.e., "when two notes are sounded together they generate a third and deeper tone whose vibrational number equals the difference of their several vibrational numbers." However, as chords are very difficult of accomplishment and the tone is of most unsatisfactory quality, for all practical purposes, they may be ignored. On the horn, as on all the smaller cup-mouthpieced instruments, double and triple tonguing can be executed with great rapidity and ease, but the instrument itself is better adapted to slow movements and hunting calls.

Of the music for the horn, little can be said here, save that a every great composer since Handel has scored freely for this beautiful instrument. Mozart left three concertos for orchestra with horn *obbligato*, Beethoven a sonata for horn and piano, Weber a concerto for horn and orchestra, Schumann a short work for horn and piano, and Richard Strauss a concerto with orchestra. Rossini, son of a horn player, may be said to have introduced the modern melodic method of scoring for the horn.

The French horn is the most difficult of the valved instruments on account of the very large number of its harmonics, and their extreme adjacency in the upper register. But it has its advantages, for it is universally voted the most beautiful and most poetic wind instrument in the whole orchestra.

Note. The horn family has been extended downwards by introducing the Wagner tubas, for which see Chapter XII. An account of the Flügel horn, a true treble to the French horn, is given in Chapter XI.

CHAPTER IX.

THE TRUMPET.

The Trumpet.

*Length of Tubing.**—In B flat, 4 ft. 7¼ ins. In F, 6 ft. 1 in.

Bore.—Restricted conical (nominally cylindrical).

Mouthpiece.—Hemispherical cup-shaped.

Number of Valves.—Three.

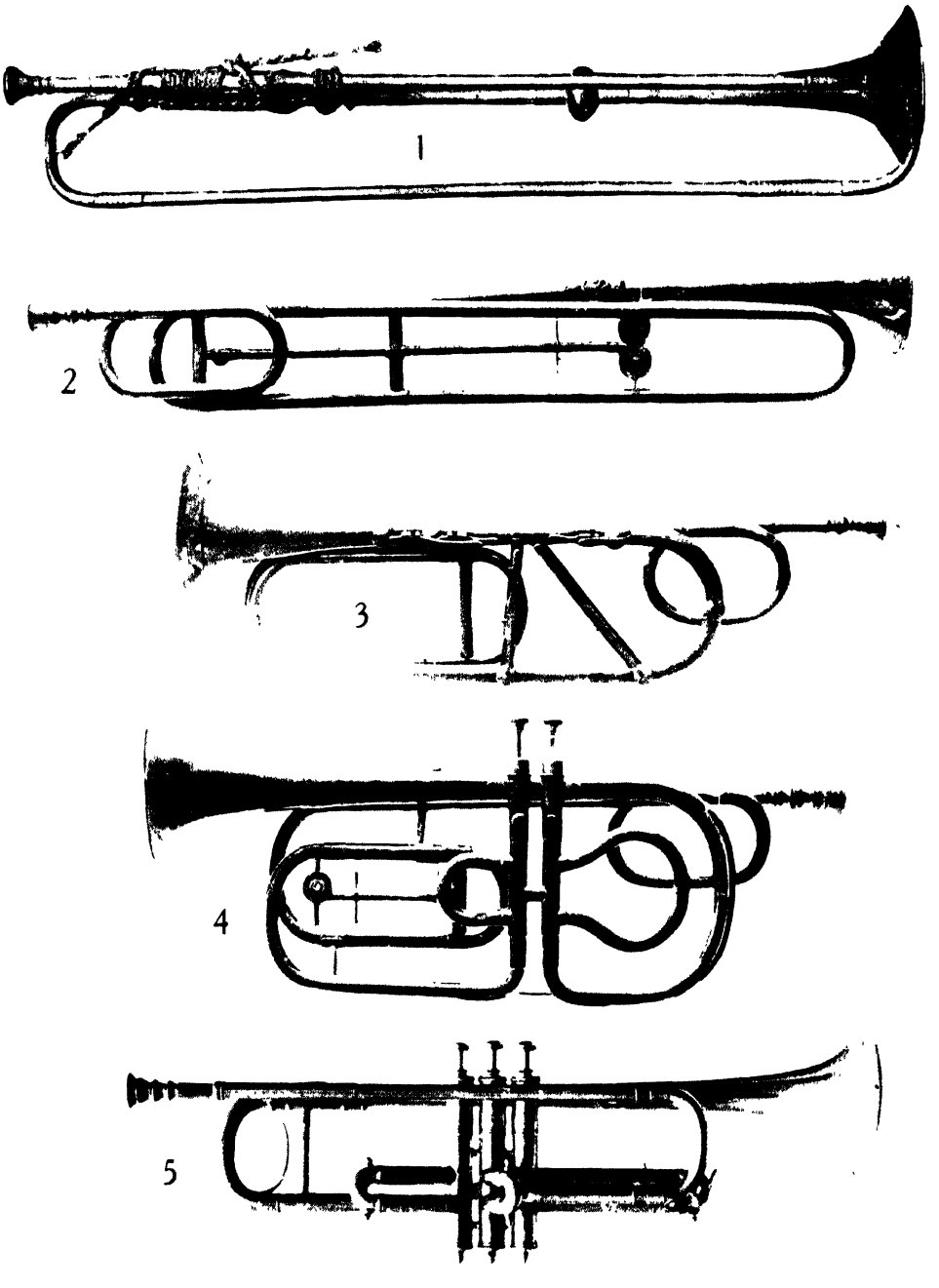
Compass (for orchestral purposes).—

Actual sounds. 

Usually two, sometimes three, trumpets are used in the orchestra.

* A = 439 vibrations per second at 60 degrees Fah.

† Richard Strauss frequently scores for C, a tone higher, but the upward limit depends almost entirely on the skill of the performer.


1
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1 2 INCHES 5 6

PLATE 8.—TRUMPETS.

1. CLARION, A.D. 1775. *(From the Donaldson Collection.)*
2. SLIDE TRUMPET, T. Harper's Model. Early nineteenth century.
3. KEYED TRUMPET, circa 1815.
4. TRUMPET with two valves and slide. A.D. 1828.
5. Modern VALVED TRUMPET in B flat.

CHAPTER IX.

THE TRUMPET.

FRENCH, TROMPETTE. ITALIAN, TROMBA. GERMAN, TROMPETE.

OF all instruments, the history of the trumpet is one of the greatest pomp and pageantry. From the earliest times the profession of trumpeter has been looked upon as one of honour, for this instrument has ever been regarded as the special emblem of royalty and nobility.

It is, of course, impossible to say when the trumpet first came into use, but we know that the ancient Egyptians had short trumpets, reserved almost exclusively for purposes of war, and the frequent allusions to trumpets in the Bible are known to most readers. With the Hebrews it was particularly popular, being extensively used on all possible occasions, grave or gay. To quote but a few instances:

Devotional music: "The Levites which were the singers . . . . stood at the east end of the altar, and with them one hundred and twenty priests sounding with trumpets" (II Chronicles, 5).

Festal music: On the coronation of Joash—"all the people of the land rejoiced, and sounded trumpets" (I Chronicles, 23).

Military music: The victorious army of Jehosaphat "came to Jerusalem with psalteries, and harps, and trumpets" (I Chronicles, 20).

According to Josephus, the straight silver trumpet of the Jews was about twenty-one inches in length, and the same historian is responsible for the statement that the number of trumpets in use in the days of Solomon was 200,000. On what grounds this estimate was made we cannot say, but it is probable that the word trumpet is here used as a generic term for, at any rate, all metal instruments.

Turning to the Greeks, we know that in B.C. 396 the victors of the Olympic musical contests were two trumpeters, Timœus and Crates. The Greeks had no less than six species of trumpets and horns, the characteristic trumpet being known as salpinx, chronicled as having been used at the siege of Troy.

The Romans had a small bored trumpet called the lituus, which consisted of a straight cylindrical tube with a short, slightly spreading bell curving off at right angles, in form something like the letter J. One of these was discovered in a tomb at Cerveteri in the year 1827, since preserved in the Vatican, its pitch being a third below our E flat cavalry trumpet. It is an interesting, and at the same time a curious fact that the Chinese have a trumpet of great antiquity, essentially identical in shape to the Roman lituus.

As to the trumpet's use in Britain during the first centuries of our era, nothing definite is known, but in all accounts of the battle of Hastings, trumpets and horns are mentioned, and the literature of England from that date onwards affords abundant evidence of its use on all occasions. To instance but two well-known passages:

Chaucer, in his "Knight's Tale" (circa 1386), describes the music for a tourney:

> " . . . . Pypes, trompes, nakeres, clariounes,
> That in the bataille blowe bloody sownes . . . . "

Nakeres are kettle-drums, so the second line must be excused on the plea of poetic licence so far as they are concerned.

Again:

> "Ther was myrth and melody . . . .
> . . . . With trumpette and with claryon clere."
> ("The Squyr of Lowe Degre," circa 1400.)

In post-Roman Europe trumpets became known under two distinct names, buzines (from Latin, *buccina*) and clarions (*claro* or clear). The former, called also trumpets, trombes, tromps, etc., were straight tubes, six feet or more in length, later destined to have applied to them chromatic slides, and so become sackbuts or trombones. Clarions, on the other hand, were shorter and smaller in bore than buzines, and as time went on their length was further re-

duced by bending, first in a zig-zag and later in the form characteristic of our modern cavalry trumpet. A very early example of the former method is depicted on a Miserere (carving on the under part of a choir stall) in Worcester Cathedral, circa 1396, but this peculiar shape is more familiar to us in the pictures of Fra Angelico (1387-1455).* By the beginning of the sixteenth century the zig-zag method of folding† had entirely given place to the principle on which all trumpets are still modelled. This form was by no means new, although it may have been re-invented, for a similarly constructed instrument was pictured many centuries earlier in a fresco on the House of the Gladiators at Pompeii, where it may be seen to this day.

In European countries, during the Middle Ages, the number of trumpeters attached to prince or nobleman conveyed, to a certain extent, degree of rank, somewhat in the same way as do the salutes of gun permitted to Indian potentates. For instance:

In 1629, two trumpeters were in attendance on the body of the late Duke of Buckingham from Portsmouth to London. In 1669, four trumpeters and a kettle-drummer attended Lord Howard to Morocco.

In 1691, seven trumpeters, a kettle-drummer and five oboists accompanied William III to Holland.

Trumpeters had the standing of officers and were permitted to wear the feather of nobility in their caps, being also provided with horses and grooms. In England, the "sergeant trumpeter" of the King had sole authority to license the playing of trumpets or the beating of drums outside the royal household or army, anyone using these instruments without such authority being liable to prosecution. The *title* of sergeant trumpeter lapsed with the death of the late T. Harper, but the use of trumpets in important functions of State has by no means been abandoned, twenty-four silver trumpets having been constructed by Messrs. Potter, of London, for the State trumpeters to herald the Durbar Proclamation at Delhi (1912).

Trumpets and clarions have invariably formed part of the

* See frontispiece.

† It is an interesting fact that trumpets of this shape are still to be found in Nepal.

royal bodyguard, the number varying between seven in the time of Edward III and seventeen during the reign of Charles II, when we are told "the pay of twelve trumpeters and a kettle-drummer amounts unto £1,290 per annum." It will be seen that kettle-drums have always been associated with trumpets, at least one drummer being allotted to every band of trumpeters. Extra payment was made when on expeditions away from home, in the time of Charles II, sergeant trumpeters receiving ten shillings, the others five shillings a day per man. Further information about the duties and life of a sergeant trumpeter during this reign will be found in Appendix II.

We must now turn from the glorious history of the trumpet's use to examine more particularly the details of the instrument itself.

Virdung, in 1511, names three species of trumpet: the clarion, the military or field trumpet, and the so-called Thurner horn. The latter was probably akin to the clarion, and used mostly by watchmen on towers and castles.

In the time of Prætorius (1619) trumpets of all kinds were constructed in the key of D, the extremely high register of the clarion —so favoured by Bach and Handel—being dependent on its restricted bore and small mouthpiece. Prætorius mentions an extra length of tubing or crook which was attachable to the trumpet at the mouthpiece end, this lowering the pitch to C. In later years, when trumpets (and clarions) came to be regularly employed in orchestras, they were usually constructed in the key of F, being provided with crooks for E, E flat, D, C, B flat, and A, also less frequently for G, G flat, B, A flat and D flat.

