

How a Trumpet Is Made

Author(s): D. J. Blaikley

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his own craft, as 'The lass with the delicate air' can sufficiently testify.

Arne took himself seriously when he produced 'Artaxerxes.' I am afraid modern audiences would not stand this opera in its fullness. It gradually faded until only 'In infancy our hopes and fears,' 'The soldier, tired of war's alarms,' and 'Water parted from the sea,' were the sole remnants of that once famous production. That the last-named was considered 'genteel' we have the bear leader's testimony in 'She stoops to conquer,' for it shares with the minuet from 'Ariadne' the honour of supplying the music for the bear's dancing. Arne was an English musician—a thoroughly English one—and if we are to believe many people, we never had much native talent that lay in that direction. Still, it seems to me that with all Arne's faults and with all his limitations, and these were but of his age, he should be far dearer to us than many of those foreign composers who supply our concert programmes with lyrics that are either, in translation, sickly sentimental or deadly dull, and whose music cannot have the same appeal to our English temperament. Yet beyond the three Shakespearean songs, 'Blow, blow, thou winter wind,' 'Where the bee sucks' (both more frequently used as test-pieces for children's singing, rather than as concert items), and 'When daisies pied,' what does the average person hear of Dr. Arne's music except 'Rule, Britannia'?

Arne is probably the most representative of English composers of the 18th century, save for Church music. It is true he did little instrumental work that is now known, though Mr. Moffat has resuscitated a Violin sonata of great merit\* and it is more than likely that other buried work might be brought to life with advantage. Yet Arne is neglected, and shamefully so. His work has to be culled from old copies, published during the composer's lifetime, and this is accessible only in such storages as the British Museum, or the private libraries of musical antiquaries.

It will be interesting to note how many arrangers of concerts will remember the musician's two-hundredth anniversary, or, having remembered, will make a feature of Arne's music? I fear but few. Yet among the constantly-repeated items there could surely be a little room spared for some of his best music, vocal and instrumental, to let this generation know that worthy music could, at times, come from the brain of an Englishman.

#### HOW A TRUMPET IS MADE.


By D. J. BLAICKLEY.

#### III.—TRUMPETS AND HORNS WITH SIDE-HOLES.

It has been demonstrated in the foregoing articles that trumpets and other kindred instruments of fixed lengths are limited in intonation to the natural harmonic scale, and that although from the eighth to the sixteenth harmonic many notes agree with those of the diatonic scale, yet

the agreement is far from being complete. But if we reject the various attempts that have been made to derive the diatonic scale from any one root, we can plainly see that from two roots standing a fourth apart, as from C to F (doh fah), elements may be chosen, some of them being common to both harmonic scales, which give the diatonic scale in its completeness. Thus if we take a horn in C, the 8th, 9th, 10th, 12th, 15th and 16th notes are correct for C, D, E, G, B and C, and the 11th, 13th and 14th notes are incorrect. But supplementing this horn by one in F, a fourth higher, we obtain F, G, A, as its eighth, ninth and tenth harmonics, and thus from two instruments of fixed length we are able to produce the accepted diatonic scale, which may very reasonably be regarded as being derived from two roots or generators. This arrangement, requiring two instruments and two players to produce a scale of only one octave, though scientifically correct, is manifestly inconvenient, and the difficulty would be increased if we endeavoured to fill up the lower intervals of the harmonic scale; for more and more tubes of different lengths, giving different fundamental tones, would be required.

The art of wind instrument making is therefore to a large extent the art of treating a tube of fixed length in such a way that it virtually becomes many tubes of different lengths, giving different fundamental tones, and consequently different series of harmonics. From mediæval days to the time of Bach and Gluck the family of instruments known as Zinken or Cornetti were much used, and these instruments afforded one means of attaining the desired end. They were usually made of wood, with a conical bore, and were played with cup-shaped mouthpieces. By the use of side-holes closed by the fingers, the different lengths referred to above were obtained; these holes were usually seven in number, six for the fingers and one at the back for the thumb. The finger-holes enabled the player to produce a diatonic scale, and by overblowing the compass could be extended to two octaves or rather more. From accounts by Mersenne (*Harmonie Universelle*) and others, the cornetti appear to have been much appreciated, but as they now have only a historical interest, it will be sufficient to say that they were made of various pitches, covering a range from tenor to soprano. The chief defect of the larger ones was due to the fact that the finger-holes were neither so large nor spaced so far apart as requisite for good intonation. Theoretically a side-hole should be large enough to act as if it were the open end of a tube, but when the finger-holes are small in comparison to the diameter of the instrument, this condition is impossible, and many complications and imperfections result therefrom.

