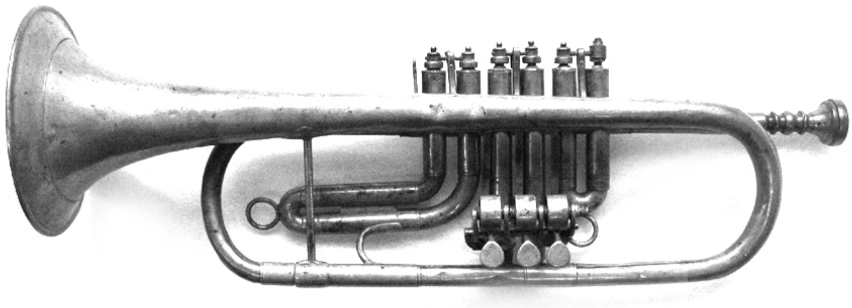


Figure 22
Trumpet in C by Andreas Barth, Munich, ca. 1845 (M Stadtmuseum, 79-38);
with piston ends after Leopold Uhlmann.

rotary-valve trumpets. Instruments with clock-spring returns constitute the second largest group among the double-piston valves, reaching their peak in the 1840s.

There is a third operating mechanism for double-piston valves—one which also uses levers, but shorter ones. Such instruments appeared as early as the 1820s, but were used principally in the 1840s and 1850s. These instruments are held vertically with the loop above the bell, like those with long levers. According to Heyde this model originated in Adorf in Saxony, where it is first recorded in a trumpet by Johann Gottlieb Roth. His pupil Carl August Müller (1804-70), who was born in Adorf, built instruments in the same style

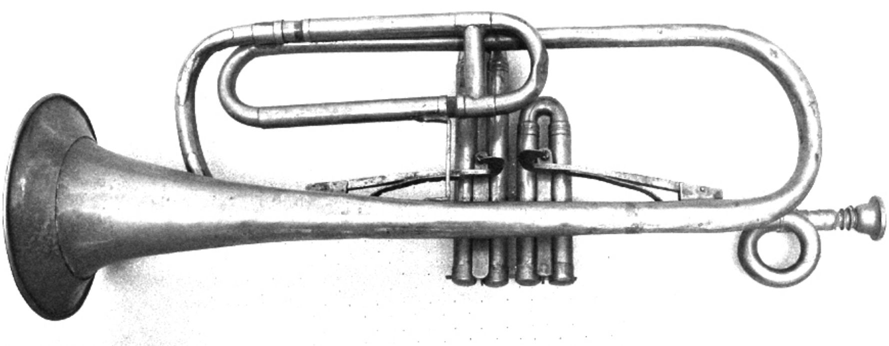


Figure 23
Unsigned trumpet in G with short levers and flat spring (GNM, MI 380).

around 1835. According to drawings of Müller's instruments, published by Heyde,[24] they had the semitone valve first. Müller settled in Mainz in 1824; this is the reason why this model was called the "Old Mainz" valve later on. The earliest instrument with this construction seems to be the unsigned trumpet in G (GNM, MI 380, Figure 23), which could be as early as 1835 or even a little earlier. This instrument has a flat spring as return mechanism, the oldest form of this valve type.

Carl August Müller introduced small rollers to improve the operation of the return-spring in 1835. According to Herbert Heyde, this construction was influenced by a similar feature found in French woodwinds.[25] The trumpets by Carl Sanner, Johann Conrad Lips (Figure 24), and Antoine Courtois all have this feature, as do American instruments by Lathrop Allen, Graves & Co., and E.G. Wright.

The saddles, serving as axle bearings for the short levers (as can be seen on Lip's trumpet in Figure 24), are quite similar to those found in Barth's later mechanism; this suggests that he might have gotten his idea from such instruments.[26] There is, in fact, a very interesting link that supports this hypothesis—the trumpet in 4-ft. C by Barth's apprentice, Dominicus Leicher, dated 1837, in Ingolstadt. This trumpet has double-piston valves with short levers

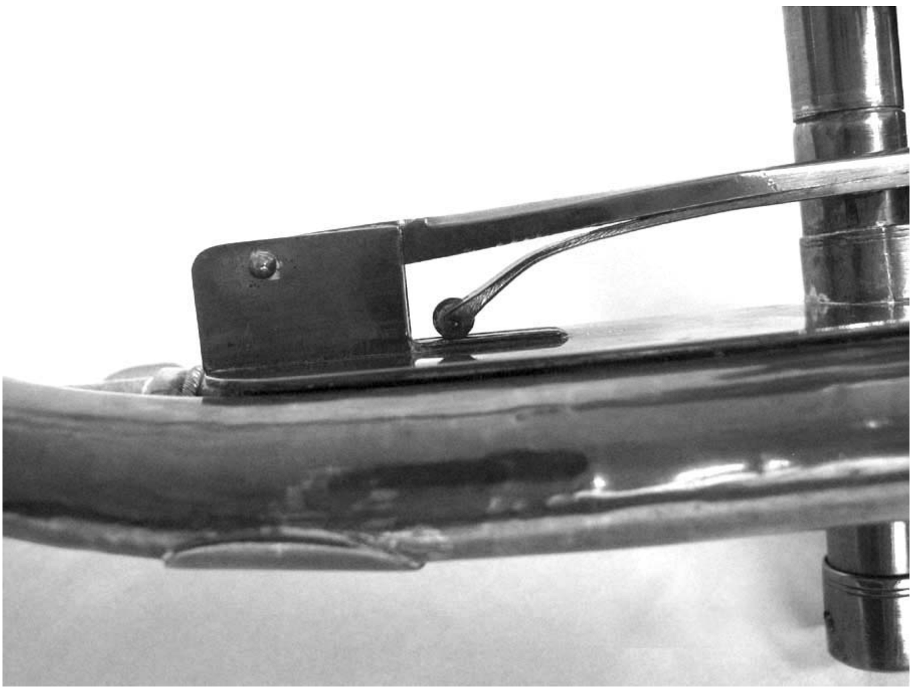


Figure 24

Trumpet in G by Johann Conrad Lips, Gotha, ca. 1850 (Berlin, 1010). Note the roller at the end of the return-spring, guided by means of a groove.

and return-springs with rollers similar to the instruments under discussion, but unlike the instruments we have seen so far, the short levers for both valves are pivoted at the same side in one common saddle (Figure 25). Leicher's instrument dates from the time when the change of construction took place in the Barth workshop.

Figure 25
Trumpet in C by Dominicus Leicher, Augsburg 1837 (Ingolstadt, 2693). Note the pivot ends of the two short levers, saddle, and return-spring roller.

Unlike the double pistons with long levers, which were more or less exclusively built in Bavaria and Switzerland,[27] double pistons with short levers were widely spread. They were known in different areas of Germany—for example, in the cities of Würzburg in Franconia and Gotha in Thuringia, but also in Paris, where the latest instrument of this type on our list was built by Antoine Courtois in or shortly before 1853. This construction is also frequently found in early American brass instruments with reversed valve order; well-known makers such as J. Lathrop Allen, Graves & Co., and E.G. Wright produced them, as pointed out above.

In four instruments in the list the double-piston valves are operated by means of a piston-like mechanism with a return-spring in a separate tube. These instruments are of varying provenance: a horn (Figure 26) and a posthorn by Hirsbrunner in Sumiswald, Switzerland; a bass trumpet by Carl Binder of Stuttgart, Württemberg; and a soprano saxhorn by Isaac Fiske of Worcester, Massachusetts (Figure 5).

Figure 26
Horn in F/E♭ by Hirsbrunner, Sumiswald, ca. 1835, with piston-operated double-piston valves (Burri, 103).

Finally, there are two instruments with double-piston valves of a very special kind. Their construction would not deserve the German term *Doppelrohrschubventile* (double-piston "push" valves), customarily used for all of the above-mentioned types, but would have to be called *Doppelrohrzugventile* (double-piston "pull" valve). Such a valve type is found on the unsigned trumpet in G, which was probably built in Markneukirchen (Markneukirchen, 69, Figure 27), and another horn from the Hirsbrunner workshop.

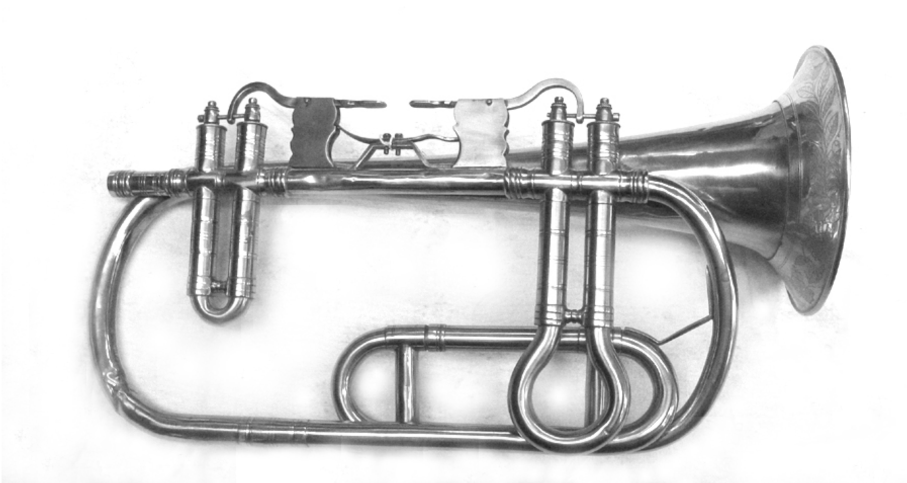


Figure 27
Trumpet in G, unsigned, Markneukirchen, ca. 1835 (Markneukirchen, 69).
The pistons are pulled, not pushed.

On the trumpet from Markneukirchen the valves are positioned exceptionally far apart. The two-armed lever-operating mechanism is placed at the end of the pistons. When a lever is pressed down it lifts a bar on the opposite side of the axle and hence pulls the ends of the pistons up (instead of pushing them down, in the customary manner). It is possible to operate the levers with two fingers of one hand; however, it would be more convenient to operate them with both hands. This trumpet is held vertically, like the Bavarian instruments, but with the loop below the bell.

Rotary valves
The only valve type found throughout the entire time span under discussion is the rotary valve. Altogether, seventy-one instruments with rotary valves are listed in Table 1. They were almost equally common from the 1840s until the 1890s, as can be seen in Chart 4a. Again, several different types can be distinguished.