The clarion and the trumpet were among the first wind instruments employed in the orchestra, and in 1607 Monteverde scored parts for five trumpets of different registers in his "L'Orfeo" overture.

From this period until the time of Handel, the trumpet, or more rather, the clarion, received very marked attention from the greatest of composers. Arias with trumpet *obbligato* were common, extremely florid passages being written for the higher instruments.

The usual method of scoring in orchestral works was for clarion one and two and principal, the latter, which took a lower and independent part, being in compass and timbre very similar

to our modern cavalry trumpet. The clarions, having, as they did, command over those higher harmonics which lie very close together, were possessed of considerable melodic possibilities. By the time of Haydn, however, the cult of the clarion had passed, and Mozart went so far as to rearrange many of Handel's parts for this extinct instrument, allotting the higher notes to the clarinet whose tone somewhat resembled that of the clarion (hence the name clarion-et, now usually spelt clarinet).

From this time onwards the trumpet as an orchestral instrument fell on evil days, for its compass was so limited as to be of little use beyond occasional fanfares and duty calls. Beethoven may be said to have employed it more for the sake of using the instrument than from any absolute necessity, but at the same time he generally allotted a few notes *solo* to the trumpet in every work—his usual custom with all wind instruments—in order to hold the attention and interest of the performer. As there was no true soprano brass instrument capable of melody, Mendelssohn scored for the oboe in this capacity, and the harsh, powerful tone peculiar to the wide-reeded oboe of that period no doubt answered the purpose fairly well.

Then came the short-lived popularity of trumpets (and horns), rendered chromatic by keys and tone-holes, followed and quickly usurped by valve mechanism, an account of which has been given in an earlier chapter.*

With the adoption of valves we once more find the trumpet an important melodic instrument, though now completely chromatic and of considerably lower compass than the antique clarion. Liszt, Schumann and Wagner helped the valved trumpet towards acceptance by scoring for it freely in their works, but even then the old and cumbersome arrangement of crooks survived. It is probable, however, that their actual use was confined almost solely to the imagination of the composer. For instance, Wagner excels himself by marking no less than ten changes of crook in the ninety-six bars of his introduction to the third act of "Lohengrin." The whole entr'acte occupies only some two and a half minutes in performance, and some of these changes are without even half a bar's

* See Chapter II.

rest in which to effect them, while, if put into actual practice, several bars' *tacet* would be required!

As a matter of fact, the trumpet being now equally chromatic with the flute or the clarinet, or any other wind instrument, the need of crooks no longer exists, though in practice a half-tone change is still extensively used. Trumpets in B flat have now almost entirely superseded the F trumpet, and these, like the cornet, are provided with a crook or a movable slide ("quick-change") to lower the pitch a semitone. The normal B flat instrument is then used for flat keys, and converted into A for sharp keys, thus avoiding the extreme use of accidentals dependent on the third valve in combination, a circumstance which does not always make for perfect intonation.

From America there hails rather a useful appliance to overcome the latter objection, in the form of an instantaneously adjustable third valve slide. That is, the slide moves freely in its tube, and can be extended at will by means of a spring attachment worked by a finger of the left hand. In slow passages notes produced by the third valve in combination—which are inherently sharp—can be flattened by judicious use of the spring slides, though in rapid passages this would prove impracticable. A London maker has also produced a trumpet with a spring attachment to the tuning-slide, so that any note of the entire register can be flattened at will: performers should appreciate this as a more generally useful system than the one first quoted.

While Wagner and other Continental composers were busy scoring rapid and highly chromatic passages for the valve trumpet, the semi-chromatic slide trumpet was still adhered to by the English. This instrument—which never found much favour on the Continent—had been introduced at the close of the eighteenth century by a celebrated trumpet player named John Hyde, but the date and the name of the inventor appears to have been lost.

The principle of the slide trumpet differs from that of the slide trombone and the tromba di tirarsi in several respects. To begin with, the slide was only capable of extending to the "third position," that is, a shift of two semitones, and after use it was automatically returned to its normal (closed) position by means of a spring attachment. Moreover, this slide extension took place at

the back of the instrument, that is, towards instead of away from the player, as with the trombone. Its use in an imperfectly chromatic manner answered fairly well so long as the instrument was kept in one key, but when it was crooked from F, its normal pitch, to, say, C, a fourth below, the positions on the slide all became considerably farther apart (see Chapter II). In other words, the player had to vary his slide positions with each change of crook, a feat of very extreme difficulty if perfect intonation was to result.

T. Harper, perhaps the most famous exponent of the instrument, says in his instruction book: "For keys above D an extension of less than half the slide will be sufficient (for the semitone position), but for keys below D about two-thirds will be required. The whole tone position is only possible in keys above E—by the full extension of the slide." Besides these two extensions there was a third and shorter one, used to correct certain harmonics not otherwise in tune with tempered harmony. The slide trumpet, in fact, owed its fame to such exceptional exponents as John Hyde, McGrath, and the Harpers, father and son, but the exceptional difficulties peculiar to the instrument forbade its satisfactory use by the ordinary run of players.

Long after they had found acceptance on the Continent, valve trumpets were regarded with distrust and suspicion in England. Valve systems of the early days were undoubtedly highly faulty, and notes made by their use were consequently of a poorer tone-quality than the "open harmonics," but all such objections have been overcome now for a considerable number of years. However, old ideas and superstitions die hard, and, incredible though it may seem, one still occasionally hears people who know no better advance the opinion that trumpet parts should be written as much as possible on the open harmonics "owing to the inferior timbre of the valved notes!"

We will now give briefly a description of various kinds of trumpets occasionally mentioned and met with.

The Bach trumpet is so called on account of its occasional use in the rendition of Bach's trumpet parts, written—as we have seen—for an entirely different instrument to that in modern use. The Bach trumpet, however, in no way resembles the clarion, but is simply a valve trumpet made perfectly straight, this form being

said to favour the utterance of the higher notes. It is constructed in various keys, D (alt), C and A being the more common. A Bach trumpet in B flat alt, an octave above the ordinary B flat instrument, has been designed especially for the performance of the Brandenburg Concerto No. 2, in F, in which the extreme note a^3 occurs for the trumpet.

Tromba di Tirarsi (see Chapter X).

Bass trumpet in E flat, D or C, largely used by Wagner in his later works, its compass as used by him being from B flat to g^2 flat. This instrument is practically a modification of the alto valved trombone.

The Holztrompete. An instrument designed for Richard Wagner, who, in "Tristan and Isolde" (Act III) wished to give a more perfect representation of the peasant pipe than the cor anglais could offer. The Holztrompete consists of a slightly conical wooden tube sounded with a cup-shaped mouthpiece, and having a small bell somewhat like that of the cor anglais. In some respects it resembled the ancient zinke or cornett, but instead of finger-holes it had one valve by which the pitch of the natural harmonics could be varied. The instrument may be regarded as a freak, for it is rarely, if ever, used even in Germany, never in this country.

The Tromba Marina, or Marine Trumpet, known also as the mock trumpet, and somewhat popular during the seventeenth century, was not a trumpet in any respects whatever, being merely a wooden monochord of some considerable length.

Trumpets are transposing instruments, and therefore the notation used is exactly similar to that for the clarinet or cornet, a tone and a minor third above the actual sound for the B flat and A instruments respectively. Many composers, however, still prefer to write as if for the trumpet in F, which, as has been pointed out above, in practice has almost entirely given way to the modern instrument in B flat. In this case the method of notation is to write a fourth lower than the actual sounds, a B flat trumpeter having therefore to transpose at sight a fifth *above* the written notes. Some players prefer to use a trumpet in C, a tone above the B flat instrument, but the practice is exceptional.

As regards the tone of the trumpet, no better authority could be quoted than Berlioz: "The quality of tone of the trumpet is

noble and brilliant; it suits with warlike ideas, with cries of fury and of vengeance, as with songs of triumph; it lends itself to the expression of all energetic, lofty and grand sentiments, and to the majority of tragic accents. It may even figure in a jocund piece, provided the joy assume a character of impulse or of pomp and grandeur."

The trumpet is capable of *double forte* or *double piano* over practically the whole of its compass, though the lower notes are very difficult to produce with any brilliancy *piano*. When uttered by a good player *forte* they assume the character of a brilliant-sounding trombone. The upper notes in particular are very rich in the higher dissonant overtones or upper partials, the result being a crispness and sparkling brilliancy of tone peculiar to the trumpet, and quite distinctive from the broader, duller, and inferior timbre given by the cornet.

Possible execution varies between the slowest of sustained notes and the utmost rapidity of double and triple tonguing. Trills are possible on most notes by means of the valves, but rapider and more effective shakes can be accomplished on the higher compass by making use of the natural harmonics alone, as described in the chapter on the French horn.

A welcome variety in tone colour is obtained by the mute, a fact of which modern composers are well aware. The first to make effective use of this device was Wagner, though Mozart scored for muted trumpets in "Zauberflöte." Richard Strauss employs the mute almost to excess.

Some years back, when the slide trumpet fell into disuse, the cornet was adopted in most orchestras, and at one time seemed to have irrevocably taken the place of the classic and nobler-toned trumpet. This state of affairs, happily, is at an end, for improvements in design and construction have given the modern B flat trumpet an irreproachable tone throughout its entire compass, and now the trumpet is rapidly ousting the cornet from even the smaller bands. This is but as it should be, and it only remains for composers to awake to the fact of the brilliant melodic possibilities latent in the trumpet, and to make fuller use of them than has been the general practice up to the present. In conclusion, no better

words could be quoted than those of Richard Strauss, given already in a former chapter: "Reactionaries of an insufferable sort are, in my opinion, those who teach that it is vulgar to use a valve trumpet for melody—for no other reason than because Beethoven was of necessity obliged to confine his natural trumpet players to the tonic and dominant."

CHAPTER X.

THE TROMBONE.

The Trombone.

*Length of Tubing.**—Tenor in B flat, 9 ft., bass in G, 11 ft. 1 in.

Bore.—Cylindrical slides, restricted conical bell.

Mouthpiece.—Modified cup-funnel.

Means of Chromaticism.—Extending slide to depress pitch by six semitones.

Compass (for orchestral purposes).—

Tenor in B flat: 

bass in G: 

Contrabass in B flat, an octave below tenor.

Of trombones, three are usually employed in the modern orchestra : two tenors and a bass. Formerly it was customary to use an alto, tenor and bass.

* A = 439 vibrations per second at 60 degrees Fah.

CHAPTER X.

THE TROMBONE.

FRENCH, TROMBONE. ITALIAN, TROMBONE. GERMAN, POSAUNE.

THE trombone is primarily what its name implies—a big trumpet (Italian, *tromba*, trumpet; termination—*one*—signifying large). The early English name was sackbut—spelt, according to the custom of the times, in a very arbitrary manner: sackbutte, sackbud, sagbud, shagbushe, shagbolt, etc.—is said to have come from the Spanish *sacabuche*, which may be translated "draw tube." The present German word, posaune, was in use in the time of Prætorius, and is a modification of the earlier busaun, which itself was derived from buzine, the mediæval straight trumpet, from which the trombone has by degrees evolved.

There is no definite information forthcoming as to when and where the device of a slide for altering the pitch and creating new series of harmonics was first invented or applied, but it is generally supposed to have originated in the region of Northern Italy in the early part of the fourteenth century. It has been said that the King of Naples presented George the Third with a "Roman trombone" which had been dug up at Pompeii in the year 1738, but if there is any truth in the statement—which seems doubtful, for no traces of such an instrument can now be found—the so-called trombone was in all probability only a buccina, a large circular instrument of the horn type, which might easily have been spoken of by the Italians as a "big trumpet" or *trombone*.

Again, some authorities give as evidence of an early sackbut the supposed representation of a "slide" in a Boulogne manuscript dating from the eleventh century, but it has now been definitely decided that this is really a *sambique*, an instrument of the harp

type. As to its early use in England, we know that King Henry VII had four sackbuts in his private band in 1495, that his musical son, Henry VIII, increased the number to ten, and that sackbuts were invariably combined with cornets in wind bands performing in churches and places of amusement.