The tenor instrument of this old family of cornets (or Cornetti) was known as the cornou, and for the convenience of fingering was given a slightly serpentine form, thus . The further extension of the length of such an instrument to reach the 8-ft. C, an increase of calibre to

\* 'Trio Sonata in E minor' in 'Old English Violin Music' (Novello).

yield a bass quality, and a more complete bending or serpent-like form resulted in the Serpent, which is generally regarded as the invention of Edmé Guillaume, a canon of Auxerre, in 1590. The difficulty of placing the finger-holes of such a large instrument in even approximately correct positions was partially overcome by the gradual addition of key-work, but at the best the serpent was uncertain in intonation and unequal in the tone-quality of successive notes. It was in use, however, until comparatively recent times, for the late Sir Michael Costa used it in the performances of the Sacred Harmonic Society; it therefore had a life of nearly three centuries.

About the year 1780, an inventor contrived a modification of the form of the serpent, while preserving its musical (or *un-musical*?) characteristics. This modification consisted in doubling the tube abruptly upon itself, in the manner of the bassoon. In this form the instrument was widely known as the bass horn or *basson Russe*, and it became very generally used in military bands.

For the sake of chronological order, the application of side-holes to the trumpet must be parenthetically noted here, and the further development of the bass horn or serpent be made the subject of a succeeding paragraph. It appears that towards the end of the 18th century the cornetto had gradually fallen into disuse, and it became increasingly important to improve the trumpet, or to supplement its natural notes by others which would make its scale more complete. About the year 1795, the instrument maker Weidinger, of Vienna, produced a trumpet with five side-holes, opened by keys or levers, but the idea was probably due to a horn player named Koelbel. The instruments were much used for a time, but as it is impossible to maintain the true trumpet tone without the bell expansion, and as when the side-holes are open the tone comes mainly from a cylindrical tube, it is not surprising that the popularity of this variety of trumpet was not maintained. One point in the design, however, was distinctly good, and this was the covering of all the lateral holes with padded keys, leaving none to be stopped merely by the fingers; by this means free choice of position for the holes giving the scale became possible, and the application of keys to the bugle (patented by Joseph Halliday in 1810) resulted in an instrument which held an important place in military and other bands until it was displaced by the more modern piston instruments.

To return to the bass-horn. Halary, an instrument maker of Paris, modified its form and proportions, and by using key-work throughout produced an instrument having fairly good intonation and uniformity of tone-quality. His patent was taken out in 1822, and his instrument, known as the ophicleide, and made both as a bass and as a tenor, had a longer reign than the key-bugle, although, like its smaller companion, it has ultimately given place to the piston instruments. The pitch of the key-bugle was usually  $c$ , and that of the

ophicleide was an octave lower, or C, but practically the lower range of the latter was relatively one octave greater than that of the former, for the first chromatic octave of the bugle began with  $c'$ , the octave from  $c$  to  $c'$  not being used, whereas on the ophicleide the pedal octave from C to  $c$  was available with chromatic completeness, as the instrument was furnished with eleven or twelve keys. On the bugle, with its practical scale beginning only on the second harmonic,  $c'$ , the interval between this note and the third harmonic ( $g^1$ ) could be divided chromatically with the five or six keys usually fitted. This use of the pedal octave of bass brass instruments has been maintained on modern piston valve tubas or bombardons, as will be explained in the section to be devoted to these.

On both the key-bugle and the ophicleide there was an 'open-standing' key, by which  $B\sharp$  and  $B$  respectively were obtained, and for military purposes the ophicleide was also made in  $B\flat$  with  $A_1$  in the 16-ft. octave for its lowest note. The tone of the instrument was characteristic, though somewhat hollow, and therefore did not blend well with that of the trombones. Mendelssohn, however, employed it so effectively in his 'Midsummer Night's Dream' music that some critics aver that none of our more modern instruments can quite take its place, and with the present desire for every possible variety of tone-colour, it would not be surprising if we were to see a revival of the ophicleide, which, since the death of Mr. Sam Hughes, has been practically an obsolete member of our bands, both orchestral and military.