Probably the earliest rotary-valve instrument in the list is the trumpet attributed to Nathan Adams, which is now in the Don Essig Collection in Warrensburg, Missouri. It does not have the typical American string linkage, discussed below, but elegant levers, which are reminiscent of the keys on keyed trumpets and bugles.

The earliest European type of rotary valve, dated between 1828 and 1831 by Heyde, is found on the valve horn Markneukirchen 1175 (Figure 28). Heyde observes that this valve with three passages must be close to Blühmel's patent application from 1828.[28] Like the early box-valve instruments by Schuster and the instruments in St. Petersburg, this horn has fixed loops rather than valve slides. Assuming this horn was built under Blühmel's influence, it is not surprising that it has the semitone valve first.

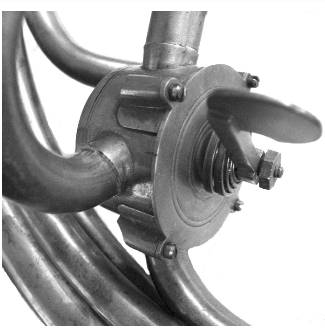


Figure 28a, b
Horn with early type of rotary valves with three passages;
Markneukirchen, between 1828 and 1831
(Markneukirchen, 1175).

While Blühmel's early rotary-valve construction is rather large in size, as can be seen in the Markneukirchen horn, Joseph Riedl's patent from 1835 in Vienna shows a much more delicate rotor made possible by the reduction of the number of passages from three to two. The motion of the rotor is limited by the shape of the push rods, as can be seen from a drawing by Heyde.[29] Fritz Herold in Aschaffenburg built a similar stopping mechanism on his fluegelhorn with reversed valve order as late as ca. 1850 (Figure 29). He used a flat spring for the touchpiece return mechanism instead of a clock-spring.

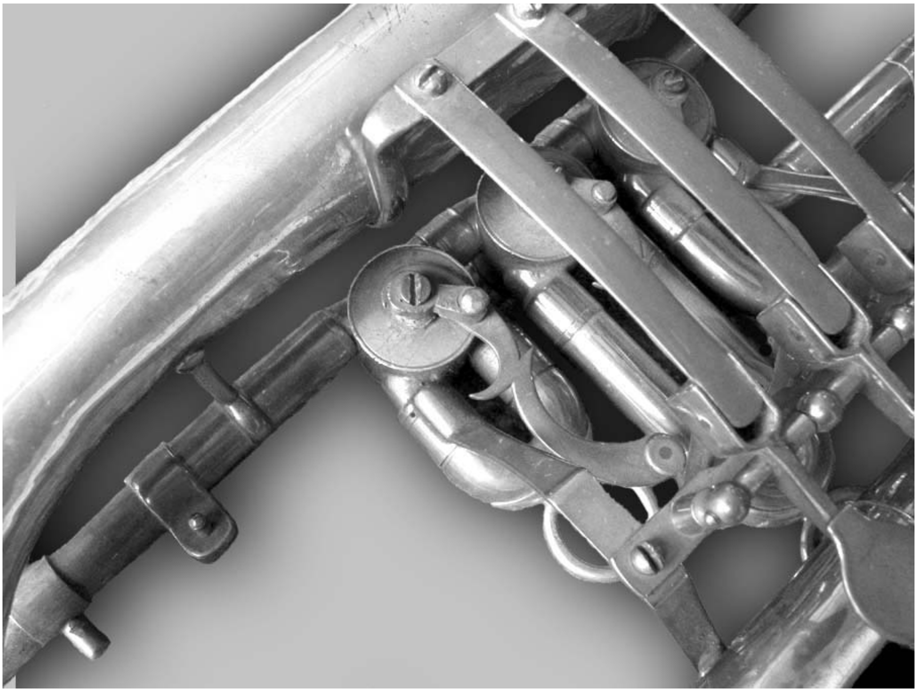


Figure 29
Fluegelhorn in C by Fritz Herold, Aschaffenburg, ca. 1850 (DM, 30808).
Detail of stops and flat springs.

Similar flat springs were built in Mainz by Carl August Müller for double-piston and rotary valves; they are called "New Mainz" valves (Figure 30).[30] The similarity of Herold's and Müller's valves is not surprising, since Aschaffenburg is not far from Mainz.

As can be seen in Chart 4c, double-piston-valve instruments were dominant until the 1840s in Bavaria, while rotary valves took over the field in the 1850s. All Bavarian rotary-valve instruments on the list are equipped with a clock-spring return mechanism.

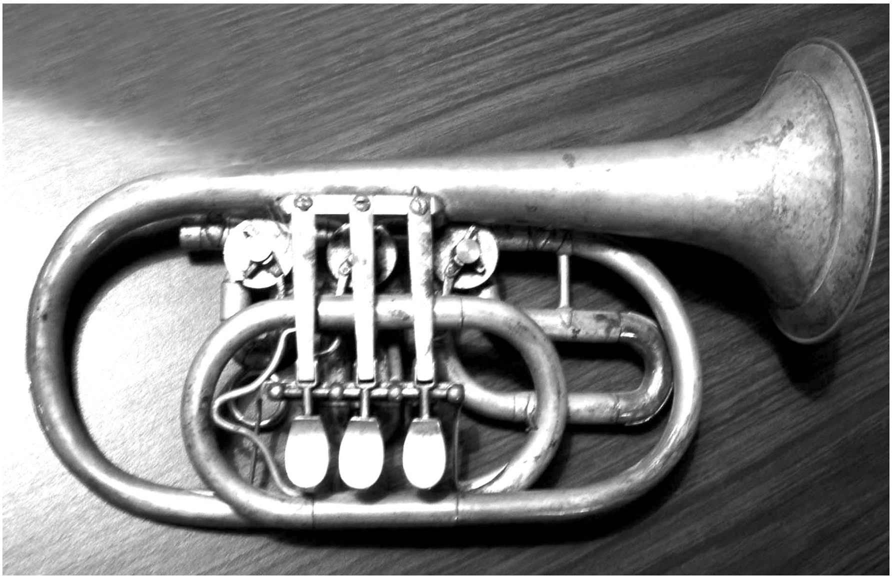


Figure 30
Cornet in B♭ by Carl August Müller, Mainz, ca. 1850,
with “New Mainz”-type valves (Fiske, B 169. Photo: Al Rice).

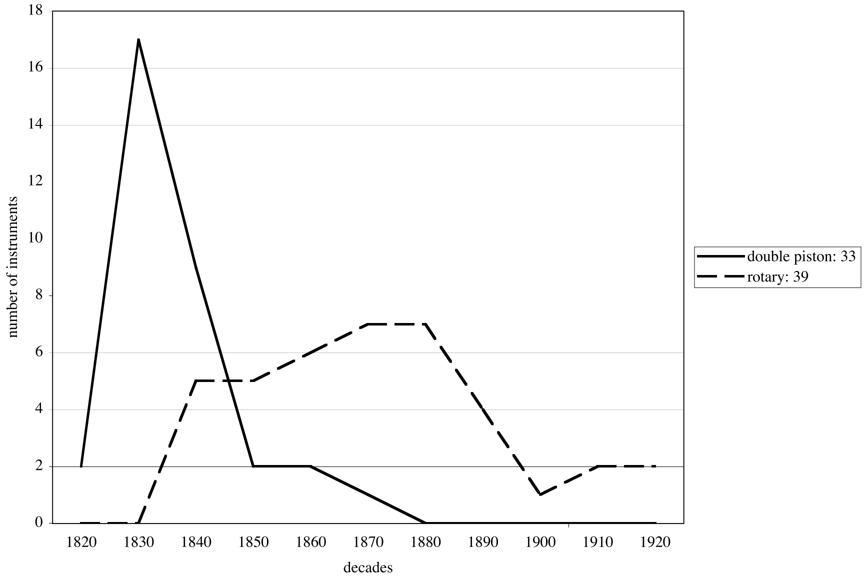


Chart 4c
Chronological distribution of double-piston and rotary valves in Bavaria.