Virdung, in 1511, gives a representation of a busaun similar in form to the modern slide trombone, but with a somewhat shorter slide, capable of a shift of only about two and a half instead of three tones. The first makers of sackbuts of any note were the Neuschels, of Nuremberg, who became famous for their instruments during the first half of the sixteenth century.

Prætorius (1619) gives a complete family of eight posaunes: alto in D, four tenor or *gemeine rechte* in A, two quart posaunes in E and D (a fourth and a fifth below the *gemeine rechte*) and an octave or contrabass posaune in A, an octave below the tenor.

The octave bass sackbut was originally constructed with a double circle of tubing—a kind of crook—inserted between the slide and the bell to give the necessary length, and it was not until four years before Prætorius wrote that the bell and slides were made of sufficient length to admit of the production of all the chromatic intervals an octave below the tenor. In comparatively recent years the whole family of trombones have become raised half a tone in pitch: thus we find alto in E flat (sometimes F), tenor in B flat, bass in G, F or E flat, and contrabass in B flat. This latter fell into disuse for a considerable time until it was revived by Richard Wagner in his "Nibelungen Ring" in the form of the contrabass trombone with double slides.

There was yet another sackbut, a treble, constructed usually in the key of A, and found in the scores of Bach and Handel under the name of tromba di tirarsi. It was in all respects a miniature trombone—unlike the later English slide trumpet in this respect—and was in unison with the modern trumpet in A. For this instrument Handel wrote the famous *obbligato*, "The trumpet shall sound" ("Messiah"), the original German title of which is "Sie schallt die *posaune*."

But to return to sixteenth century England. The sackbut rapidly became exceedingly popular, and apparently its players attained great proficiency, for in 1604, when Duke Charles of Lor-

raine wished to procure sackbuttists for his court orchestra, he sent to England for them. Bands of cornetts and sackbuts were comparatively common, and were for many years included in the choirs of the larger cathedrals and churches.

The sackbut has always found a place in the royal bands of English monarchs, to be brought out on all state occasions. Thus we find two of these instruments used at the funeral of James I in Westminster Abbey (1625), while at the funeral of Queen Mary, in 1695, Purcell employed a "discant sackbut," which may be identified with the tromba di tirarsi mentioned above.

In Italy the trombone was in use during the sixteenth century onwards, and in 1607, Monteverde, in the production of his "Orféo" at Mantua, used five of these instruments: two altos, two tenors and a bass. In France they found no definite footing in orchestras till after 1774, when Gossec introduced them into his opera, "Sabina." In Germany, the posaune was in universal use during the sixteenth century, and in 1558, Krüger brought out a volume of four-part chorales having, in addition to a light organ accompaniment, parts for four and six posaunes.

Bach made great use of the trombone and wrote parts for it in many of his works. Handel did likewise, but by this time we find that its reign in England was temporarily at an end. After being almost universally employed in cathedral choirs, in royal bands, town bands, and by wandering musicians and waits, the sackbut must have gradually ceased to find favour, for at the Handel celebrations of 1783, the only players available were two foreigners attached to the King's private orchestra. The fact of this disuse may have been owing to the ancient cornett—the sackbut's treble in the old wind band—having become obsolete, but more probably to the growing popularity of the horn and serpent.

Mozart employed the instrument extensively, usually with solemn and imposing effect, but after the times of Bach and Handel the trombone appears to have become less popular even on the Continent, for it was used by Beethoven only sparingly, and rather in the character of an extra instrument. But despite this fact, the trombone was a favourite with Beethoven, and when he employed it he did so with masterly effect. Two of his "Equali," for four trombones, were performed at his graveside in the year 1827.

Mendelssohn may be said to have established for the trombone its present position in the orchestra, but personally he was rather inclined to hold it in reserve, for, said he, "it is too solemn an instrument to use except on very special occasions."

Towards the end of the eighteenth century, and with the resuscitation of Italian opera in England, the sackbut once again found favour, but now reappearing under the grandiloquent Italian name, trombone. Although the actual structure of the instrument remained practically the same as before, certain undesirable features became popular. For instance, the "bell" of the instrument was made to curve in a wide semicircle above the player's head, while sometimes its end was wrought into the fanciful shape of a serpent's head, with forked tongue and jagged teeth. About the year 1830 this was still further exaggerated, the bell being given an extra half turn so as to project the sound to the back of the performer. Fortunately, these models were soon abandoned, for they seriously interfered with the acoustic proportions of the bell, and consequently both timbre and intonation suffered.

And then, shortly after the Battle of Waterloo, came the introduction of the valve. The slide trombone, the only wind instrument that is equally capable with the violin of the most exact accuracy of intonation, was unsafe from desecrating hands and fell a ready victim to the valve mania. But a short sketch of the history of valves has been given in a preceding chapter, together with some reference to their application on the trombone, so it suffices to say that although the three-valved trombone is to-day more often than not used on the Continent, it is practically never met with in England, save perhaps in a few undistinguished "military" and brass bands. The characteristic trombone timbre seems to be in some way lost by the addition of valves, and intonation can never more than approximate to the degree of accuracy obtainable with the slide.

There is, however, a univalve attachment known as the trill valve, which in no way interferes with the action of the slide, but acts as a useful adjunct, especially to players in small orchestras who may be required to read euphonium or bassoon cues. This valve, which nominally lowers the pitch by half a tone, is placed in such a position as to be operated and at the same time concealed by the left hand, and the unavoidable inaccuracy of intonation

which must occur in the extreme registers should be too slight to appear noticeable. Besides giving an extra low note, it greatly simplifies the execution of certain passages, notably the shift of the whole length of the slide from low B to low B flat, this being accomplished by a single movement of the valve. For the production of shakes and turns it is also useful, although the trombone, in common with the trumpet and French horn, will give excellent shakes by a movement of the throat, without aid of either slides or valves.

Pedal notes on the trombone—that is the fundamental harmonic obtainable with each of the seven positions of the slide—are generally very difficult of production, owing to the smallness of the bore as compared with its length, but as their quality is less rich than the corresponding overblown harmonics they are but seldom used.

Trombones are still constructed in E flat or F alto, B flat tenor, bass in G or F, and contrabass in B flat, but during recent years the alto has almost entirely dropped out of use, the parts being played on the tenor instrument, while the contrabass is very rarely met with. It is usually provided with double slides, an invention attributed to Halary in 1830, but the idea was by no means new, for the Paul de Wit collection of instruments at Leipzig contains a bass trombone with double slides, dated 1612. This device greatly diminishes the extension of arm necessary for the lower positions, but at the same time it requires much added nicety of adjustment for correct intonation, and therefore renders the instrument extremely difficult to play.*

The trombone is undoubtedly the most versatile wind instrument of the orchestra as far as quality of tone is concerned. When played *pianissimo*, in minor and broken chords, it expresses the most hopeless gloom and sadness—no better example of such use could be quoted than a passage for three trombones and tuba at the end of Tchaïkovsky's Sixth Symphony. When used in unison or harmony in a slow *mezzo-forte* movement, the tone of the trombone assumes a deeply religious character, while in *double forte* passages, especi-

* In the normal instrument, when it comes to length of tubing involved, an error in slide extension is necessarily doubled; with the double slide, it is quadrupled.

ally in the middle register, it is superbly noble and arresting. It is with this tone of proclamation and lofty grandeur that one realises the inner truth of the name trombone—a big trumpet. When played *fortissimo* the tone is fearful and menacing: it speaks with an air of wild and passionate tragedy quite unobtainable on any other instrument save the human voice.

After the periods of transition both in structural design and in playing through which the trombone has passed, it is interesting to observe the return to ancient standards that has come about during recent years. Tenor trombones are no longer made with large bores and wide, clumsy bells such as were often met with a few years ago, and which gave a tone quite foreign to the trumpet quality proper to the instrument; we have instead the small-bored, narrow-belled sixteenth century prototype up to date, and consequently that pure and refined timbre which makes us realise that the trombone is of the trumpet and not the cornet family.

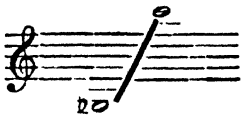
In actual playing mere noise and blare is no longer appreciated: we hear far more of that quiet, artistic style of execution recommended by Mersenne, who, in 1627, wrote to the effect that the tone of the trombone should assimilate itself more to the mellowness of the human voice, and emit a peaceful rather than a warlike sound.

CHAPTER XI.

THE CORNET.

The Cornet.

*Length of Tubing.**—In B flat, 4 ft. 7¼ ins.
Bore.—Conical.
Mouthpiece.—Modified cup-funnel.
Number of Valves.—Three.
Compass (for general purposes).— In B flat



With a few exceptions cornets are used in the orchestra only when trumpets are not forthcoming, in which case two is the usual number.

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* A = 439 vibrations per second at 60 degrees Fah.

CHAPTER XI.

THE CORNET.

FRENCH, CORNET-Á-PISTON. ITALIAN, CORNETTO. GERMAN, CORNETT.

THE cornet, highly popular though it may be, is by derivation a mongrel instrument, having for parents the trumpet and the horn—or, more rather, the chromatic bugle, which is the true soprano of the horn family. The proportions of its bore and of its mouthpiece are something midway between those of its parents, and consequently its tone is neither so brilliant and noble as the one, nor so mellow and soothing as the other.

In its present form the cornet is comparatively a modern instrument, having only come about since the introduction of chromatic mechanism in the form of valves, but its ancestry can be traced very clearly, if a little indirectly, to an instrument of very considerable antiquity, the cornett (German, zinke: French, cornet-á-bouquin).

The cornetto, cornett, or cornet, as it was variously spelt, probably originated like the horn, simply from an animal horn cut off short at the smaller end, only in this instance finger-holes were bored so as to give a rude form of musical scale.

It had been used on the Continent of Europe and in Britain from very early times, and by the fourteenth or fifteenth century was usually constructed of wood covered with leather, or of ivory, and provided with six finger-holes in front and one behind for the thumb. This conical-bored instrument was sounded by a very shallow, narrow-brimmed mouthpiece—never by a reed, as is sometimes erroneously stated—considerable exertion being required to

produce the two-and-a-half octaves which composed its compass. Henry VIII left no less than twenty-one cornettos in his collection of instruments.

During the fifteenth and sixteenth centuries, the cornett was perhaps the most popular of all wind instruments, being the most important treble member of the wind bands—combined here with sackbuts—and also extensively used in church choirs to support the upper voices. According to the general practice of the time, these instruments were made in various sizes, usually in "nests," or families of three, comprising the ordinary cornett, the treble cornett, a fourth higher, and the great cornett, a fifth lower, having between them a compass ranging from about C to g_3. In shape they were sometimes straight, sometimes slightly curved, and in the time of Prætorius (1619), were often provided with one key to extend the compass downwards. One species of cornett had no definitely formed mouthpiece, the lips being placed against the smaller end of the tube, which was shorn off flat. This resulted in a softer and more sympathetic tone, and was therefore known as the mute cornett.*

Although England may be said to have been the chief home of the cornet, its use at important functions and church services seems to have ceased during the reign of James II, its place being filled by the increasingly popular hautbois, and by the middle of the eighteenth century few, if any, players of the instrument were left. On the Continent, however, it was still to be met with during the time of Bach and Handel.

Gluck was the last composer of importance to employ zinken in his orchestra, parts being found for them in the original scores of certain of his operas, such use, however, usually being restricted to repiano work in supporting alternately the voice, trumpet and horn parts.

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* All you that doe professe
Sweet Musick's art,
Lay aside your vyoll,
Lute and harp . . . .
Mourne organs, flutes,
Mourne trumpets shrill,
Mourne cornets mute and round.
Lament, lament.
—"Elizabeth's Losse," 1603.

Long after the original cornetts had become obsolete, one member of this interesting family, the bass cornett or serpent (see tuba), remained in popular use, Mendelssohn, Verdi, and even Wagner, including parts of it in certain of their works.

In 1810, a bandmaster of the Cavan Militia, James Halliday by name, patented a chromatic keyed bugle, known also as the Kent bugle, being named after the Duke of Kent, who took considerable practical interest in the instrument.