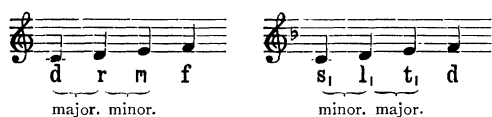
It is more easy to describe the acoustical foundations of an instrument and its mechanical contrivances than it is to define its characteristics of tone-quality, or even to give it a name that will be generally recognized. The same name has at different times and in different countries been given to different instruments, and the same instrument is known by different names. For instance, the name cornet, as applied to the old instrument with finger-holes, is also applied to the well-known modern instrument with valves, and beyond the fact that they are both blown with the lips, the two have nothing in common. Again, as regards tone-quality: a certain type of tone is regarded as the ideal one for a given instrument in one country, and the same quality would not be appreciated in another. As an instance of this the following remarks of Berlioz may be of interest. Writing of the Gewandhaus orchestra, Leipsic, in 1843, when he conducted a concert there, he said: 'L'ophicléide, ou du moins le mince instrument de cuivre qu'on me présentait sous ce nom, ne ressemblait point aux ophicléides français; il n'avait presque point de son. Il fût donc considéré comme non avenu; on le remplaça tant bien que mal par un quatrième trombone.' Yet we may, perhaps, safely assume that an ophicleide admitted into the Gewandhaus orchestra would at least approach very nearly to the German ideal of the instrument.

## IV.—TRUMPETS AND HORNS WITH SLIDES.

Horns, strictly speaking, do not lend themselves to the application of a movable telescopic slide for scale purposes. To make the heading of this section more accurate, a modification of the old schoolboy riddle might be suggested, and to the question 'When is a horn not a horn?' the answer would be 'When it is a trombone.' It is with trombones that we shall be chiefly concerned until the modern valve instruments are considered.

In the preceding section the action or effect of side-holes was considered. By their means we virtually obtain many instruments of different pitches combined in one; in other words, by the successive opening of the side-holes the air-column of the original tube is shortened step by step, and thus different fundamental notes are established, which, with their natural harmonics, can be so used as to give a chromatic scale of from two to three octaves, and on some instruments even more.

With the slide this scheme is reversed. Instead of obtaining new fundamentals by shortening the tube, a telescopic slide is bent or doubled on itself into U form, and by extending this the normal length of the instrument can be increased either by definite stages or gradually to give the effect of the *portamento* or glide. The great advantage of the slide over any other means of altering lengths, whether by decrement or increment, is that the slide admits of infinite gradations of pitch, so that, to take an instance, the distinction between the major and minor tone need not be lost. On fixed-tone instruments the changing position of the major and minor tones is obliterated: *d r m f* in C becoming the same as *s<sub>1</sub> l<sub>1</sub> t<sub>1</sub> d* in F:




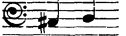
whereas on a slide instrument the proper sequence of the major and minor tones can be expressed.

The question is sometimes asked, why is such a valuable means of obtaining just intonation confined to trumpets and trombones? The answer is that the slide principle, from its very nature, is applicable only to instruments which have cylindrical tubing for the greater part of their length. To an instrument such as the French horn, which has a slight though gradual taper, or to the tuba with its wide mouth and rapid taper, the principle of the slide cannot possibly be applied to any useful extent.

The addition of the slide to the natural trumpet appears to have been made about the end of the 18th century. The slide is so placed that it is moved outward towards or under the player's chin by two fingers of the right hand, and recovers its home or closed position by means of a spring. This arrangement of the slide gives a shift equal to a tone in pitch, and therefore its advantage, though limited, is very distinct. It is possible that an increased length of slide, giving a more

complete scale, may be adopted in the future, but although attempts have been made in this direction these are not as yet much known.