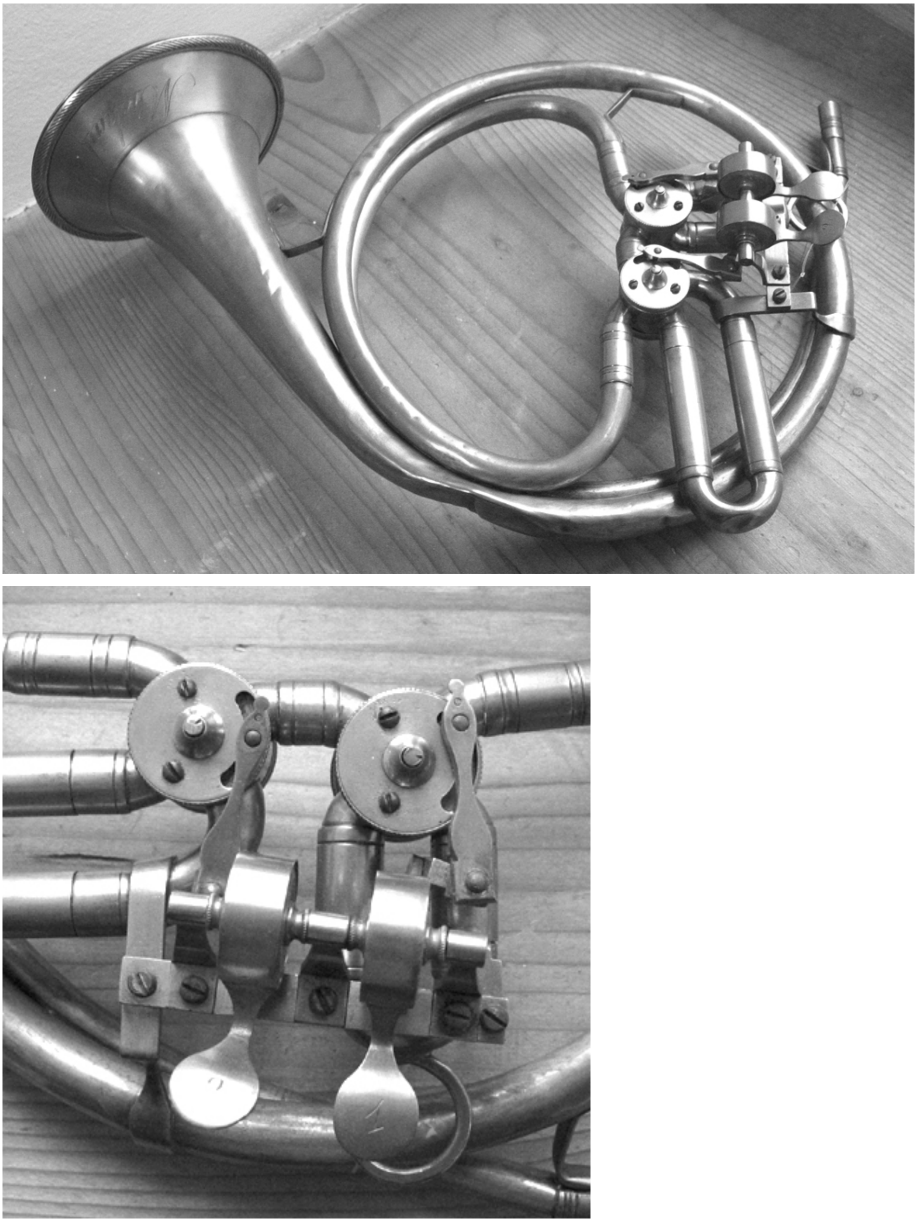


Figure 31a, b
Posthorn in G by Michael Saurle Sr., Munich, ca. 1840 (Bad Tölz, 8202). Valves with crescent-shaped openings to stop the motion of the rotor.

Michael Saurle's two horns have rotary valves with internal stops and crescent-shaped openings, a typical construction for south Germany.[31] Saurle's posthorn in G in Bad Tölz (Figure 31a, b) resembles exactly the *gromat. Posthorn in G mit F Bogen* ("chromatic post horn in G with F crook") Michael Saurle offered in his price list between 1826 and 1840 for fl. 22;[32] the F crook is missing.

From a comment in the postscript of the same price list, it becomes obvious that the customer—or in this case, his budget—decided whether an instrument was to be equipped with double-piston or rotary valves, Saurle writes:

> Alle die vorne und hier angezeigten Chromatischen Instrumenten kostet jedes Stück mit Cylinder oder Wiener Maschine um 5 fl. mehr.[33]
>
> All the chromatic instruments mentioned above and here each cost an additional 5 fl. when they are made with rotary or Vienna mechanisms.

Andreas Barth's horn from ca. 1845 likewise has rotary valves. When he first introduced them, he used delicate push-rods, as can be seen on the trumpet in Basel and the baritone

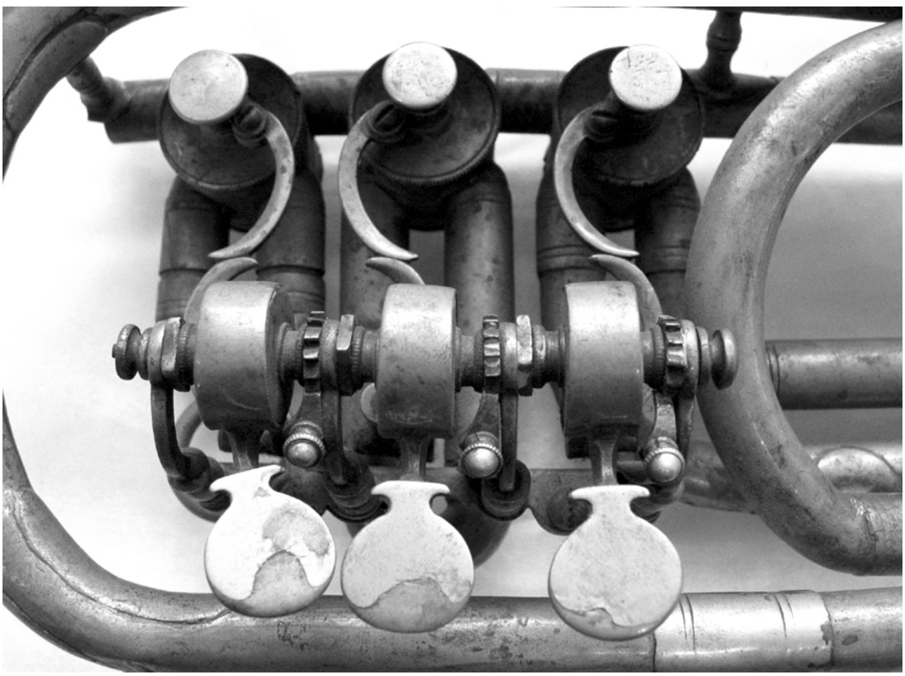


Figure 32
Trumpet in C by Andreas Barth, Munich, ca. 1860 (M Stadtmuseum, 64-23).
Gear with regulating knobs.

in the Stadtmuseum in Munich. Some of his instruments have internal, others external pin stops. From Barth's latest dated instrument, the fluegelhorn with one key from 1863, we can draw some conclusions about the dating of two other instruments of his, the valve horn and the trumpet in the Münchner Stadtmuseum. Both have a gear with elegant knobs (Figure 32) to regulate the clock-spring. The same knob is found on the dated fluegelhorn. However, the horn has only two valves, and therefore may be from ca. 1850, rather than the 1860s.

In Bavarian rotary-valve instruments, internal stops appear on instruments made from the 1840s through the 1890s; external pin stops (Figure 33) can be found from the 1840s until ca. 1915. Both types were built with and without the gear, which was probably used as early as ca. 1850 by Barth, through principally later, from the 1860s onwards.

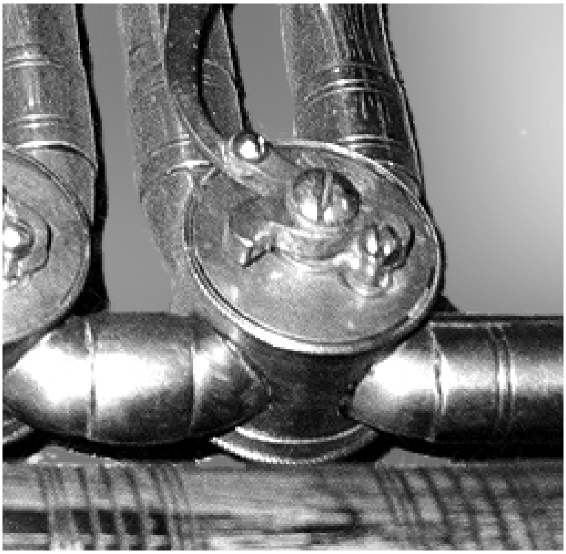


Figure 33

Tuba in 16-ft. C by Joseph Saurle, Munich, ca. 1845/50 (BNM, MU 182). External pin stop.

The valve-and-hand horn by Johann Gottfried Kersten Jr. in the Edinburgh Collection has a very early type of horseshoe stop. The earliest horseshoe stops (see Figure 34a, b) on Bavarian instruments, among those examined for this study, are much later. Instruments of this type were built by Anton Scherlein of Augsburg and Michael Bachlehner of Landsberg, south of Augsburg, in the 1860s. Also, the two latest instruments on the list, the trumpet and bombardon by Anton Schöpf Jr. of Munich, from ca. 1925, have this feature. Instruments with this later, rather standardized form of horseshoe stop with cork buffers were built in Markneukirchen with reversed valve order at least until 1900, as can be seen in the trumpet in B♭ by Adolf Kessler (see Table 1).

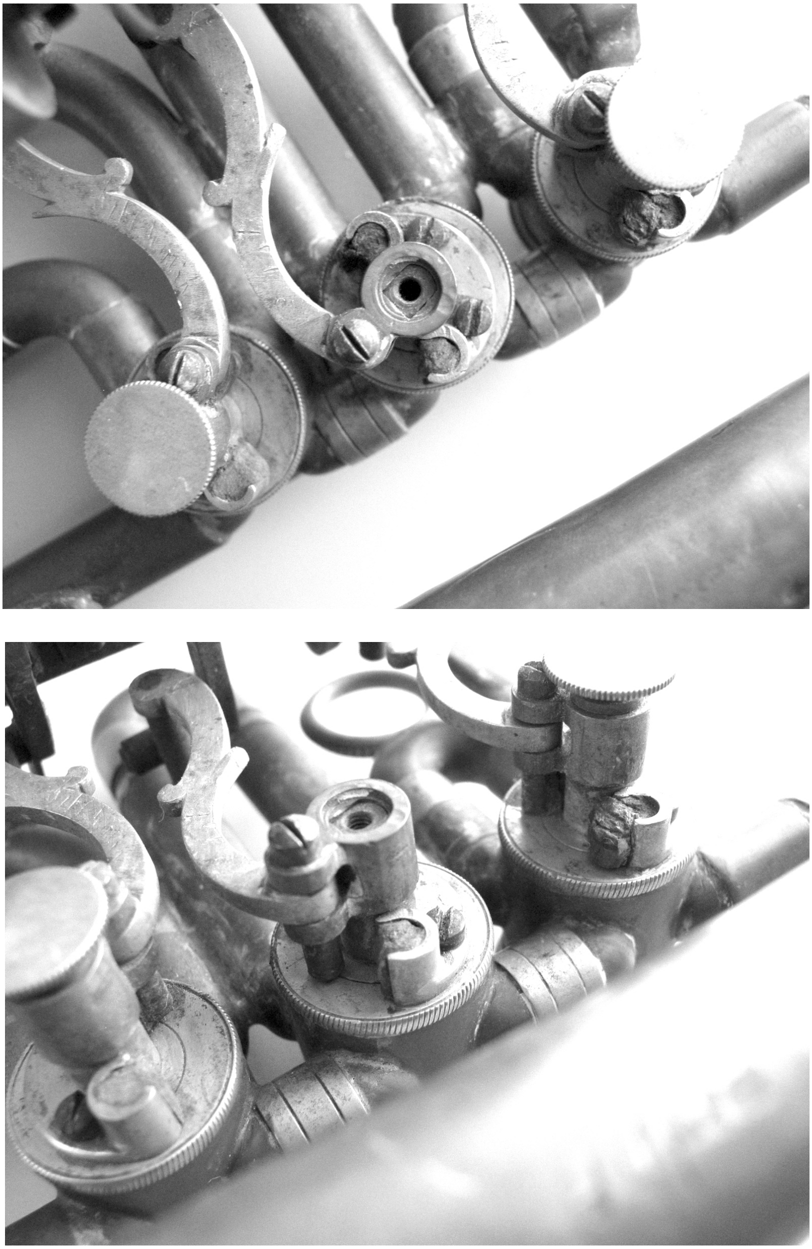


Figure 34a, b
Trumpet in C by Konrad Weidlich, Regensburg, ca. 1890 (Utley/NMM, 9977).
Horseshoe stops.