As a matter of fact, there was very little "invention" connected with the keyed bugle, for it was merely a soprano member of the ophicleide family,* the bass of which had been introduced as an improvement on the bass horn and serpent at the end of the eighteenth century. It has been pointed out, in dealing with the instrument in the next chapter, that although, from an acoustic point, the ophicleide differs widely in theory from the serpent, yet it was the logical development of the older instrument. Serpents, too, were in actual fact bass cornetts, and so the keyed bugle was to all intents and purposes an improved cornet, made throughout of metal, and provided with five, and later, six keys, thus giving a chromatic compass of over two octaves.

Keyed bugles achieved a truly remarkable popularity during the early decades of the nineteenth century, being used in orchestras, in military and brass bands, and in churches, as well as by the populace in general, including guards of stage coaches, who—if Dickens is to be believed—were wont to while away the tedium of a long journey by playing merry lilts thereon. This feature alone gives it a marked resemblance to its forerunner, the cornet, for the latter was perhaps more favoured among the masses than any other contemporary wind instrument.

Sir Henry Bishop allotted to the keyed bugle a solo in the overture to "Guy Mannering" (1816); the style of music generally written for the instrument was highly chromatic and melodious. The modern representative of the key bugle is, of course, the flügelhorn or chromatic bugle, precisely the same instrument, save that its chromaticism is effected by means of valves instead of keys.

* At this period there was a complete set of ophicleides: the keyed bugle or clavitube, the alto ophicleide or quintitube in F or E flat, and the ophicleide proper in B flat or C, and contrabass in F or E flat, an octave below the alto.

The keyed bugle was displaced by the cornopean, the direct forerunner of our modern cornet, an instrument first provided with two and afterwards with three valves, whereupon it became known simply as the cornet.

A valve contrivance was invented especially for the cornet by an Englishman named John Shaw, who, in 1824, brought out an arrangement of flat discs which were made to rotate against one another, and so open and close the valves. The same inventor produced a rotary valve on the tap system in 1838, but the Continental methods of piston and rotary valves proved to be the more perfect, and so the inventions of John Shaw were doomed to meet with neglect.

Early cornets were provided—quite unnecessarily—with numerous crooks, including A, B flat, A flat, G and C, but at the present day those in B flat and A are the only ones used. A non-transposing or "vocal" cornet in C is sometimes met with, and there is also an instrument in E flat, a fifth above the B flat, used occasionally in brass bands.

Modern cornets are usually provided with a "quick change," that is a mechanical device for converting the pitch from B flat to A or vice versa, without the necessity of taking off and adjusting a different crook or shank, as was the usual method until a few years ago. The quick-change is effected in several different ways, the most usual being in the form of an extra movable slide which is pulled out to its full extent to put the instrument into A, pushed home to re-convert it to B flat. Another method takes the shape of an additional small bow of tubing through which the air can be diverted by turning a rotary valve, the consequent additional length of the air column being sufficient to depress the pitch half a tone, and so place the instrument in A.

Horns, trumpets, trombones and cornets can be muted, the usual method being to fix a separate wooden or brass mute into the bell, but a fixed mute always ready for use is the chief feature of the "echo cornet," very occasionally used by soloists. This instrument has a kind of extra closed bell through which, on the depression of a small valve operated by a finger of the left hand, the column of air is diverted from the ordinary open bell, thus producing a muted or "echo" effect.

PLATE 9 CORNETS

1 TREBLE CORNETT in ivory, early seventeenth century. *From the Donaldson Collection.*

2 KEYED BUGLE and KEYED TRUMPET circa 1830, the parents of the:

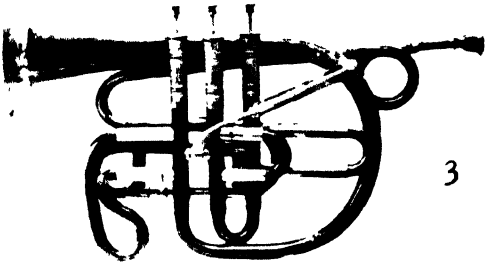
3. CORNOPEAN, circa 1845

4 CORNET (Modern) in B flat

5 CORNET (Pocket Model) in B flat.

1

2



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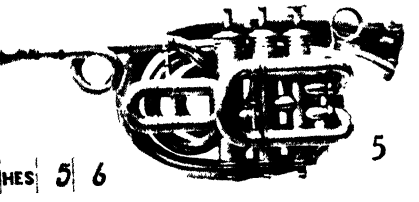

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1 2 INCHES 5 6

The cornet was first used in the orchestra by Balfe, who scored for it in "The Maid of Artois" (1836), since when several composers, including Verdi, Wallace, Meyerbeer and Bizet wrote airs for it in some of their operas. Its employment by the great composers, however, has always been rare, for the cornet is not properly an orchestral instrument, having been introduced more or less as a makeshift when trumpets were not forthcoming. With the advent of the improved B flat trumpet, an instrument with a tone-quality in all ways highly superior to that of the cornet, such employment is now practically *nil*, and even in its own stronghold, the military band, the cornet appears to be losing ground. And for this reason. The instrument, having, as it does, a nondescript tone which does not blend particularly well with either trombones or horns, composers and bandmasters are beginning to see the advisability of abandoning the cornet in favour of trumpets and flügelhorns, thus giving two highly distinctive, and, at the same time, superior tone colours. This procedure has been the rule on the Continent for a number of years, and lately several of the best British military bands have followed suit.

No doubt this excellent example will be copied by other military bands as time passes, and for brass bands, with their very limited range of tone-colour, the abolition of the cornet seems indeed the only sane course, the great mystery being why the change did not take place decades ago.

As a solo instrument, for the rendition of vocal airs, "showy" variations with double and triple tonguing, etc., the cornet has for long been popular, and all honour is due to Koenig, Arban, Jules Levi, and other virtuosi of the nineteenth century, who helped to raise the standard of cornet playing, and bring it to its present high level. The cornet is, of course, easier to play than the trumpet, for although its pitch and harmonics are precisely the same, the agility and freedom peculiar to the trumpet enhances the likelihood of blowing false notes, especially with those not well accustomed to the instrument. Some cornet players, too, find a difficulty in adopting the shallow cup-shaped mouthpiece necessary on the trumpet, without which the correct tone is unobtainable, and in all cases the trumpet form of mouthpiece demands much better condition of the lips in order to produce a good tone free from "buzzing" than

does the deeper-cupped cornet mouthpiece. It is probably on account of these difficulties that cornet players have fought shy of tackling the trumpet, and consequently we find the neglect of the latter instrument in military and brass bands.

Cornets are very suitable for playing dance music, operatic airs and suchlike in small orchestras, and also for displaying the virtuosity of the player as regards expression and general brilliancy of execution, but, as a matter of fact, it is open to question whether the trumpet does not lend itself to such use even more sympathetically than does the cornet, though of course its characteristic nobility of tone seems to demand higher and more serious standards.

In what is known as classic music, both ancient and modern, the employment of the cornet is quite out of place, and for this reason it is now to be met with less and less, even in the smaller orchestras.

When overblown the tone of the cornet is inclined to become coarse and vulgar, a fact which might well be borne in mind by certain of our military band soloists, who appear to imagine that mere lung power counts for everything. In the hands of an artistic performer, however, it is by no means to be despised as a solo instrument, though in no way can it ever aspire to the brilliancy and dignity characteristic to the trumpet, neither to the dulcet, mellow strains of its other parent, the chromatic bugle.

CHAPTER XII.

THE WIND BASS.

The Tubas.

Tuba (Euphonium). Bass Tuba (Bombardon).

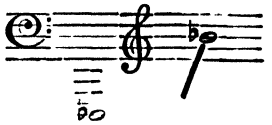
*Length of Tubing.**—Euphonium in B flat, 9 ft. ¾ in. Bombardon in E flat, 13 ft. 9 ins., "double B flat bass," 18 ft. 3½ ins.

Bore.—Wide conical.

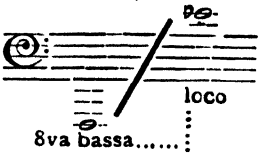
Mouthpiece.—Modified cup-funnel.

Number of Valves.—Usually four, sometimes three or five.

Compass (for orchestral purposes).—Euphonium with four valves.†



Bombardon (four valves).



One tuba is used in the orchestra.

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* A = 439 vibrations per second at 60 degrees Fah.

† Elgar writes down to the D flat in his "Cockaigne" overture.

CHAPTER XII.

THE WIND BASS.

FRENCH, TUBES. GERMAN, TUBEN.

Consisting of the tuba (or euphonium) and the bass tuba (or bombardon).

ONE type of orchestral wind instrument still remains, the true bass, sounded by means of a cup or funnel-shaped mouthpiece, and typified by the tuba and bass tuba, known in the wind band as the euphonium and bombardon respectively.

The most ancient cup-mouthpieced bass instrument was probably the Roman buccina, used by them as an infantry bugle, but on account of its narrow bore and small mouthpiece the fundamental harmonics could rarely, if ever, have been employed.

The buccina was made in a spiral form and was carried circling under the left arm with the bell falling over the right shoulder (or vice versa), the weight being supported by a cross-bar resting on the shoulder and steadied by the hand.* It was approximately eleven feet in length, and its bore was conical. The compass consisted of about three octaves of natural harmonics, in unison with our horn in G.

The Anglo-Saxons in early times appear to have had long horns or trumpets, about which nothing definite can be said, except that they were of such a length that they had to be rested on the ground while blowing. Probably they were not unlike the Swiss or Roumanian alpenhorns, still to be found, straight wide-bored instruments of some eight feet in length.

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* See silhouette medallion on title page.

We have seen the various attempts, during the Middle Ages, to construct genuine bass instruments, typified in the great bass recorder, the gross doppel quint pommer, or great bass shawm, and the octave bass sackbut, but the first cup-mouthpieced bass of any note was the natural bass of the cornet family, the serpent.

The "invention" of this most interesting instrument is attributed to Canon Guillaume, of Auxerre, about the year 1590, but as it was merely a development of the cornett or zinke, no great invention was involved, save perhaps the curious serpentine shape which gives it portability, and from which its name is derived.

Like the cornett, the serpent was made of wood covered with leather, the conical tubing ending abruptly without forming a "bell." The actual length of tubing was about eight feet, and the earlier models were provided simply with six finger holes. As years went by, numerous keys were added, but these only caused confusion without doing much to improve the very capricious scale. The tone of the serpent, while being peculiarly mellow (almost reedy) was extremely powerful, indeed, it is said that when played by a boy it could be distinctly heard above a full male choir. Notwithstanding this, it found much favour in churches before the advent of the ill-favoured American organ, and it was extremely popular in military bands.

Handel included parts for serpent in his "Water Music" and "Firework Music," as also did Mendelssohn in "St. Paul" and Wagner in "Rienzi." Its compass covered about three octaves from bass D, but, as is the case with all cup-mouthpieced instruments, much depended on the skill of the performer. Chromaticism was obtained by "cross fingering," and by only partially stopping the tone holes; but as the latter, in order to accommodate the limited stretch of the human fingers, were perforce assigned to anything but their acoustically correct positions, the intonation must have been far from true.

Towards the end of the eighteenth century the so-called bass horn, a modification of the serpent, became popular. It was constructed in a more portable form than the older instrument, consisting as it did of two almost parallel conical tubes, connected together at the lower end in a kind of box. It had a small wooden or metal bell, and a metal crook carrying the mouthpiece. There

were six finger holes and one or more keys, and its lowest note was usually B flat, four semitones below the serpent.

Another contemporary instrument was the serpentcleide, less popular than the bass horn, but still a serpent, made now in bassoon form and provided with several keys. It was played with a cup mouthpiece attached to a bowed metal crook exactly similar to that of the bass horn, and the bell was frequently wrought into the fanciful shape of a serpent's head, with forked tongue and jagged teeth.