In the trombone we have the slide at its best, and, granting the condition that the slide principle can only be utilised on instruments of a certain quality of tone (determined mainly by their cylindrical tubing), it is difficult to conceive that any contrivance could be more scientifically and musically true, or better adapted to give the desired results. The early use of the slide on the trombone, as compared with its much later use on the trumpet, is to be accounted for by the fact that, the trombone being used as a bass to the cornetti, its lower notes were called upon, and the necessity of filling up the gaps between the lower harmonics could only be met by the use of the slide. In the oldest instruments of the trombone family, the sackbuts, it does not appear that the slide was capable of an extension of more than a tone and a half or two tones, but from the time of *Virdung (Musica Getutsch, 1511)* to our own time, the trombone has undergone but little change, and the slides have been of the length required to give every semitone between the second and third harmonics, requiring seven 'positions,' or the home position and six shifts, each shift *lowering* the fundamental pitch one semitone. Therefore, assuming the instrument to be in C the note  would be the second

harmonic, and  would be the third harmonic of *f*  $\sharp$  and *g* respectively, obtained from the seventh and sixth positions; *i.e.*, to yield the semitone *above c*, the second harmonic of C, the instrument must be *lowered* to *F*  $\sharp$ , so that the third harmonic of this new root or generator may give the note required.

The chief distinction between the trombone and the trumpet, both being instruments of the same general character, lies in this, that the trombone serves as the tenor or bass to the trumpet, the latter instrument having a smaller bell and being played with a smaller mouth-piece, whilst the total tube length, and therefore the harmonics of the tenor trombone in C and of the trumpet in that key, are the same.

Trombones have been made, and are still made, in various keys. For the sake of completeness the whole of the recognized members of the family are here named:

DISCANT TROMBONE,	Obsolete.
in <i>b</i> $\flat$ , <i>a</i> , <i>a</i> $\flat$ , or <i>g</i> .	
ALTO TROMBONE,	Rarely used: as a first trombone sometimes replaced by the Tenor in C.
in <i>f</i> or <i>e</i> $\flat$ .	
TENOR TROMBONE,	The instrument in <i>B</i> $\flat$ is the most generally used.
in <i>c</i> or <i>B</i> $\flat$ .	
BASS TROMBONE,	The G is the usual bass in this country.
in G, F, or E $\flat$ .	
CONTRABASS TROMBONE,	Very little used, but required by Wagner.
in C or <i>B</i> $\flat$ <sub>1</sub>	

For the bass trombone in E♭, and more especially for the contra-bass trombone, the length of slide extension is so great that double slides have been introduced, by means of which the 'shift' of the B♭<sub>1</sub> contrabass becomes the same as that of the B♭ tenor, an octave higher.

(To be continued.)

## Occasional Notes.

The full programme of the Leeds Triennial Festival, which will take place from October 12 to 15, is as follows: Wednesday morning.—'Elijah' (Mendelssohn). Evening.—Symphonic poem for orchestra, 'Villon' (Wallace); 'A Sea Symphony,' for soli and chorus (Vaughan Williams); Concerto for pianoforte and orchestra in C minor (Rachmaninoff), the solo part played by the composer; Orchestral fantasia, 'Don Juan' (Strauss). Thursday morning.—Overture, 'Egmont' (Beethoven); 'A German Requiem' (Brahms); New Symphony (Rachmaninoff), conducted by the composer; Overture, 'In der Natur' (Dvorák). Evening.—Overture, 'Zauberflöte' (Mozart); 'Ode for St. Cecilia's Day' (Handel); Act I., 'Die Walküre' (Wagner). Friday morning.—Symphonic Variations (Dvorák); Ode, 'Wellington' (Stanford); Motet, 'Sing ye to the Lord' (Bach). Evening.—'The Blessed Damozel,' for soli and female voices (Debussy); 'Sea Pictures' (Elgar); Part-songs for chorus, (a) 'Go, song of mine' (Elgar); (b) 'As Vesta was descending' (Weelkes); Symphony (No. 3) in E flat, 'The Rhenish' (Schumann); 'The Wedding of Shon MacLean' (Hubert Bath), conducted by the composer. Saturday morning.—'The Passion according to St. Matthew' (Bach). Evening.—Symphony (No. 4) in F minor (Tchaikovsky); 'The Pied Piper of Hamelin' (Parry); 'Songs of the Fleet,' a new work (Stanford), for baritone solo and chorus; Variations (Op. 36) (Elgar); and selections from Act III., 'Die Meistersinger' (Wagner).