There is one rather unusual—presumably German—rotary-valve instrument, a slightly experimental trumpet in Kuhlohorn-form in the Goldgruber Collection, with a probably unique return mechanism: it has needle springs, which seem to be influenced by woodwind return springs.[34]

It is striking that the rotary valve, which received significant improvements in Vienna, was not used there in reversed valve order (nor was the double-piston valve, which was so important in Vienna, as observed above). Not a single instrument with rotary valves in the list comes from Vienna.

Apart from the Adams instrument, mentioned above, other typical American forms of rotary valves can also be found in reversed order. Three such instruments by Thomas D. Paine have his improved three-passage rotary valves, for which he took out a patent in 1848.

Figure 35a, b
Soprano cornet in E♭, Boston Musical Instrument Manufactory, Boston, ca. 1870 (Eldredge, NA), with side-action string-operated rotary valves (Photos: Niles Eldredge).

The idea behind this type of valve was to reduce the movement and force needed to operate the valve. To accomplish this the Paine valve has three passages in the rotor, which reduces the movement necessary to operate the valve from one-fourth to one-eighth of a turn.[35] This represents, in a sense, a return to Friedrich Blühmel's idea of 1828. Paine's alto horn in A♭ refers to the 1848 patent in the signature; an early type of string-linkage is used. On Paine's valved and keyed bugle in E♭ the valve loops are seemingly arranged in the normal order of whole tone, semitone, minor third. However, the levers with which the first and the second valves are operated cross. Therefore the semitone valve is in fact operated with the first, and the whole-tone valve with the second finger. This is an obvious compromise between the constructional advantage of having the shortest valve loop in the middle and retaining the fingering of the valves in subsequent semitone-steps from the shortest to the longest. Paine's E♭ bugle thus represents an important link between the reversed valve order and the normal construction known today.

Four American instruments in the list, built 1851 and later, have top-action string-operated rotary valves; one, the Boston Musical Instrument Manufactory soprano cornet, has side-action string-operated rotary valves (Figure 35a, b). These are the two typical forms of rotary valves in the U.S. in the middle and the second half of the nineteenth century.

The unsigned cornet in the Utley Collection (Utley/NMM, 7023, Figure 36) has so-called Allen valves. This valve type was developed by Lathrop Allen between 1847 and 1852. The rotors are much smaller in diameter than in normal rotary valves, but longer. The tubing is flattened where it enters and leaves the rotor. Such a rotor was considered faster, simply because of its smaller diameter.

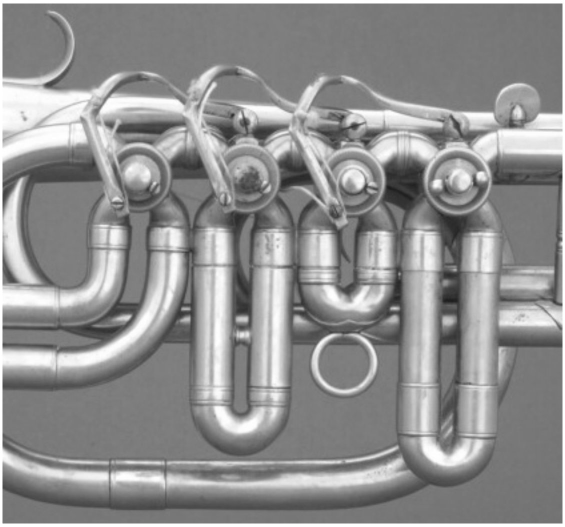


Figure 36
Cornet, unsigned (American), ca. 1860. (Utley/NMM, 7023). Allen rotors (Photo: Mark Olencki).

Number of valves

So far it has become obvious that instruments with the semitone valve first were predominantly an early phenomenon in the history of valved brasses. Therefore it is not surprising that almost half of all the instruments listed in Table 1 have only two valves. The earliest dated two-valve instrument on the list is the Michael Saurle trumpet in Nördlingen, but Friedrich Wilhelm Schuster's two-valve trumpet might be even earlier. The latest two-valve instrument listed was built after 1853: it is the James Reynolds trumpet in Bad Säckingen. As can be seen from Chart 5, the peak of instruments with two valves was reached in the 1830s. In the 1840s two-valve instruments are just slightly more frequent than three-valve instruments, after which time the latter outnumber the former.

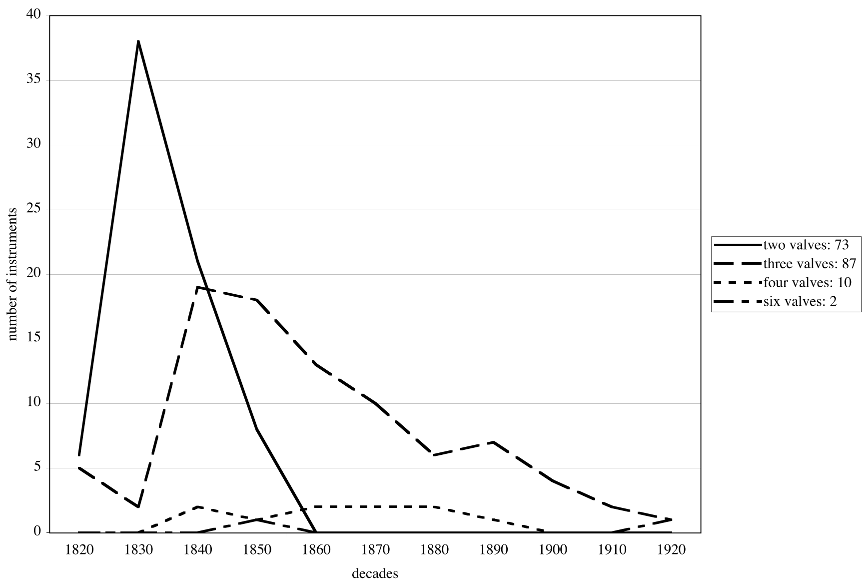


Chart 5
Chronological distribution of first-valve-semitone instruments, according to number of valves.

Although Stölzel's and Blühmel's first constructions were predominantly two-valve instruments, a three-valve trombone is mentioned in Blühmel's patent proposal from 1818. Christian Friedrich Sattler built three-valve horns with Stölzel valves as early as 1819.[36]

The earliest three-valve instruments with the configuration descending semitone/whole tone/minor third are the two Russian instruments from St. Petersburg and the bass trumpet by Friedrich Wilhelm Schuster, now in Berlin (no. 3104). Schuster's bass trumpet in 9-ft. B♭ shows the same construction as his two-valve E♭ trumpet mentioned above. He probably chose the number of valves according to the pitch of the instrument, using three valves for the lower-pitched instruments, for which the intonation problems would have been greater when only two valves were used than in higher-pitched trumpets.

The situation in Munich was remarkably different. There the makers seem to have persisted in making two-valve instruments regardless of pitch until the mid-1840s, with only one exception, the valve ophicleide by Michael Saurle. However, a remark in Saurle's price list from 1826/1840 raises slight doubts about the reliability of the surviving instruments in respect to this question. He says,

> Alle diese hier verzeichneten Chromatischen Instrumenten mit Vendille sind mit 2 Höble. Die mit 3 Höble kostet jedes Stück um 5 fl. mehr.[37]

> All the chromatic instruments with valves listed here are with 2 levers. Those with 3 levers cost an additional 5 fl. each.

Instruments with more than three valves can be found between the 1840s and the 1920s (see Chart 5).

Instruments with valves and keys and the possible origins of reversed valve order

Some instruments combine valves and keys. As can be seen in Chart 6, their chronological range is from the 1830s to the 1860s; written sources hint at their use even later.

The three cornopeans from or built for the British Isles, signed by Richard Garrett, Frederick Pace, and Metzler/Corcoran, respectively, have the typical English "clapper key," which was designed as a trill key. George Macfarlane patented this device in France in 1845. However, the cornopean by Richard Garrett was built considerably earlier, between 1826 and 1834 (Figure 37).

On the trumpet/cornet in B♭ by Lathrop Allen at Colby College, the key seems to have been used to improve intonation; obviously this did not work on the first attempt, since the position of the key was altered. The E♭ valved-and-keyed bugle by Thomas D. Paine, now in Warrensburg, with two treble keys and its peculiar, key-like valve touch-pieces, is very closely related to the keyed bugle.

The keyed bugle may in fact have played an important role in the development and persistent use of the reversed valve order. From written sources as well as surviving instruments, a striking conclusion can be made: To the best of our knowledge, fluegelhorns were the only instruments equipped with trill keys in Bavaria. Documentary references to fluegelhorns with trill keys can be found between 1856 (a handwritten price list by Johann Baptist Riefler, Maria-Rhein) and ca. 1879 (a price list of instruments by Anton Betzenhammer in Munich).[38] There are three fluegelhorns with trill key listed in Table 1: one is by Georg Ottensteiner, another is by Andreas Barth (Figure 38a, b), and the third one is unsigned, but is most likely from Bavaria as well. All three are in 4-ft. C and were built in the 1860s; the Barth fluegelhorn is actually dated 1863. The instrument by Barth has four valves, while the other two fluegelhorns have three valves.