But with the new century came the ophicleide, an all-metal bass,* provided originally with seven, afterwards with eleven keys. Its name is derived from the Greek for *serpent* and *key*. Its bore was very similar to that of the serpent, and in shape it was a modified bass horn. It had a chromatic compass extending just over three octaves from low B^1, and it was sounded by a metal or ivory mouthpiece very similar to that of our modern bass trombone. Its timbre varied greatly over each register, owing to the great distance separating the extreme tone holes, and it was not so mellow or "woody" as that of either of its prototypes, the serpent and the bass horn. Its extreme loudness drew from one quarter the facetious nickname of the "chromatic bullock," but to have merited this it must have been shockingly overblown, for within recent times ophicleides have been revived on the variety stage, and their tone, though a trifle dry, was mellow and pleasing in the extreme, and quite unlike any instrument used in the modern orchestra.

In all but theory, the ophicleide was a logical development of the serpent—(1) serpent; (2) bass horn; (3) serpentcleide; (4) ophicleide. In acoustic theory, however, it heralded a new departure. The serpent, though a cup-mouthpiece instrument constructed occasionally in brass, produced its scale after the manner of the flutes and oboes, that is, a succession of tone holes gave a diatonic scale of one octave, further octaves being obtainable by "overblowing." The ophicleide, like the soprano keyed bugle, was dependent more upon the harmonic series of notes, as are all the modern "brass" instruments. That is, the tone holes were used in a similar manner to valves, or "positions" on the trombone slide, each hole permitting of a definite series of harmonic notes.

* As regards material, the author has seen an early serpent made entirely of brass.

In military bands, the alto ophicleide in E flat or F was at one time popular, being employed additionally to the ophicleide proper in B flat or C. At the same time, it is very interesting to notice that the older wooden instruments were not readily displaced by the novel all-metal bass, for while the band of the Royal Artillery (circa 1820) included two serpents and two bass horns, there was but one ophicleide. The last-named instrument is said to have been used by English and French troops on the field of Waterloo (1815).

Mendelssohn alone of all classic writers employed the ophicleide freely, and as late as the year 1834 a musical critic wrote: "*The ophicleide is destined to operate a great change in the constitution of the orchestra.*" But this proved a false prophecy, for the days of brass instruments operated by keys and tone holes were at an end, and the reign of the all-revolutionising valve had already begun. William Wieprecht, a German, even as early as the year 1828, had produced a family of valved instruments, comprising B flat euphonium, B flat tenor horn, E flat trumpet (with two valves) and a soprano corresponding to the E flat cornet.

It seems superfluous to add that the genius of Adolphe Sax was in turn directed towards the improvement of brass instruments, and in 1845 the results of his researches—a family of at least seven instruments—were patented under the name of saxhorns. These instruments ranged from E flat soprano to BB flat (double B flat) bass, and extending over a compass of six octaves, from e^3 in the treble to E^2 in the bass.

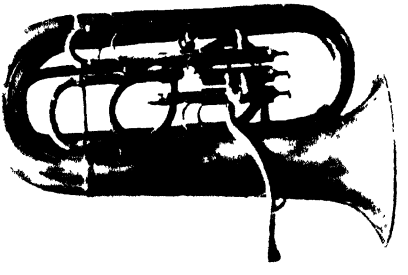
The deeper varieties of saxhorns came to be known in the orchestra as tubas. These must not be confused with the ancient Roman instruments of similar name. The Roman tuba was a straight conical horn, some three feet in length, and therefore pitched somewhat higher than our modern military bugle.

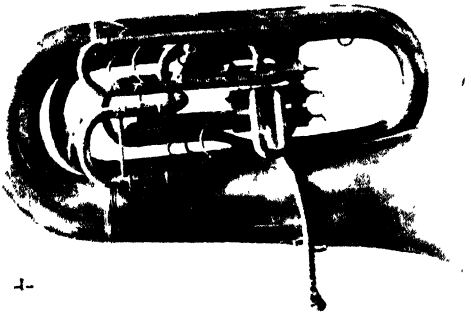
The early orchestral tubas were in F and had three valves, their compass extending no lower than our modern four-valved euphonium in B flat. The latter is useful for the rendition of old tuba parts, for a depression of the fourth valve automatically puts the instrument into F.

Among the saxhorns were the B flat baritone and the B flat bass, instruments in exactly the same key, but differing in width of bore, that of the latter being greater, and therefore characterised by

PLATE 10 — WIND BASS.

1. SERPENT by F. Pretty. Late eighteenth century.
2. OPHICLEIDE by T. C. Lewis, of London. Early nineteenth century.
3. EUPHONIUM in B flat, by Rudall, Carte and Co.
4. BOMBARDON in E flat, by Rudall, Carte and Co.





a deeper and more rotund quality of tone. In the "seventies," Phasey, a Coldstream Guardsman, widened the bores and further improved these instruments, and the results came to be known as the euphonium and the bombardon, called in the orchestra the tuba and bass tuba. As with the saxhorns, the B flat euphonium and B flat bombardon differ merely in width of bore, but the bombardon is usually built in E flat, sometimes F, occasionally BB flat,* an octave below the B flat bombardon. The double B flat bass is frequently made in curved (helicon) form for military bands, being then carried round the performer's body.† It is provided with from three to five valves. The tone is very rich and powerful, but the extreme low notes are hardly audible unless doubled an octave higher by the euphonium.

Though the saxhorns proper have to so great an extent given place to euphoniums and bombardons, the original instruments still retain some degree of popularity, especially on the Continent of Europe.

There is yet another class of tuba, distinguished by the name of Wagner tuba, and especially designed by that composer for use in the "Nibelungen Ring" and other of his works. These instruments rightly belong to the horn family, while the ordinary tubas may be considered as the natural basses of the cornet family.

Wagner tubas are provided with four valves, and usually consist of a tenor in B flat and a bass in F. They each have a compass of some three octaves from bass F and C respectively. They are sounded by deep V-shaped mouthpieces and have a horn-like quality of timbre. Wagner used them to carry down the tone colour of the horns, instead of using the trumpet-toned trombone or the ordinary hollow-toned tuba as a makeshift complement to the horn family. As a matter of fact, the Wagner tubas are seldom, if ever, met with in England, their place usually being taken by tenor horns or euphoniums.

By those who are familiar with the euphonium and bombardon it may be asked, why is their (tuba) tone so different from that of either the trumpet or the horn family? This peculiarity is ac-

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* Known in the orchestra as the contrabass tuba.

† See silhouette medallion on title page.

counted for partly by the large size of the mouthpiece, which enables the performer to make use of the valve notes between the fundamental and the first harmonic—practically impossible on the trumpet and horn—partly by the extreme width of the bore, which again favours the emission of these lower sounds. The fact of dealing with such deep notes, which of course depend largely on the lengthy tubing of the instrument, renders the three-valve system too inaccurate for general use, and it is for this reason that the bass brass instruments are usually provided with a fourth, or even a fifth valve.

The tuba is usually used in conjunction with three trombones, to which it makes an unsatisfactory contra-bass, for the tone does not blend well, and it is besides prone to become too powerful. In the military and brass band the euphonium is treated as an important solo instrument, standing in much the same position as the 'cello does in the orchestra, while the bombardon corresponds to the double bass. In the orchestra the tuba is treated as a non-transposing instrument, obliging the player to transpose his part at sight, unless his instrument happens to be in the key of C.

The tubas permit of great gradations of tone, varying from *pianissimo* to *fortissimo*, from grave solemnity to joyful brilliance, but always mellow, rotund and dignified.

CHAPTER XIII.

TIMPANI.

CHAPTER XIII.

TIMPANI (KETTLE DRUMS).

FRENCH, TIMBALES. ITALIAN, TIMPANI. GERMAN, PAUKEN.

ALTHOUGH kettle drums do not come under the heading, "Wind Instruments," it is with this portion of the orchestra that they are invariably associated—especially in olden times, when kettle drums formed a natural bass to trumpets—hence a brief survey of their history will not be out of place in this volume.

The origin of the drum is, like that of the flute or horn, lost in the mists of antiquity, but as drums are invariably found to play a most important part in the lives of all savage or semi-civilised peoples from North to South and from East to West, we may take it that they were used by man in his most primitive state, and probably formed the very earliest method of mechanically producing sound.

Assyrian, Egyptian, Greek and Roman sculptury and literature all offer abundant evidence of the use of drums by these peoples, and it is from the Greek drum, *timpanon*, that the term usually applied to the orchestral kettle drum was originally derived.

Drums are of three kinds, each variety exhibiting its own distinctive characteristic:

1. A skin stretched across a hollow cylinder or frame open at the other end, e.g., the timbrel or tambourine.

2. A skin stretched across a closed hemispherical vessel, e.g., the naker or kettle drum.

3. Two skins, one stretched over each end of a hollow cylinder or frame, e.g., the tabor or common drum.

We will deal here only with the second of these three varieties.

In very early English literature little or no mention of drums of any kind is to be found, the first reference to nakers or kettle drums appearing in a list of minstrels of Edward I in 1304. Later, Froissart, the French historian, gives "nacaires" as one of the instruments used in the triumphal entry of Edward III into Calais in 1347.

The word nacaire, nakyr, or naker, is derived from the Arabic *nacareh*, a fact suggesting that both the name and the idea of drums was to a large extent borrowed from the Moors during their occupation of Spain. Nakers were invariably used in pairs, and being only of small size, were worn strapped round the player's waist, the position in which they are depicted in a carving beneath a choir stall in Worcester Cathedral (circa 1396), previously mentioned in the chapter on the trumpet.

Henry VIII was the first to introduce from Vienna kettle drums of a size more nearly approaching those in use at the present day, these same being played on horseback "after the Hungarian manner," though sometimes kettle drums were supported an the backs of men or boys, the player marching behind. Somewhat similar drums had been used by German cavalry regiments since the middle of the sixteenth century, but more than a hundred years elapsed before this custom was adopted by the English. This brings us to the time of Charles II, when every posse of trumpeters was allotted at least one kettle-drummer, and neither trumpets nor drums could be played outside the army or royal household without a special licence from the King's sergeant trumpeter or the drum major general, a title which appeared for the first time during this reign. About this time cavalry regiments were gradually equipped with kettle drums, other regiments being allowed them only if captured in battle. The cost of drums was somewhat excessive, considering the high purchasing value of money at that period. For instance, on January 17, 1679, an order appears to pay "*the sum of £12 for a pair of new Kettledrummes for his Majesty's troop of Horse, under the command of Captain Legg*," while, in 1687, there appears an "*Account for one paire of Kettledrummes, heads and sticks, at £10, for his Majesty's service in Ireland.*"

Kettle drums were of course mentioned by Prætorius, this name for them having been invariably used instead of the archaic *nakers*

since the Reformation, and during the latter part of the seventeenth century Lully, the French operatic composer, introduced them for the first time into the orchestra. They have been more or less permanent members of the orchestra ever since, though in the eighteenth century they were used in greater numbers than is the custom at the present day. For instance, the Electoral Orchestra of Dresden (1750), which averaged about forty-three instrumentalists, included two pairs of kettle drums, while a modern orchestra of a hundred frequently has but one pair, or, at most, a set of three.

Handel, Mozart, Beethoven, Mendelssohn, and all the great composers have used drums,* but Beethoven was responsible for three important innovations: tuning the drums in octaves (this being easily accomplished, as each drum has a compass of about a fifth); striking both drums at once so as to produce a chord; and using them as solo instruments. Berlioz said that it took seventy years to discover that three drums were possible in an orchestra, but he himself made a far greater discovery, for he scored for *eight pairs* of drums, manipulated by no less than ten players, in his "Requiem Mass."

Kettle drums are generally used in pairs, one larger than the other, tuned, as a rule, to the tonic and the dominant. The pitch can be raised or lowered by accordingly increasing or slackening the tension of the vellum drum head, this being usually effected by means of five, six, or even seven screws placed around the circumference. As this process takes an appreciable time, efforts have been made to devise a tuning arrangement operated by a single screw, but no single action tuning contrivance is likely to give a head equally strained, and therefore in tune *all round*, and so the original method of separate screws still remains in general use.