Many of our readers will be interested to know that the library of the late Mr. F. G. Edwards (Editor of the *Musical Times* from 1897 to December, 1909) will be sold by auction in April, by Messrs. Puttick & Simpson, at their rooms in Leicester Square. A more detailed notice will appear in our April issue. The contents include Alessandro Scarlatti's manuscript of 'L'Olympe Vindicate'; proof copy of the vocal parts of 'Elijah' with Mendelssohn's corrections in red chalk; early editions of Bach's Christmas Oratorio, Passion Music, Cantatas, &c., and some autograph letters from Mendelssohn to Bartholomew, respecting the English translation of 'Elijah.'

The Philharmonic Society has conferred upon Mr. Emil Sauer, in recognition of his artistic merits, the much coveted Philharmonic gold medal, bearing the impression of Beethoven's likeness, which has only been presented to a few most distinguished artists who have repeatedly assisted at the Philharmonic Society's concerts.

At a meeting of the Standing Committee of the Gloucester Musical Festival, held on February 12, under the presidency of the Dean of Gloucester, the following programme was suggested for adoption by the stewards for performance at the September meeting

of the three choirs of Gloucester, Worcester and Hereford: Tuesday morning (September 6), 'Elijah'; Tuesday evening, new orchestral work by Vaughan Williams, and 'Dream of Gerontius'; Wednesday (September 7), Symphony in A flat (Elgar), 'Beyond these voices' (Parry), new Organ Concerto (Dr. Basil Harwood), Rhapsodie for alto voice with male-voice choir (Brahms), and 'By the waters of Babylon' (Goetz); Wednesday evening, 'Ode to music' (Parry), new choral work by Dr. A. Herbert Brewer, &c.; Thursday (September 8), 'Tod und Verklärung' (Strauss), 'Requiem' (Berlioz), 'Be not afraid' (Bach); Thursday evening, new orchestral work by Professor Granville Bantock and 'Stabat Mater' (Dvorák); Friday (September 9), 'Messiah.'

Sir Hubert Parry has generously given the sum of £1,500 towards the improvement of the Shire Hall for musical purposes. It is hoped that extensive alterations, both as regards the seating and structure of the Hall and the Orchestra will be completed in time for the Gloucester Festival.

From a programme:

'When shepherds pipe on oaten straws,  
And merry larks are ploughmen's clocks;  
And turtles kiss the rooks and daws,  
And *mermaids* bleach their summer frocks.'  
The cuckoo then, &c.

This is evidently a local printer's idea of sea-side costume. It may be presumed that 'Mermaids' summer frocks' are of watered silk. We commend the line to the notice of Shakespearean scholars, as a new reading of the bard. If to the charms of flowing locks and sweet voice the mermaid adds 'summer frocks,' no wonder the mariner's trade is a dangerous one.

Among the festivals which are to take place during this year's exhibition in Munich, there will be a Beethoven-Brahms-Bruckner Cycle by the orchestra of the Munich Konzert-Verein. This cycle will, as last year, be under the direction of Mr. Ferdinand Löwe (Vienna), and the most celebrated soloists will take part. The following dates have been fixed: August 5, 8, 13, 15, 17, 19, 22, 24, 27, 31, and September 2 and 4. These twelve symphony concerts are arranged for the days when there are no Wagner or Mozart festival performances, and will take place in the new music hall of the exhibition. The prospectus may be obtained on application either to the Geschäftsstelle der Ausstellung, the Landesverband für Fremdenverkehr, the Konzert-Verein München, or the Tourist Office of Schenker & Co., in Munich.

With reference to the article on Chopin in the earlier part of the present issue, it is but just to say that much of the information given therein has been obtained from Professor Niecks's valuable and exhaustive life of Chopin—'Frederick Chopin, as a Man and Musician.' Many of our readers will be interested to know that this important publication has now been reduced in price to 12s. 6d. It is still issued in its original form and binding, in two volumes.

The *Musical Competition Record* for March will not be included as one of the extra supplements in the present issue. It will, however, be published as usual in the March number of the *School Music Review*, and any of our readers who wish to keep the series complete may obtain a copy gratis and post-free on application to the publishers.