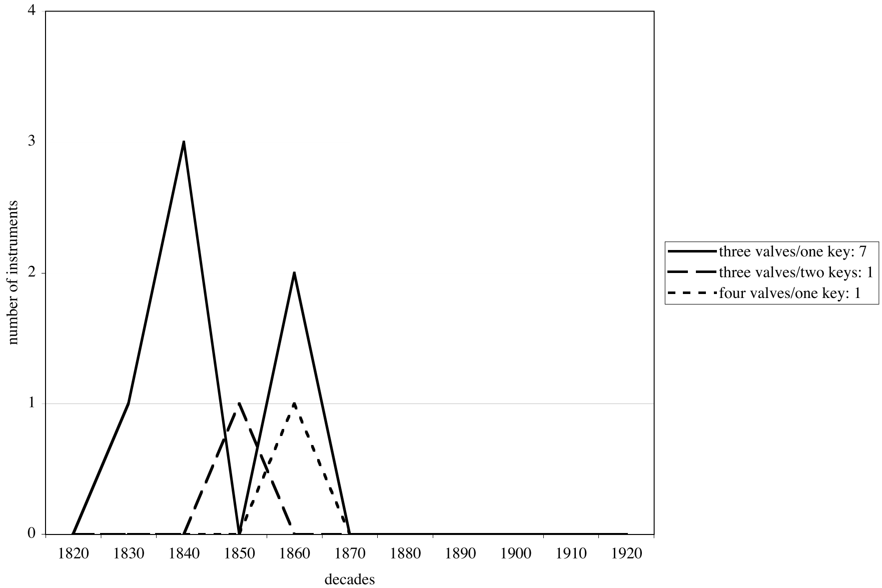


Chart 6
Chronological distribution of first-valve-semitone instruments with both valves and keys.

Figure 37
Cornopean in B♭ (A, A♭ and G) by Richard Garrett, London, ca. 1830, with typical clapper key (NMM, 0438. Photo: Bill Willroth Sr.).

Figure 38a, b
Fluegelhorn in C by Andreas Barth, Munich, 1863, with four valves, lowering the pitch one, two, three, and four semitones, respectively, and trill key (GNM, MI 317).

The Barth fluegelhorn is a particularly remarkable instrument, though it seems a rather late source to provide a possible answer to the question of the origin of the reversed valve sequence. The key is a closed trill key; the four valves of this instrument lower the pitch one, two, three, and four semitones respectively. The shape and construction of all three of these fluegelhorns with trill key represent virtually an unaltered adaptation of the keyed bugle. Barth even uses the material common for English keyed bugles, a copper alloy.

Erich Tremmel published a very important document about the invention in 1832 of a *chromatisches Fluegelhorn* by Michael Saurle.[39] Unlike Stölzel, who developed his valved horn from a natural hand horn (and who was rather condescending in his view of contemporary attempts to develop keyed horns),[40] Saurle understood his invention of a chromatic fluegelhorn as an improvement of the keyed bugle. He built keyed bugles in much the same style as the typical English ones. A large number of them survive, and they are also listed in his price list from 1826/1840. Concerning his new invention of a chromatic fluegelhorn, Saurle writes,

> Die bisher bey jeder Blechmusik eingeführten Klappen=Flügelhörner waren zur Hervorbringung reiner und wohlklingender Töne keineswegs geeignet und eine Verbesserung derselben oder die Erfindung eines ganz neuen Instruments wurde allgemein gewünscht… Ich habe nun ein neues Blase=Instrument erfunden, welchem ich den Namen: "**Chromatisches Flügelhorn**" [bold type original] beylege, das neben der größeren Reinheit der Töne insbesondere das vor dem gewöhnlichen Klappen=Flügelhorn voraus hat, daß es sechs Töne mehr hat als Letzteres, nehmlich vom unteren H an, auch noch das B, A, As, G und Fis, ferner dass man durch die aufzusteckenden Bögen eine Vertiefung der Tonarten, und zwar mittels der angebrachten Züge oder Pumpen, ganz rein und wohltönend bewerkstelligen kann.[41]

> The keyed bugels used in every brass band until now were not at all suitable for the production of pure and good-sounding notes, and an improvement to them or the invention of an entirely new instrument was widely desired…. I have now invented a new wind instrument, which I have given the name "**chromatic fluegelhorn,**" that has, in addition to a much purer sound, an advantage over the common keyed bugles in that it has six more notes, namely starting from the low B, also the B♭, A, A♭, G, and F♯; moreover, by adding crooks one can achieve a completely pure and euphonious lowering of the instrument's pitch, by means of the built-on slides or pistons.

It appears that Saurle's chromatic fluegelhorn, of which no example seems to have survived, was an instrument in 4-ft. C. It probably had no keys, but three valves in descending-semitone order for *b, b♭,* and *a,* offering also the notes *a♭* when combining the semitone and minor third, *g* by combining the whole tone and the minor third, and *f♯* by using all three valves together. When "improving" a keyed bugle by substituting valves for keys, it was obvious that it was necessary to keep the consecutive semitone order. The only difference between the keyed bugle and the valved fluegelhorn was that the notes ascended when opening the closed keys and descended when operating the valves. However, there was one exception to this rule in the construction of a keyed bugle: The lowest key was usually an open key; operating it lowered the pitch. The separate mention of the note *b* in Saurle's description might refer to this construction: the note *b* was already obtainable with the lowest key of a keyed bugle in C. Such keyed bugles in C by Saurle with an open key for *b* survive for example at the GNM and in Halle.[42] We therefore propose that the valved fluegelhorn was developed as an extension of the function of the open key of a keyed bugle.

If one added valves to a natural instrument, as Stölzel did, all choices, including the arrangement of the valve order, were open. On the other hand, having a keyed bugle as a model naturally led to the order of progressing semitone steps. Probably a certain amount of historical memory is still present in the Barth fluegelhorn from 1863; after all, he was around in 1832 when Saurle invented his fluegelhorn. It might have been this memory of the keyed bugle that led to the continued equipping of fluegelhorns with trill keys in Bavaria.

So the question of the origin of the reversed valve order can now be answered—at least for the Bavarian fluegelhorn with its clear roots in the keyed bugle: It was a transformation of a "keyed fluegelhorn" to a "valved fluegelhorn." However, two-valve trumpets had the semitone first in Bavaria even before the chromatic fluegelhorn was invented.

From a player's point of view as well as from a purely intuitive standpoint, a progression of semitone steps from the shortest to the longest tube length or a regular sequence from the highest to the lowest note is clearly more logical than the modern pattern. Only the constructional advantage of having the shortest valve loop in the middle could justify the development and later standardization of the valve order we know in brass instruments today. This constructional element became relevant only for instruments with more than two valves. Early makers of two-valve instrument with whole-tone valve first may have wished to favor the more important diatonic step over the chromatic step, by assigning it to the index finger.

Which hand operates the valves?

In a price list of Anton Betzenhammer's from ca. 1879, we read the following sentence:

> Bei werthen Aufträgen wolle gefällig genau angegeben werden, ob das Instrument für rechte oder linke Hand.
>
> With your esteemed commissions, you are respectfully requested to specify whether the instrument is for the right or the left hand.

Thus, the customer could decide—at least in Bavaria—whether the instrument should be left- or right-handed. One would expect left-handed instruments to be preferred by left-handed people and right-handed ones by right-handed people. Since there are fewer left-handed people than right-handed, one would expect more right-handed than left-handed instruments. This is actually confirmed in Chart 7 by the two more or less parallel curves of right- and left-handed trumpets, the former being generally more numerous than the latter.

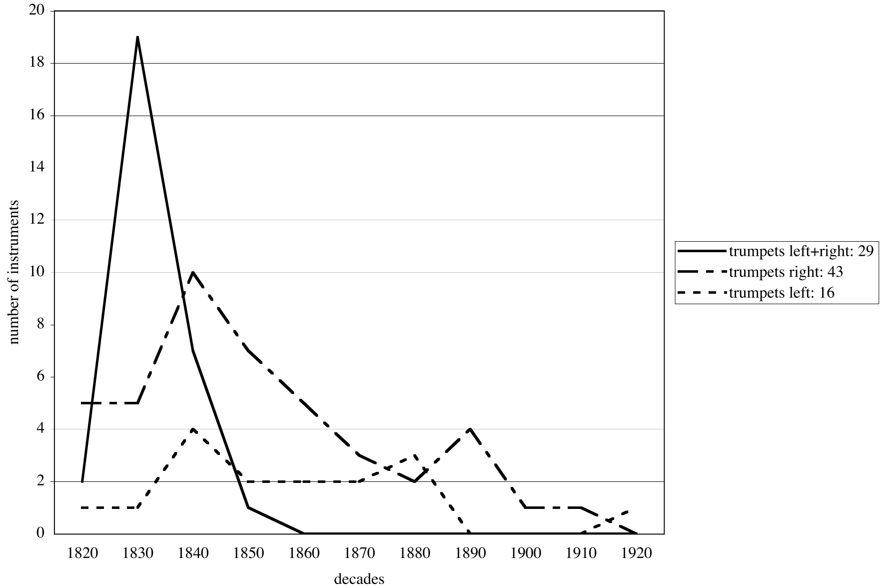


Chart 7
Chronological distribution of left- and right-handed trumpets.

One might also ask whether personal preference was the only criterion that determined which hand operated the valves, or if there were also certain traditions that influenced construction. The issue is closely related to Richard J. Martz' discussion of left- vs. right-handed horns, in this issue.[43] Keyed trumpets, for example, were more often left-handed, according to Heyde, because they followed the natural-trumpet tradition of being held with the right hand; thus only the left hand was free to operate the keys.[44]

In Bavaria the reason for the free choice of right-handed or left-handed instruments until the early twentieth century seems to have its roots in early valve constructions, or perhaps the keyed bugle. It is astonishing that there seem to be no surviving Barth or Saurle keyed trumpets, although the latter's price list from 1826/40, mentioned above, lists them.[45] On the other hand, there are many surviving keyed bugles from both workshops, as already mentioned. The main difference between the Austrian-type keyed trumpet and the keyed bugle, invented in England and copied in Bavaria, is the way they were held. The former was played with one hand only, the latter with both hands. If one assumes that the surviving keyed bugles from Bavaria are in fact an indication for customary performance practices, one can conclude that playing with both hands was quite common. It is therefore not surprising that the earliest valve instruments—double-piston valve trumpets with long levers—were constructed to be playable with both hands. However, it was also possible to play these valve trumpets with the left or the right hand only. A two-valve double-piston trumpet with long levers is shown by Kastner being played with the right hand.[46] As can be seen in Chart 7, instruments leaving all choices open—to be played with the left, the right, or with both hands—were most frequent in the 1830s, the heyday of the double-piston valve construction with long levers.