Although at first sight the playing of kettle drums may appear a very easy matter so far as tone production is concerned, yet when it comes to actual practice, the difference in tone produced by a skilled and an unskilled player, on identically the same instrument, is truly remarkable. The one will sound bell-like and resonant, while the other is dull and unresponsive. Kettle drums are

* The term drum in the orchestra always means kettle drum, never bass drums or side drum.

struck near the outer circumference, not in the middle, as is popularly supposed, and they may be muted by laying a thin cloth over the head. This is indicated in the score in several different ways: *corperti, con sordini, gedampfte* or *timbales couvertes.*

Solos, apart from a two, three, or four note phrase in the orchestra, are impracticable, though exhibition solo playing on a number of drums tuned to different pitches is occasionally heard—for instance, the "Solo for Six Timpani," in F, B flat, C, D, E flat and F octave, by Julius Tausch, to mention but one example.

CHAPTER XIV.

THE ORCHESTRA.

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THE ORCHESTRA.

"Pour not out talk where there is a performance of music."—Ecclesiasticus.

HAVING dealt in detail with each separate wind instrument, a sense of completion seems to demand some reference to their use collectively in the orchestra. This, however, is a subject about which many volumes have been written, and as almost any reputable dictionary of music will give a more complete history of the orchestra than would be possible in the confines of the present handbook, no further effort will be made, than to give an outline sketch, leaving enquirers, who are sufficiently interested, to fill in the gaps for themselves.

Just as the prototypes of all our wind instruments date back, directly or indirectly, to a period when human civilisation was in its infancy, so has the orchestra gradually developed and evolved from the time when savages first gathered together to blow pipes and horns, and beat drums.

The first *historic* references to orchestras appear on the imperishable monuments and in the coloured papyri of Assyria and Egypt. From these we have learnt that for some thousands of years before our present era, harps, stringed instruments and vertical flutes were used for religious purposes in the temples, while the music of harps, lyres, tambourines, single and double reed or flageolet pipes, and flutes made a fitting accompaniment to the gorgeous splendours of the royal feasts of Egypt and Babylon. In this connection, as in all others of the ancients, harmony was unknown, the instruments simply playing in unison or octaves, with an occasional drone bass.

The Hebrews employed groups of instruments for religious and secular purposes, frequent mention of their use being found in the Scriptures. While studying such passages, however, the names of the instruments must not all be taken literally, for the early translators of the Bible being of necessity in ignorance of the discoveries which archæological research has since brought to light, frequently translated unknown names—regardless of accuracy—by substituting those in common use in their own generation.

With regard to the music of the Greeks and Romans, Cornelius Nepos, the great Roman historian, leaves it on record that the playing of instruments was reckoned as "highly commendable" by the Greeks, by the Romans as trivial and unworthy of serious consideration. The Greeks appear to have cultivated solo rather than ensemble playing,* while the Romans, for all their vaunted scorn of musicians, were extremely fond of noisy displays of trumpets, horns and pipes of various kinds, while bands of stringed instruments were used for religious purposes.

After the fall of the Roman Empire, and when the turmoil caused by the formation of the new European nations had subsided, the ensemble playing of instruments became popular, originally in unison or octaves, but later with elementary forms of harmony consisting of fourths, fifths and octaves. With the growth of polyphony during the eleventh century came the practice of constructing the different instruments in choirs or families, comprising treble, alto, tenor and bass, approximating in pitch to the different registers of the human voice. Works written for such choirs of instruments were known as *consorts*, a term also applied to the actual performance.

In the early Middle Ages the performance of instrumental music was almost universally restricted to a choir or consort of only one species of instrument: for instance, we read of consorts of recorders, consorts of shawms, or consorts of cornetts, but very rarely, say, of consorts of recorders and cornetts, or of shawms and recorders. This custom held even as late as 1581, when an "orchestra," including flutes, hautbois, cornetts, trombones and strings took

* The Pythian Games, when first instituted, appear to have consisted solely of contests in musical skill.

part in the marriage festivities of Margaret of Lorraine with the Duc de Joyeuse. Instead of all the instruments playing together in the same composition, as would be the custom at the present day, the orchestra was divided up into groups, all the flutes playing at one time, the cornetts at another, and so on.

Exceptions to this rule, of course, occurred; for instance, Froissart, the famous fourteenth-century French historian, tells of a grand consort "*de trompes, de tambours, de nacaires, de chalemies, et de muses*" (bagpipes) which was got together to greet Edward III at the triumphal entry into Calais in 1347. Again, the old wind bands which played at fairs and popular festivals, consisted mainly of cornetts and sackbuts, while the music at tournaments and feasts was supplied by a variety of instruments playing in crude harmony. Such an "orchestra" was known as a *broken consort*, this form of band being alluded to by Prætorius as if it were more popular in England than elsewhere. The very term *broken* suggests that instruments were only combined in this way when a complete family or consort was not available. Modern survivals of the true consort are not unknown, though their use is mainly limited to saxophone and other "freak" bands, on the variety stage. Particulars of a genuine flute band (consort) are given in the footnote, page 33.

By the seventeenth century, however, the varied tone-colour of the broken consort had become more generally appreciated, and within a hundred years—that is by 1700—we find a perceptible tendency towards the mixed orchestra of strings, wood-wind, brass and percussion usually in more or less fixed proportions. It is interesting to note, that from this time until the nineteenth century, the proportion of wind instruments was considerably greater than is customary at the present day, this being partly accounted for by the fact that, in former times, violins were usually strengthened by oboes, and 'cellos by bassoons, a practice found in many of the works of Bach and Handel.

In 1750, the Electoral Orchestra at Dresden—considered at that time a model of "balance"—numbered among its instruments five oboes and five bassoons, against eighteen violins and five 'cellos. This in itself is a marked contrast to the ideas of the last half century or so, when two of each wood-wind instrument has been the general rule, but it is still more remarkable when one calls to mind

the fact, that oboes of the eighteenth century were played with a reed almost as wide as our modern bassoon reed, and consequently the tone was loud and harsh in the extreme. On the same lines, try to imagine the effect of the Handel Commemoration (1783) Orchestra, which included forty-eight first and forty-seven second violins, twenty-six violas, twenty-one 'cellos, fifteen double basses, six flutes, twenty-six oboes, twenty-six bassoons, one contra bassoon, twelve horns, twelve trumpets, six trombones and four drums!

We must now leave this hurried survey of the orchestra past, and turn to the orchestra present and future.

The wind department of the nineteenth century orchestra until the time of Wagner's popularity, usually consisted of two each of flutes, oboes, clarinets and bassoons, two or four horns, two trumpets and three trombones, the cor anglais, bass clarinet, contra bassoon and tuba being looked upon as extra instruments, only for very occasional and special use.

The custom of increasing the number of wind instruments was perhaps inaugurated by Berlioz, but it was left to Wagner in his later works to insist on three of each wood-wind instrument, with constant use of piccolo, cor anglais and bass clarinet, in addition to at least four, sometimes six or eight horns, three trumpets, three trombones and one or two tubas. Modern composers have gone several steps further, for, in addition to again increasing the number of wind, both wood and brass, they have gone to the length of reviving several obsolete instruments, such as the flûte d'amour, oboe d'amour and basset horn, besides employing saxophones and sarrusophones, hitherto not considered as belonging to the orchestra.

In fact, the modern tendency appears to be to revive the old consort of treble, alto, tenor and bass of each instrument, and to combine all these consorts together in the orchestra, so that the tone-colour peculiar, say, to the oboe, clarinet, or horn family, will be available for unbroken passages from treble to bass, instead of having to carry on the phrase by employing instruments of widely different timbre.

Continuing on these lines, the constitution of the full orchestra of the future may be logically forecasted thus:

Flute family: piccolo,* concert flute,* alto flute (flûte d'amour) and tenor flute (called also bass flute).

Oboe family: oboe,* oboe d'amour, cor anglais,* baritone oboe (called also bass oboe) or the heckelphone.

Bassoon family: tenoroon, bassoon* and contra bassoon.*

Clarinet family: clarinet in D (or E flat), clarinets in B flat and A,* tenor clarinet (basset horn), bass clarinet* and pedal clarinet.

Saxophone family: soprano, alto, tenor and bass.

Sarrusophone family: doubtful—probably only bass and contra bass.

Horn family: flugelhorn, French horn,* and Wagner tubas, tenor and tenor bass.

Trumpet family: "Bach" trumpet, B flat (soprano) trumpets* and bass trumpet.

Trombone family: alto, tenor,* bass* and contra bass.

Tubas: bass* (possibly, but probably a bass Wagner tuba) and contra bass.

What will be the outcome of all this?

Probably a return to simpler methods, for the cost of upkeep of such an orchestra would be prohibitive anywhere outside a great metropolis. Then again it would require a composer of very much more than ordinary genius to write *effectively* for such a huge potentiality of tone-colour, besides which many of the fine nuances of tone which distinguish the different instruments (for instance, the upper notes of the oboe d'amour from the ordinary oboe, and the lower notes from the cor anglais) would be completely lost in a large orchestra, while at best they would only be appreciated by a very exceptional and sensitive ear.

The chief cause of the difficulty experienced by young composers in obtaining a hearing for their works, lies in the fact that they score in a manner too liberal and too ambitious to repay production, except under a very well-known and popular name. Richard Strauss, one of the most ardent supporters of gigantic orchestras, has recently struck a new note, quite revolutionary to his usual teach-

* The instruments starred are those in general use at the present day, the others are to be found in the scores of modern composers.

ing, but which may have far-reaching effects in the future. In his opera, "Ariadne auf Naxos," he dispenses with the full orchestra and employs only thirty-five performers, each of whom has to be a soloist, giving to each a different and distinct part—in fact, "chamber music" on a grand scale. Included in the band are strings, flutes, clarinets, bassoons, horns, a trumpet, a trombone and kettle drums.

This is a brilliant example from a brilliant man, and one which deserves the serious consideration of those unknown and unheard composers who, all too frequently, make the fatal mistake of assuming a lofty disdain of humble beginnings.

APPENDIXES.

APPENDIX I.

THE BUGLE AND THE CAVALRY TRUMPET.

(1) HISTORY AND EVOLUTION.

INSTRUMENTS sounded by means of hollow mouthpieces are scientifically divided into two families: horns and trumpets. Bugles belong to the horn group, these being distinguished by wide, spreading tubes and deep, cupped mouthpieces, while trumpets have narrow, almost cylindrical tubes, sounded by shallow mouthpieces, the resulting tone being clear and vibrant, while horn (bugle) sounds are full-bodied and comparatively dull.

Anciently no very rigid distinction appears to have been made between the two classes of instrument, and, in consequence, the fragmentary evidences available for disentangling their gradual growth are frequently conflicting, rendering it impossible in many instances to differentiate between the early progenitors of the two species.

A primitive type of bugle, common to all nations, and at all periods, from pre-historic almost down to modern times, consists simply of a hollow animal horn cut off short at the smaller end, so as to form a flat rim against which the lips might rest, in lieu of a definitely formed mouthpiece. This "horn"—in every sense of the word—may be regarded as the direct ancestor of the modern infantry bugle, not only as regards design, but also in actual name. In mediæval England, "bugle" meant *young ox*, the Latin equivalent being *buculus*, and it was from the

> "hornes of grete oxen or of Bugles"
>
> (Sir John Maundeville, c. 1400)

that these rude signalling instruments were most generally fash-

ioned. Records of their use are abundant in contemporary literature:

"Two squyers blewe . . . . . with ij grete bugles hornes"
(Caxton, A.D. 1480).

And not only in this manner were the horns of oxen turned to good account, for:

" . . . . . precious cuppis be made of bugull hornys."

Tradition, in fact, suggests that, with the smaller end temporarily closed they formed convenient, and at the same time capacious drinking vessels, while their more legitimate employment subsequently proved a most effective means for the summoning of fresh liquor!

As time went by, the name bugle-horn became shortened to bugle, which word referred thereafter, not to the animal, but solely to the instrument, no matter of what material it might be made.

But trumpets, horns and bugles of metal are no recent innovation: they were common objects among the more civilised nations several thousand years previous to mediæval Britain, as witness the bas-reliefs of ancient Egypt, and the frequent references among the Scriptures, especially in connection with Mosaic Law. Moses, indeed, ordered "two silver trumpets" for use in the Temple, to be wrought from a single piece of metal. On the Arch of Titus, at Rome, faithful representations of these identical instruments are still extant, together with sculptured models of the seven-branch candlestick, and other plunder from the devastated Temple, carried through the streets of Rome at the Emperior's triumph. These silver trumpets appear to have been about two feet in length, perfectly straight, and all but identical with the Roman *tuba*. Josephus, an unreliable historian, in telling of the Hebrew love for horns and trumpets, estimated the number of such instruments in use at the time of King Solomon to be no less than two hundred thousand, but upon what grounds this calculation was based, it is difficult to comprehend.

The Greeks were familiar with six species of trumpet and bugle, certain of which were employed for signalling purposes at the siege of Troy (B.C. 1374). At their inauguration, the world-famous

Olympian Games were nothing more than contests of musical skill, and it is left on record that, for the year 396 B.C., the proclaimed victors were two trumpeters, Timæus and Crates.

Among the Roman Legions, every regiment of horse and foot was provided with at least one variety of trumpet or bugle, chief among which were the *tuba*, or straight bugle, which gave the signal for the attack, the *buccina* and the *cornu*, deep-sounding horns whose employment appears to have corresponded more to the camp uses of our infantry bugle. The Roman cavalry were directed by the sound of the *lituus*, a kind of trumpet, but entirely different in appearance to the modern instrument.

Celtic horns of wood and metal, at least two thousand years of age, have been dug up in the peat deposits of England, Ireland and elsewhere, several interesting specimens of which are preserved in the British Museum, also in the National Museum at Dublin. A few of these have the mouth-hole pierced in the side, instead of at the end of the tube, a peculiarity which is also common to the Ashantee war horn.

In British manuscripts from the eighth century onwards, mention of the bugle-horn is frequent. Persons and communities of importance occasionally possessed bugles made from elephant tusks,* known then as oliphant horns, but these were regarded as a rarity, to which great respect was due. One of the most renowned bugles in literature is undoubtedly Rollo's, or Roland's horn, on which he summoned Charlemaign to his aid at the battle of Roucesvalles, A.D. 778. This almost magical instrument was a favourite theme of the Anglo-Norman romancers, who avowed that Roland's terrific blasts could be heard at a distance of thirty miles.

In the Middle Ages, bugle-horns were employed chiefly in the chase, in castles—for domestic and warlike signalling—and for sounding the curfew. They assumed many different shapes and forms, and the materials from which they were constructed included horn, ivory, wood covered with leather, copper, brass, silver, and even gold. Trumpets, on the other hand, were made only of metal,

* Tusks of the prehistoric mammoth, found in the sub-arctic regions, were exported to Europe, and used in a like manner, from the very earliest times The tenth century Scandinavian horn preserved at York Minster is, in the opinion of Sir Ray Lancaster, a specimen of mammoth ivory.

and in the early Middle Ages the form was almost universally straight. Such instruments were known as bemes or buzins, a corruption of the Latin *buccina*, though the instruments bore no resemblance. Later, the long and cumbersome tube was for convenience bent back twice upon itself, in a kind of curved zig-zag, and as such is frequently represented in contemporary art. Finally, towards the end of the fifteenth century, the compactly-folded trumpet, as used at the present day, was evolved, this form going by the name of clarion and field trumpet.

Unlike the plebian bugle, trumpets were anciently reserved for use solely in the service of royalty, the nobility, and the army, and even in Stuart times the unauthorised possession of trumpets was a punishable offence. It is therefore not surprising that the profession of trumpeter was regarded as one of considerable honour and importance, each trumpeter being granted commission rank, provided with a good mount, and permitted to sport in his cap the feather of nobility. During the reign of King Charles II, the pay of an ordinary trumpeter was five shillings a day, besides extra allowances for travelling and equipment—an income which, if translated into the equivalent of modern money, would amount to no mean fortune. The custom which ordained that army trumpeters should ride on horseback probably forms the precedent of our present-day restriction of its use solely to cavalry regiments.

Trumpeters were formerly allotted to the lesser royalties and the nobility according to their degree, somewhat in the manner that Indian princes are permitted to maintain a battery of guns. Henry V had ten trumpeters to accompany him on the battlefields of Crecy and Agincourt; the Prince of Orange, on his voyage from Holland, in 1677, had five; while our own King George was attended at the Delhi Durbar (1912) by twenty-four trumpeters, with instruments of silver. These heraldic trumpets are lengthier, and more gracefully proportioned than the ordinary cavalry trumpet, appearance being accounted more important than compactness in ceremonial design.

The immediate prototype of the modern bugle appears to have been evolved in the eighteenth century, but the instrument practically owes its existence to the introduction of a chromatic bugle by James Halliday, an Irish bandmaster, at the commencement of

the ensuing century. The keyed bugle, or, as it was eventually called, the Royal Kent bugle—owing to the patronage bestowed upon it by the Duke of Kent (dealers in antiques incorrectly name it the Waterloo bugle)—achieved remarkable popularity, and remained in favour until about seventy years ago, when, musically, it was superseded by the cornet, and minus its keys, it became simply the plain, but eminently serviceable infantry bugle, as we know it to-day.

(2) Theory and Practice.

The bugle is a copper tube, small and restricted at the mouthpiece end, but gradually widening out towards the opposite extremity, technically called the "bell." In actual length the tubing falls little short of four-and-a-half feet, but in order to give portability and convenience in handling, this is coiled and recoiled into an oval form, the appearance of which is generally familiar. Absolutely no effect results from this treatment, either upon the tone, or as regards the number of different notes the instrument is capable of producing.

The other essential part of the bugle is the mouthpiece. The interior of this may be likened to a wine-glass, the bowl receiving the sound-producing stream from the lips, and the hollow stem carrying it down into the instrument. The rim is overlapping, wide and flattened, so as to afford a cushion-like surface on which the lips can rest.

The popular notion as to how the bugle is "blown" is entirely incorrect. In actual fact, the bugle is not "blown": it is the lips that have to be blown—sounded, is a better term—the bugle serving only to resolve and intensify their message, and eventually to introduce it to the open air in the form of harmonious sound. Beginners invariably attempt to blow the *bugle*, and at the expenditure of enormous efforts, amid gasps and apoplectic struggles, entirely fail to produce a solitary tuneful note, much less a series of notes such as constitute a call. Not so the accomplished bugler, who, with little effort, achieves great results.

Just as in singing or speaking, the vocal cords of the human larynx vibrate with varying rapidity according as a high or a low

tone is produced, with varying intensity (*amplitude* is the scientific term) to render that tone loud or soft, so also in sounding a bugle, the two lips are made to vibrate, for that purpose being pressed together, and stretched across the wide end of the hollow mouthpiece. The passage of breath is necessary in both instances before any sound can be produced, and the lips—especially the tyro's—require more breath, and that at a greater pressure, to set them into vibratory motion than does the natural, and very sensitive mechanism of the vocal cords. With practice, however, the lips become agreeably responsive to the will of the performer, and the volume of breath required, even to produce loud tones, is surprisingly small.

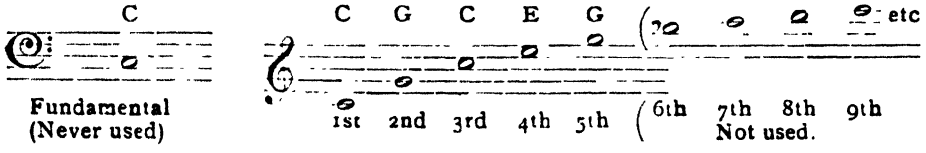
Low notes require less effort than high ones, but this arises from a natural cause, totally independent of any peculiarity in the bugle. Deep sounds result from slow lip-vibrations; that is, the lips are relaxed so as to be comparatively flabby, in which condition they are easily set in motion. To ascend the scale, the performer automatically presses the lips together, and contracts the muscles. The lips, in fact, grow harder, consequently vibration is rendered more difficult. Moreover, as the lips are tightened, the aperture between them, through which the breath is obliged to pass, becomes smaller, and naturally a higher pressure, that is, a greater *effort*, is required to force through the necessary amount of air.

The vibrating lips, closing over the mouthpiece end of the bugle, impart to the column of air contained in the bugle tube a longitudinal vibratory motion, in harmony with that of the lips. Strength and volume are gained as the wider end of the bugle is approached, until the "bell" is reached, and the vibrations, adjusted and moulded to the requisite form, are finally released from the instrument. Just as a stone thrown into a pool produces waves, so do these air vibrations, or sound waves, communicate their motion to the surrounding atmosphere, by which they are carried to the delicate mechanism of the human ear drum, impinging on it, and causing in the brain a sensation known as sound.

By varying the *amplitude* of the lip-vibrations, that is, by blowing harder or softer, the resulting sound waves become more or less vigorous, and the noise intense, or the reverse. But to vary the *period* of the vibrations, that is to make the lips vibrate slowly or rapidly, no matter what the amplitude, is to call into play a natural phenomenon, known to science as the theory of harmonics.

Slow vibrations produce deep sounds, rapid vibrations high ones, an elementary truth which is simply and clearly demonstrated by the mechanical motor horn. That a series of *different* sounds is obtainable from one and the same length of tube, such as the bugle tube, may be explained in the following untechnical terms.

The air column contained within the tube can be made to vibrate in various manners, the longitudinal waves, as it were, breaking up into smaller and more rapidly vibrating sections, forming of the whole, two, three, four, five, or more equal parts. This permits for any tube a fixed and definite range of sounds, according as the period of vibration is reduced to a half, a third, a quarter, a fifth, or less, of the end-to-end or slowest possible vibration in that tube. The note given by the longest possible vibration is known as the fundamental, but with the bugle, and other small-mouthpieced instruments, it is all but impossible to obtain, and from a practical point of view may therefore be entirely disregarded. The other notes, diminutives of the fundamental, are called the "harmonic overtones" or harmonics.



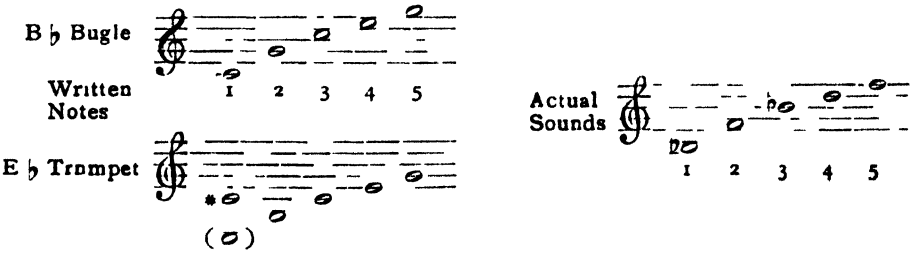
Bugle calls are composed entirely from the first five harmonic overtones given above. A series of higher notes is possible, but as their production is extremely difficult, no use whatsoever is made of them for military purposes.

Before bugle calls can be sounded with ease and certainty, much diligent practice is necessary to enable the player at will to adjust the lips so as to give the exact tension necessary for the production of the required note. The bugle, with its limit of five possible sounds to choose from, is the simplest of all the cup-mouthpiece instruments on which to acquire proficiency, more so as these sounds all lie sufficiently far apart on the musical scale to render mistakes improbable. With experience, the ear learns to guide the lips in their otherwise difficult task, and the performer needs but to mentally experience the sound, for the lips, without difficulty or trouble, to produce it.

Bugles in use among the British armies at the present day are constructed in the key of B flat, though for convenience the notated sounds are represented in the key of C. The actual bugle calls therefore invariably *sound* a tone lower than the written notes, when played on an instrument tuned to the key of C, such as the piano or the violin.

The structural differences between the cavalry trumpet and the infantry bugle have already been described, and although the section of the former's tube is cylindrical rather than conical, and the mouthpiece shallow rather than deep, yet the method of playing the two instruments is practically identical. The trumpet is the longer by several inches, in its actual tube-length as well as in the folded form, this being due to the fact that trumpets are constructed in a lower key, the key of E flat *(It was pointed out above that lower notes were produced by slower, that is, by longer vibrations, which in turn depend for their production upon longer tubes.)*

The music for the E flat trumpet, like that of the bugle, is written in the key of C, but an octave lower than that for the latter instrument. The following table gives the corresponding written notes for both trumpet and bugle, together with actual sounds, referred to the piano or violin.



(3) BUGLE AND TRUMPET CALLS.