When Michael Saurle introduced the clock-spring action to operate his double-piston valves, his Bavarian customers faced a new situation: they were now forced to abandon their former freedom of choice—left-handed, right-handed, or both hands, following their daily mood—and had to decide once and for all with which hand a new instrument should be played. Also, it was necessary to communicate this decision to the maker. Therefore, Saurle asked his clients to provide the following information when they ordered instruments with double-piston valves and the new clock-spring action:

> Auch ist bey semtlichen Chromatischen Instrumenten zu bemerken, ob der Blöser die Maschine mit der rechten oder linken Hand Dirigiren will.[47]
>
> For all chromatic instruments one should specify whether the player wants to operate the mechanism with the right or left hand.

It is remarkable that this possibility to choose right- or left-handed playing continued until the very end of the time period under consideration here. The latest left-handed trumpet with reversed valve order in Table 1 was built by Anton Schöpf in Munich between 1914 and 1931. It is a quite modern instrument, with a quick-change from C to B♭.

Fixed and interchangeable valve configuration

In an advertisement that appeared twice in the *Musical Times* early in 1850, Robert Bradshaw described his "New Patent Serpentine Valve Cornopean." After praising its advantages of having a clearer tone, resulting from the serpentine windway, he added the following comment: "The superiority of this instrument is much increased from its capability of being altered to any fingering that may be required by changing the valve slides, and its being also much easier blown."[48] Bradshaw's cornopean in the John Webb Collection has this configuration of interchangeable valve slides; it can be played with the semitone either as first or second valve by changing the valve slides. Bradshaw's cornopean in Brussels however, has a fixed valve order of semitone, whole tone, minor third.

Besides Bradshaw's cornopean, the trumpet/cornet by Lathrop Allen with one key shows the interchangeable valve order, as does the Hirsbrunner trumpet at the GNM (Figure 19). Further, two unsigned instruments, one cornet of American provenance in the

Utley Collection (Figure 6a, b) and one short-model fluegelhorn of presumably Bavarian origin in the private collection of Maximilian Goldgruber (Figure 39), have this feature of interchangeability.

Figure 39
Fluegelhorn, unsigned, Bavaria?, ca. 1890 (Goldgruber Collection).

The constructional characteristic of the interchangeable valve order can be seen in Figure 39, in the equal length of the internal part of the first and the second valve slides and their receivers. They may be either moving inner slides and equal-length outer slide receivers, as on this Bavarian fluegelhorn; or moving outer slides, as on the Bradshaw cornopean in the Webb collection—in which case equal length of the inner slide tube receivers is required.

The situation concerning the valve slides in the fixed valve order is more complex and partly deceiving. Apart from instruments with no slides or just one slide, where the fixed design is obvious at first glance, four different constructions of the moving slides can be distinguished:

outer slides for both valves
inner slides for both valves
inner slides for one valve, outer slides for the other
one inner and one outer slide for each valve.

The situation of the fixed arrangement is clear, even without pulling out the slides, when one valve has inner moving slides and the other one has outer moving slides, as can clearly be seen in Figure 18. However, sometimes it is not clear whether this construction is actually present or not; an example of this arrangement can be seen in the valves added by an unknown maker to the Kerner natural trumpet in Bad Tölz (Figure 40a, b).

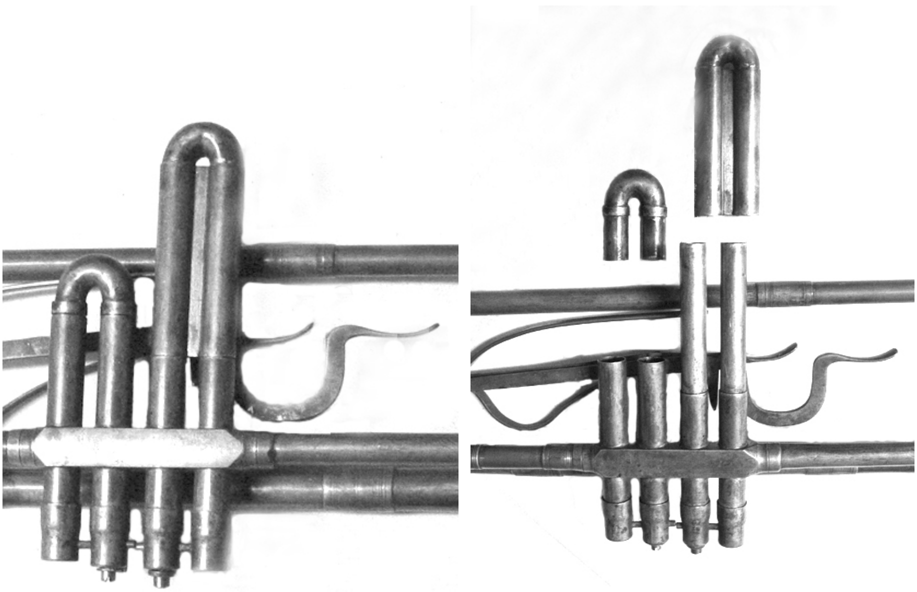


Figure 40a, b
Valve-slide construction of the Kerner trumpet in G, Vienna/Bavaria?, 1806/ca. 1830 (Bad Tölz, 8002/869).

Here it appears that the second valve—although clearly the whole-tone valve—might have shorter inner moving slides than the semitone first valve. The construction turns out to be a combination of inner moving slides for the first and outer moving slides for the second valve. The same construction can be suspected for the 1838 trumpet by Georg Saurle (Figure 21), particularly since the crosspieces at the slides (Figure 41) most likely determine the valve order. However, since only the first valve slide and not the second can be pulled out, conclusive evidence for fixed construction cannot be obtained at present; there is a slim chance that the second valve could have moving inner slides too, in which case the valve loops would be interchangeable.

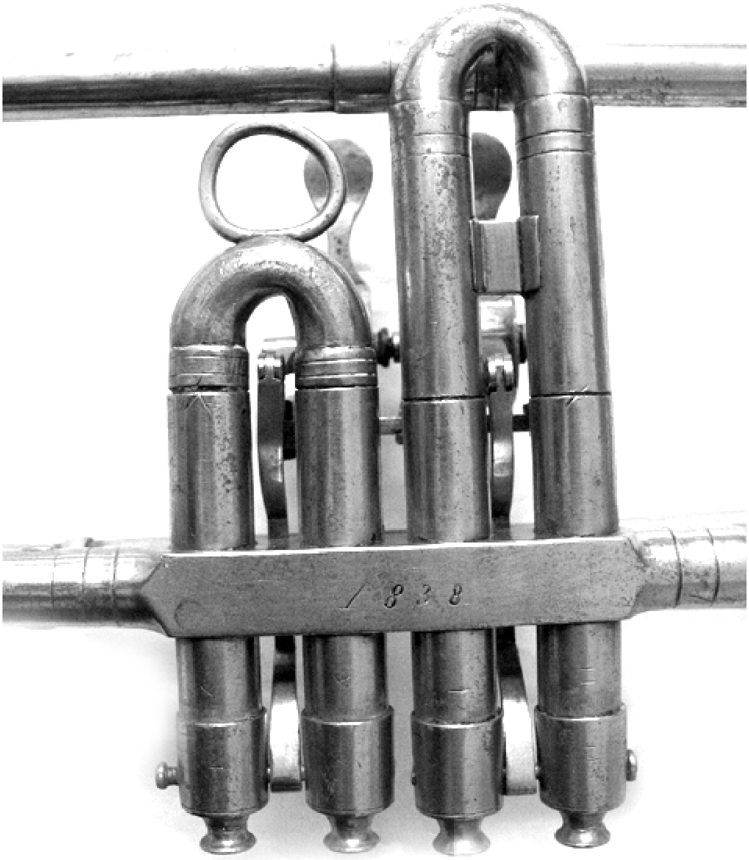


Figure 41
Trumpet by Georg Saurle, Munich, 1838 (BNM, MU 201), valve slides.

The fixed construction is clear in those instruments with inner moving slides for which the outer slide-tube receivers of the first valve are shorter than those for the second valve. This can be seen for example in Figures 4b and 7b. Instruments with inner moving slides in which the outer slide tube receivers have the same or almost the same length are suspect of interchangeability and need to be investigated.

On instruments with two moving outer slides it cannot be determined whether the construction is fixed or interchangeable without pulling out the slides, since the inner slide tube receivers could be either of the same length, in which case the slides would be interchangeable, or of different length, thereby indicating fixed construction. An example of such a situation can be seen in Figure 27; here the fixed construction could be confirmed by measuring the length of the inner slide tube receivers, which were shorter for the first and longer for the second valve.

On instruments with one inner and one outer moving slide for each of the valves the fixed construction is obvious, since one of the outer slide tube receivers must be longer than the other (Figure 42).

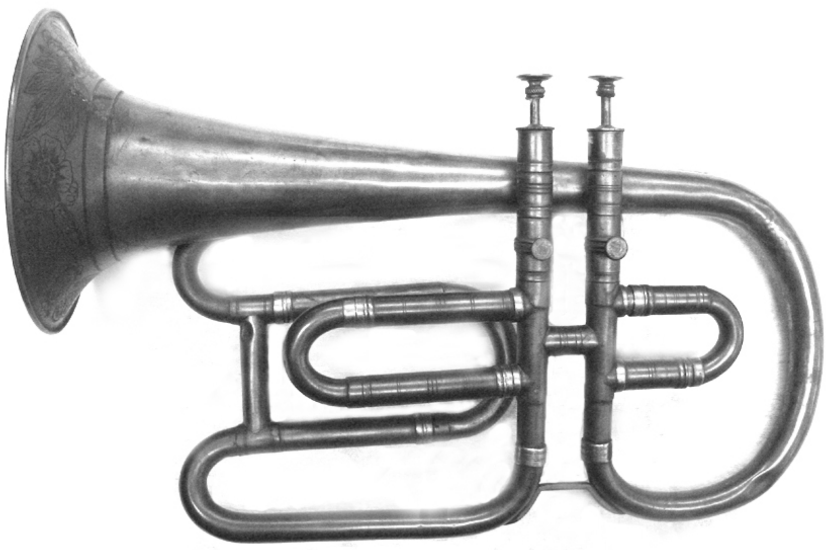


Figure 42
Cornopean in B♭, unsigned, probably Johann Adam Heckel, Dresden, ca. 1838 (Markneukirchen, 71), with one inner and one outer moving slide for each valve.

As was mentioned at the outset, it was not possible to check all the valve constructions by pulling out the slides, either because the slides were frozen or the instruments could not be examined personally. Despite this restriction, the data gathered here offers a rather clear picture of the relationship between fixed and interchangeable constructions, as can be seen in Chart 8.

Of the instruments examined or known from the literature, 158 (92%) have the fixed valve order semitone = first valve and whole tone = second valve, beyond doubt. Five instruments (3%) have interchangeable slides and three more (2%) are suspected to be interchangeable. The remainder, six instruments in all (3%), are most likely of the fixed construction, but this could not be confirmed. The number of instruments with interchangeable valve order may be slightly higher than indicated above, as it is impossible to know how many instruments known only with the regular, modern valve order are in fact

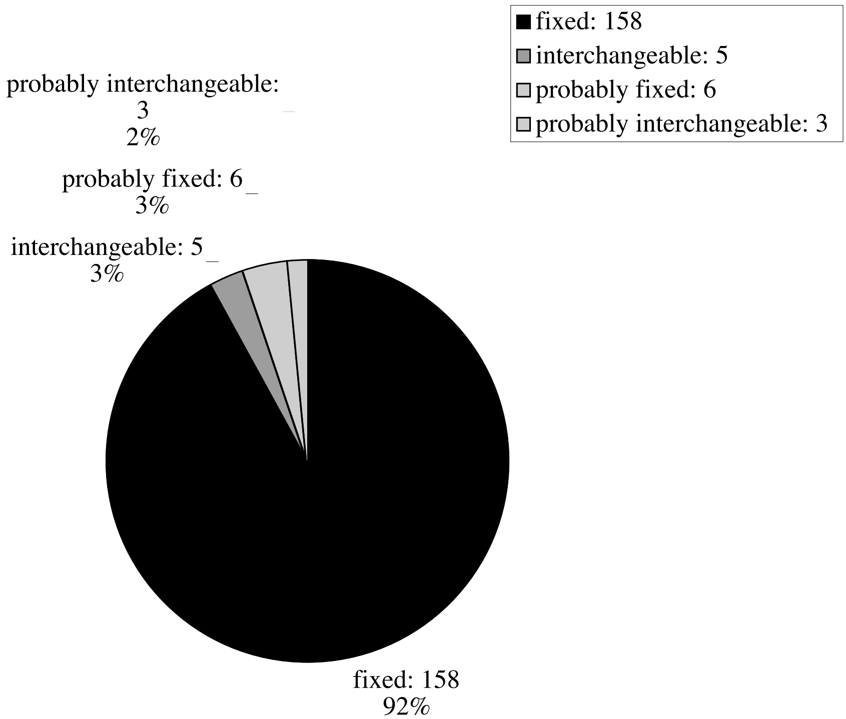


Chart 8
Fixed and interchangeable valve order.

interchangeable. However, there seems to be another factor that probably supports the results demonstrated in Chart 8—the advertisements discussed above and below. Most of these ads request the customer to choose between one *or* the other position of the semitone valve, *before* the instrument is made. Only Bradshaw leaves this choice open *after* the instrument is finished.

Other patterns of deviating valve order

There are some instruments listed in Table 1 whose valve order deviates from the normal fingering in a manner other than descending semitone/whole tone/minor third.[49] Among them is the earliest dated instrument with the semitone-valve-first known to the authors. It is the trumpet by Nathan Adams, which is inscribed on three plates, *Permutation Trumpet, Invented and Made by N. Adams, Lowell, Mass.* and *Paul Heald, Carlisle, Mass. 1825.*[50] According to Eliason, the latter is probably the owner's name. This trumpet in F and another one, which Eliason also attributes to Adams, have the valve sequence semitone, minor third, whole tone.

Figure 43
Alto saxhorn in E♭ by Adolphe Sax, Paris, 1867, with six independent valves in ascending semitone steps. The open instrument provides the longest tube length, the first valve the shortest
(Utley/NMM, 7076. Photo: Mark Olencki).

The Johann Gottfried Kersten horn in Edinburgh has a first valve that can be changed from descending to ascending semitone. The unsigned trumpet GNM MI 291 has a valve configuration in which the first valve is a whole tone and the second valve is a minor third. The valves of the early horn by Dürrschmidt (Ingolstadt, no. 2683) lower the pitch two and four semitones respectively in relation to the B♭ pitch in which it is preserved. This instrument may originally have had additional crooks for lower pitches, like the very similar Hirsbrunner horn in the Burri Collection (no. 587); in relationship to these crooks the two valves might have lowered the pitch just a semitone and a whole tone, respectively.

A further system, not taken into account in Table 1, that is based on consecutive semitone steps, but ascending rather than descending, can be seen in Adolphe Sax's patent for six independent valves from October 1852 (brevet français no. 14608, Figure 43). This construction was intended to create perfect intonation and reflects the seven positions of the trombone, which are also a sequence of semitone steps. The obvious connection between the Sax six-valve-system and trombone slide positions may provide a clue to the origin of the pattern of consecutive semitone steps, apart from the keyed bugle connection elaborated above. Trombone slide positions possibly played a role in this development as well.

Documentary references to reversed valve order

In addition to the instruments themselves, documents offer evidence for the reversed valve order in different regions and over certain time periods, as we have seen above. More such material will be discussed here.

Two sources confirm the existence of a new kind of chromatic trumpet in Bavaria in 1826, just two years before the first surviving Michael Saurle instrument with reversed valve order. The first document is an inventory from February 1826 of the *Blech-Harmonie* of the *1. Jäger Batallion*, the brass band of the First Fusilier Battalion in Burghausen, mentioning the following purchase: *1 grommatische F. Trompete* (one chromatic F trumpet).[51] The condition of this instrument is stated as *neu* (new). Only two months later, in April 1826, Michael Saurle mentions valve trumpets among *Inventionstrompeten* and keyed bugles in a letter:

> Die neue Art Gromatische Trompeten, mit denen man alle ganzen und halben Thöne mitels zwey angebrachten Maschin Klappen machen kann, und ohne einen Bogen aufzustecken aus 4 ThonArten blasen kann, welche besonders empfehlens Werth sind. Man kann sie in jedem beliebigen Thon bestellen und komt zum Beyspil eine F Trompete mit e, es, D & C Stimmung und Mundstück auf 30 fl. zu stehen.[52]

> The new kind of chromatic trumpets, with which one can produce all whole steps and half steps with the help of two mechanical keys, and without adding a crook, can play in 4 keys, are particularly to be recommended. One can order them in any key, and an F trumpet, for example, with E, E♭, D, and C tuning and mouthpiece is priced at 30 fl.

The price of "30 fl." is exactly what the First Fusilier Battalion in Burghausen paid for their valve trumpet, so it is likely that it came from the Saurle workshop. There is no specific mention of the valve order in these sources. However, it is more than likely that they refer to instruments similar to the ones from the Saurle workshop discussed above. Also, no mention is made of the valve order in Saurle's price list from 1826/40. Therefore one can conclude that valve order was not an issue of choice at that time. The semitone was always first, as can be seen in all the preserved Saurle instruments.

Only later in the century do Bavarian sources document that the customer could chose which valve should be positioned first. Around 1879 Anton Betzenhammer's customers in Munich, for example, had to determine whether they wanted to have the semitone first or second, as is obvious from the following remark in a price list of his instruments:

> Bei werthen Aufträgen wolle gefällig genau angegeben werden, ob … der halbe Ton am 1. oder 2. Cylinder, bei hoch C Trompeten: ob kurz oder lang gewunden.[53]

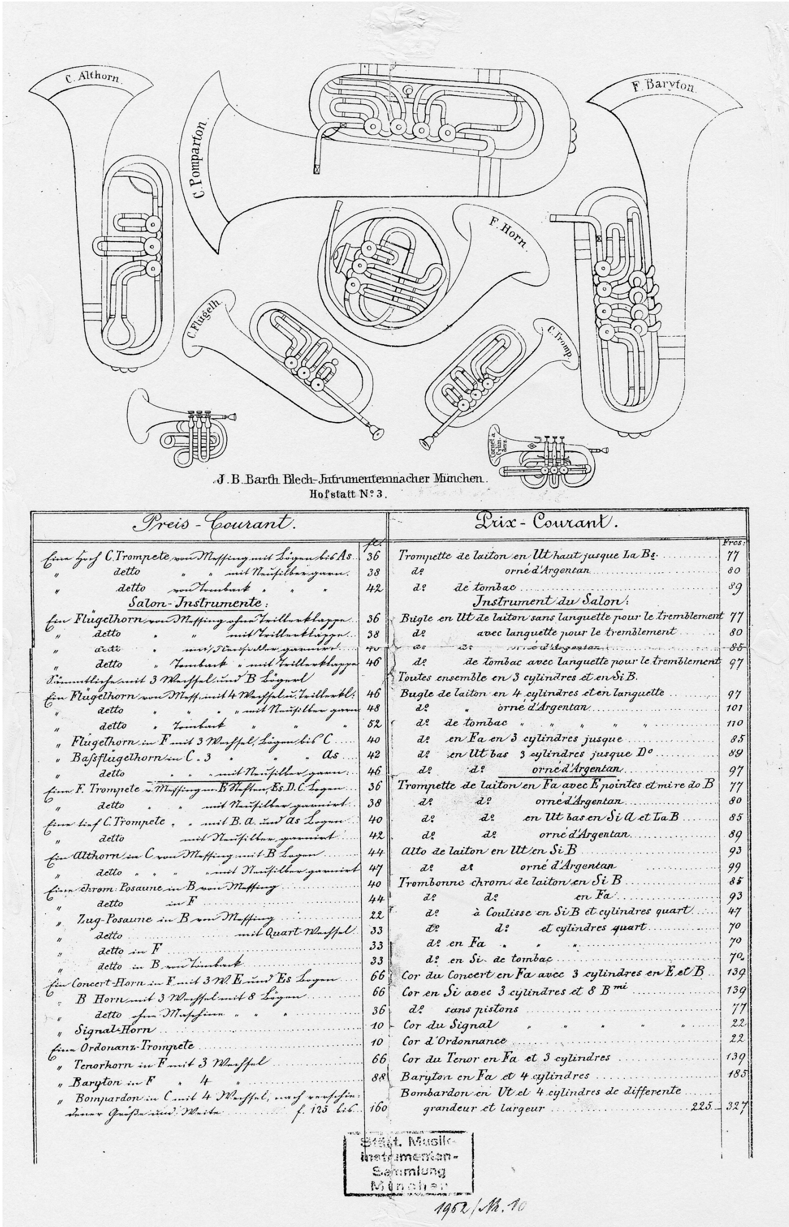
> With your esteemed commissions, you are respectfully requested to specify whether … the semitone is to be on the first or the second rotor; high C trumpets, whether short or long model.