"Bugle's note and cannon's roar
The deathlike silence broke."

—Macaulay.

There seems to be considerable doubt as to when an organised system of bugle and trumpet calls was first evolved in England. For a time, at any rate, the conveyance of definite orders by bugle

* Usually written thus to avoid ledger lines.

or trumpet, independent of a code specially arranged for the occasion, appears to have become a lost art. A cursive glance over the pages of history at once reveals that such was not always the case.

Mosaic observances regarding signals to be sounded on the two silver trumpets were absolutely definite and clear: "And if they blow but with one trumpet, then the princes, which are the heads of the thousands of Israel, shall gather themselves unto Thee. When ye blow an alarm, then the camps that lie on the east parts shall go forward. When ye blow an alarm the second time, then the camps that lie on the south side shall take their journey: they shall blow an alarm for their journeys. But when the congregation is to be gathered together, ye shall blow, but yet not sound an alarm" (Numbers X).

Greek and Latin authors expressly remark on the recognised systems of signalling by bugles and trumpets observed in their respective armies, yet Geoffrey de Vinsauf, chronicler of the Crusade of Richard Cœur de Lion, carefully explains how "it was resolved" that the sounding of six trumpets, stationed in different parts of the army, should be known, on that particular occasion, as the signal for the attack. Similar references are of frequent occurrence, and conclusively reveal the absence of a definite and fixed code of trumpet and bugle signals in mediæval England. With the revival of learning in the fifteenth century, the bugler's art appears to have been remodelled, mainly on classic examples, yet curiously enough no actual notated calls of English origin survive previous to the eighteenth century.

For a time the drum seems to have taken the place of the more cheery and powerful bugle or trumpet for the conveyance of military orders—hence the term, "beat a retreat"—but that phase passed. The renowned writer, Machievelli, in his "Art of War," strongly urged the retention of the trumpet for issuing commands on the field of battle.

British custom is usually to employ bugles on active service, their somewhat dull tones being found to possess more penetration and carrying-power than the hysteric blare of the trumpet.

APPENDIX II.

DEEDS RELATING TO GERVASE PRICE.

Sergeant Trumpeter and Yeoman of the Bows and Guns to H.M. Charles II.

(The following particulars are compiled from "The King's Musick," by kind permission of the author, H. C. de Lafontaine, Esq.).

1660, June 11.—Appointment of Gervace Price as yeoman of the bowes and gunnes and sergeant trumpeter.

1660, Dec. 5.—Warrant to deliver the mace of office provided for him.
Dec. 31.—A payment of £40, being the charges for himself and eight trumpeters for a journey to Portsmouth.

1661, Sept. 22.—Warrant for the payment of £100 yearly to Gervase Price as sergeant trumpeter of all the trumpeters, drummers and fifes.
Nov. 22.—Gervase Price, sergeant trumpeter, authorised to impresse and take up for his Majesty's service, George Chetham, trumpeter, to be employed in the voyage to Tangier.

1662, Feb. 20.- Warrant to deliver to Gervice Price, Esquire, . . . two silver hornes . . . and also one collar of silver of the quantity of 15 ounces.
June 7.- Warrant to apprehend Humphrey Dance and Robert Ostler, serjeant at mace, for siezing and assulting Gervase Price, serjeant trumpeter.

1663.—He attended Charles II to Bath for a space of thirty-seven days at the rate of 10/6 per day, the other five trumpeters receiving 5/- each per day.

1664, Sept. 19. -A command to Jervace Price, Esquire, His Majesty's serjeant trumpeter, to place two trumpeters and one drummer at the command of Prince Rupert.

1667, Feb. 20.— Warrent to prepare and deliver to Gervase Price, Esquire, one guilt trumpet weighing forty ounces or thereabouts, as a guift from his Majesty.
Sept. 29.—Warrant to pay Gervase Price and six trumpeters the sum of £410 for their attendance upon his Majesty in the progress at Hampton Court, Salisbury and Oxford, from 27 July, 1665, to 17 February, 1666.

1668, March 20.—Warrant to prepare and deliver one silver hunting horn of the quantity of 40 ounces or thereabouts, being a guift from his Majesty.

1671, Dec. 14.—Order for payment of £40-10. to Jervase Price, for himself and four trumpeters for ryding charges and other expenses in their attendance upon his Majesty to Norwich, Yarmouth, Newmarkett, Cambridg and elswhere, from 25 Sept. to 21 Oct., 1671.

1674, Feb. 27.—Warrant to Gervase Price, sergeant trumpeter, to be in readynesse with one of His Majesty's trumpettors at the gate of the Palace of Whitehall, by tenn of the clock tomorrow morning, being the last day of Febuary, in the usuall manner to attend the proclayming of peace between His Majesty and the States General of the United Provinces.

1674, Sept. 4.—Order to pay £163 to Jervas Price and four trumpeters for their attendance on the Rt. Hon. Lord Hollis and Henry Coventry, esquire, ambassadors at Breda, by the space of 103 days, from 15 April to 25 September, 1667.

1675, Feb. 9.—Warrant for payment of £21 to Jervas Price, sergeant trumpetter, for four brasse trumpetts and a pair of new kettledrumes, provided by him for his Majesty's service.

March 1 and 5.—To Jervace Price for livery and all complete furniture for himself and sixteen trumpettors and one kettle-drummer for the year 1673, £1,362 : 17 : 3.

1676, June 9.—Warrant for payment of £40 to Jervas Price for liveries for the present supply of two of his Majesty's trumpeters that are to attend the Hon. Lawrence Hyde, master of his Majesty's Roabes, to Poland.

July 18.—Warrant for payment of £212 5s. to Jervas Price for three of his Majesty's trumpeters, for their charges and expenses while attending his Grace the Duke of Richmond his Majesty's ambassador to Denmark, in the year 1672, from 29 March to the 6 January following, at the rate of 5s. by the day to each of them. Some of them have since been employed in his Majesty's service beyond the seas, so that they could not bring in their bills for their service at that tyme.

1677, Sept. 22.—Warrant for payment of £60 to Gervas Price for himself with four of his Majesty's trumpeters, for their expenses in attending upon the Prince of Orange on his voyage from Holland.

1680, June 4.—Warrant to pay £40 to Jervas Price, for the present supply of two trumpeters to attend the Earl of Mulgrave to Tangier.

1684, Feb. 22.—Liveries ordered for Jervas Price, esquire, his Majesty's sergeant trumpeter, and for 16 trumpeters and a kettle-drummer. (For each a violet coat trimmed with silk and silver lace.)

1685, Feb. 11.—Order to deliver to the above eight yards of black cloth each for mourning for the funeral of King Charles II.

May 16.—Warrant for the appointment of Gervice Price, esquire, servant in ordinary to King James II, as sergeant of all trumpeters, drummers and fifes in England and other dominions of his Majesty.

1687, Oct. 5.—Gervase Price, sergeant trumpeter, deceased, and Mathias Shore appointed in his place.

1688, Oct. 10.—Warrant to demand of the executors of Jervice Price, deceased, late serjeant trumpeter, the mace and trumpet that were in his custody at the time of his death, that they may be returned into the office for his Majesty's immediate service.

1690, April 10.—Will, dated 5 June, 1686, with a codicil of 11 September, 1687, and probate of Gervase Price, of the parish of St. Martin's in the Fields: he desired to be buried "near to the body of his late dear wife in the Cathedral Church of St. Peter's, Westminster."

APPENDIX III.

HISTORIC AUTHORITIES.

In the foregoing chapters frequent reference has been made to Virdung, Prætorius and Mersenne, the three musical historians to whom we chiefly owe most of our intimate knowledge of antique instruments of all kinds. A short note on each will not be out of place.

Sebastian Virdung is the oldest authority extant, his work, "Musica Getutscht," having been published at Basel in 1511. This history was written in dialogue, and embraces keyboard, string, wind and percussion instruments. Among the orchestral wind instruments mentioned are German flutes, recorders, shawms, bombardts, krumhorns, cornetts, clarions, trumpets, trombones and thurner horns.

Michael Prætorius (1571-1621), the famous German musical historian, left as his most important work, "Syntagma Musicum," in four volumes, the second volume, "Organographia," published at Wolfenbuttel in 1619, being the one chiefly concerned with wind instruments. Amongst the latter mentioned are German flutes, recorders, shawms, bombardts, fagotti and double fagotti, krumhorns, cornetts, horns, clarions, trumpets and trombones of four different sizes.

Le Père Mersenne (Marin Mersennus) was born in the year 1588 at Oizé, in Maine, and died in 1648. His great history of music was published in Paris in 1627, under the title, "Traité de L'harmonie Universelle," followed by an epitome of the same in Latin, "Harmonicorum Libri XII," 1648. Mention is made of practically the same instruments as those given by Prætorius, also in addition the quaint Flûte Eunuque, the forerunner of that "instrument" known as the Kazoo, now commonly seen in toy-shops. At the present day this usually consists of a short wooden tube having a large lateral hole near the mouthpiece, across which a skin membrane is stretched. The player sings, or rather hums through the "instrument," causing the membrane to vibrate, thus giving to the voice a loud and reedy quality, something suggestive of the tone of the bassoon. It appears to have been known in England at an early date, for it figures, in the writer's opinion, among the remarkable series of corbels (circa 1525) at Cirencester Church, Gloucestershire, which depict a number of contemporary instruments used in the festivities of a "Whitsun Ale." (See Appendix IV.)

The Flûte Eunuque of Mersenne differed from the Kazoo by having the membrane stretched across one end, the player singing through a lateral aperture somewhat resembling the mouth-hole of a flute, while the open end of the tube terminated in a conical bell. Mersenne recommended the more extensive use of eunuch flutes, contending that they rendered the human voice more sweet and tender, but there is no evidence to show that his somewhat artless advice was ever taken seriously. Apart from this, the mention of an authentic three-hundred-year-old ancestor of the much-despised Kazoo is an interesting and unexpected justification of the old proverb, "there's nothing new under the sun."

APPENDIX IV.

THE CIRENCESTER CORBELS.

I.

II.

III.

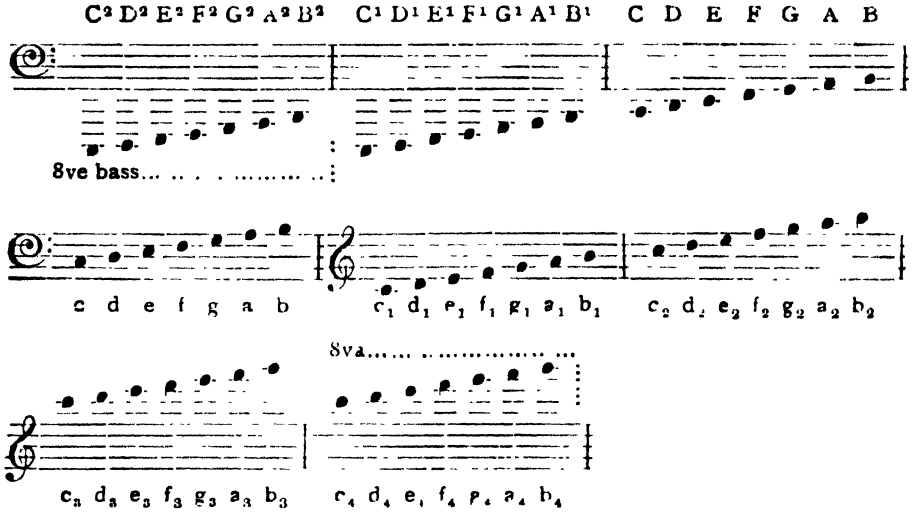
IV.

(I) Hunting Horn. (II) Identified by the author as the Eunuch Flute (see under Mersenne, Appendix III). (III) Tabor Pipe and Tabor. (IV) Double Recorder.

These are among the corbels illustrative of a "Whitsun Ale," placed above the nave clerestory of Cirencester Church, Gloucestershire, in the early years of the sixteenth century, but since rendered indistinguishable by weathering. They were copied, and cut for Carter's "Ancient Painting and Sculpture in England" (A.D. 1788), from which volume the above examples have been re-drawn.

APPENDIX V.

KEY TO THE ABBREVIATED MUSICAL STAFF NOTATION.



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