An order from the First Royal Bavarian Army Corps' First Pioneer Battalion in Ingolstadt, dated 23 April 1884, shows how a response to this request might have looked. This order is addressed to Ferdinand Stegmaier, brass instrument maker in that city. The instruments ordered were a B♭ and an E♭ *cornet à piston* and a horn. The features of these instruments were specified as follows:

> 1. Das Instrument muß leicht bläsig, rein gestimmt und so gebaut sein, daß der Bläser nicht durch eine zu hoch oder zu tief liegende Maschine in seiner technischen Ausübung gehindert ist. Die Chromatik soll mit der rechten Hand zu spielen sein, der halbe Ton ist auf den Zeigefinger, der ganze Ton auf den Mittelfinger zu richten; neueste Verbesserung. Solo Qualität; zu jedem Instrument zwei Mundstücke & die nötigen Bögen.[54]

> 1. The instrument has to be easy blowing, perfectly tuned, and so constructed that the player is not hindered in his technical execution by an action that is positioned too high or too low. The chromatic [valves] should be playable with the right hand; the semitone is to be positioned for the index finger, the whole tone for the middle finger; newest improvement. Solo quality; for every instrument, two mouthpieces & the necessary crooks.

Erich Tremmel published several Bavarian price lists, mentioned above,[55] illustrating many instruments with the reversed valve order. A price list of Andreas Barth's legal son Johann Baptist Barth, from after ca. 1875 (Figure 44), can be added to Tremmel's lists.



Preis-Courant.	fl.	Prix-Courant.	Frcs:
Eine hohe C. Trompete von Messing mit Bögen bis As	36	Trompette de laiton en Ut haut jusque La B^s.	77
" detto " " mit Neusilber garn.	38	d° orné d'Argentan	80
" detto von Tombak " " "	42	d° de tombac	89
Salon-Instrumente:		Instrument du Salon:	
Ein Flügelhorn von Messing ohne Trillerklappe	36	Bugle en Ut de laiton sans languette pour le tremblement	77
" detto " " mit Trillerklappe	38	d° avec languette pour le tremblement	80
" detto " mit Neusilber garnirt	40	d° d° orné d'Argentan	85
" detto " Tombak " mit Trillerklappe	46	d° de tombac avec languette pour le tremblement	97
Sämmtliche mit 3 Wechsel und B Bögen		Toutes ensemble en 3 cylindres et en Si B.	
Ein Flügelhorn von Mess. mit 4 Wechseln u. Trillerkl.	46	Bugle de laiton en 4 cylindres et en languette	97
" detto " " " " mit Neusilber garn.	48	d° " orné d'Argentan	101
" detto " Tombak " " "	52	d° de tombac " " " " "	110
" Flügelhorn in F mit 3 Wechsel, Bögen bis C	40	d° en Fa en 3 cylindres jusque	85
" Bassflügelhorn in C. 3 " " " As	42	d° en Ut bas 3 cylindres jusque D°	89
" detto " " " mit Neusilber garn.	46	d° d° orné d'Argentan	97
Eine F. Trompete v. Messing m. E Aufsatz, Es. D. C. Bögen	36	Trompette de laiton en Fa avec E pointes et mire do B	77
" detto " " mit Neusilber garnirt	38	d° d° orné d'Argentan	80
Eine tief C. Trompete " " mit B. A. und As Bögen	40	d° d° en Ut bas en Si A et La B	85
" detto mit Neusilber garnirt	42	d° d° orné d'Argentan	89
Ein Althorn in C von Messing mit B Bögen	44	Alto de laiton en Ut en Si B	93
" detto " " " " mit Neusilber garnirt	47	d° d° orné d'Argentan	99
Eine chrom. Posaune in B von Messing	40	Trombonne chrom. de laiton en Si B	85
" detto in F	44	d° d° en Fa	93
" Zug-Posaune in B von Messing	22	d° à Coulisse en Si B et cylindres quart	47
" detto mit Quart-Wechsel	33	d° d° et cylindres quart	70
" detto in F	33	d° en Fa " " "	70
" detto in B von Tombak	33	d° en Si de tombac	70
Ein Concert-Horn in F mit 3 W. E und Es Bögen	66	Cor du Concert en Fa avec 3 cylindres en E et B	139
" B Horn mit 3 Wechsel mit 8 Bögen	66	Cor en Si avec 3 cylindres et 8 B^{mi}	139
" detto ohne Maschine " " "	36	d° sans pistons	77
" Signal-Horn	10	Cor du Signal " " " " "	22
Eine Ordonanz-Trompete	10	Cor d'Ordonnance	22
" Tenorhorn in F mit 3 Wechsel	66	Cor du Tenor en Fa et 3 cylindres	139
" Baryton in F " 4 "	88	Baryton en Fa et 4 cylindres	185
" Bompardon in C mit 4 Wechsel, nach verschiedener Größe und Weite f. 125 bis	160	Bombardon en Ut et 4 cylindres de differente grandeur et largeur 225 –	327

Figure 44
Bilingual German-French price list by Johann Baptist Barth, Munich, ca. 1875 (M Stadtmuseum, 1952/no. 10. Photo: Münchner Stadtmuseum).

Some of the models advertised here are recognizably similar to instruments by Andreas Barth in Table 1. The cornopean or *cornet à piston* has already been mentioned. There are also several different versions of fluegelhorns with a trill key, interestingly listed among the *Salon-Instrumente.* All instruments shown in Barth's price list, with the exception of one, the *cornet à cylindre* in the lower right corner, have the semitone valve positioned first.

Herbert Heyde published brochures and price lists from Markneukirchen in the appendix of his *Ventilblasinstrument*, in which several instruments have the reversed valve order; in addition, he reproduced sketches, made for brochures, of instruments with this feature. While Heyde's published material is plentiful, there is still more to be found in the archives of the Markneukirchen Musikinstrumenten-Museum. A rich source is a convolute of drawings of instruments from the estate of the mid-nineteenth-century music teacher and technical draftsman Wilhelm Petzold of Markneukirchen.[56] Among them is a fingering chart for a chromatic alto trombone in E♭, which shows the reversed valve order (Figure 45).[57] This particular sheet is not dated; however, several similar drawings of other instruments with fingering-charts follow, one of which bears the inscription *Am 24. Nov. 1848 Gustav Kämpfe gemacht* ("On 24 November 1848, made by Gustav Kämpfe"). According to Heyde, Petzold made these drawings for Kämpfe, who was an instrument maker.[58] Gustav Kämpfe must have been a member of the Kämpfe family, who were active in Markneukirchen as dealers and musical instrument makers from 1806.[59]

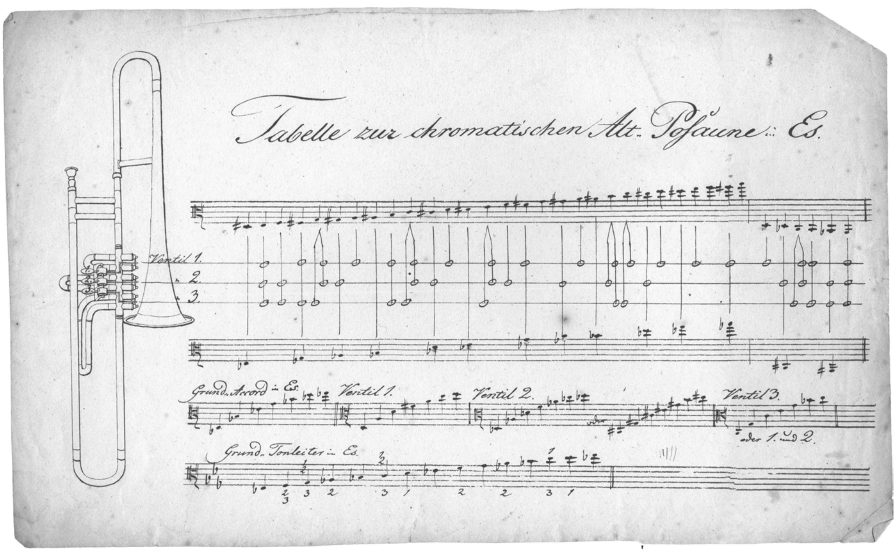


Figure 45

Fingering chart of an alto valve trombone in E♭, Markneukirchen, ca. 1848 (Markneukirchen, F 29, no. 74.1. Photo: Musikinstrumenten-Museum Markneukirchen).

This convolute includes drawings not only of instruments produced in Markneukirchen, but also instruments from other nations, which obviously influenced local production. Among the instruments with reversed valve order is, for example, a *cors harmonie, & système Gautrot*, no. 178 in a draft entitled *Manufacture Génerale Instruments de Musique Gautrot ainé, Rue Sainte Louis 60*. This indicates that the depicted models must be from the production of the Parisian firm of Gautrot between 1853 and 1856, when it resided at this address. Considering this source, one wonders whether Gautrot *ainé's* cornet, mentioned above, is an exclusive production for the Bavarian market or if the reversed valve order was common in France as well. In fact, there is no indication in this particular Markneukirchen source that the instruments described were destined for Bavaria. We can therefore assume that the reversed valve order was in production in Markneukirchen by at least the mid-nineteenth century for other regions as well.

From later sources, however, it becomes obvious that instruments with reversed valve order built in Saxony were primarily destined for the south-German or Bavarian market by the end of the nineteenth century and into the early twentieth. In an illustrated price list from ca. 1900 by the firm of August Clemens Glier in Markneukirchen, we find the following remark:

> Endlich ist bei Instrumenten, die für Süddeutschland bestimmt sind, vorzuschreiben, ob das kleine 1/2-Ton-Ventil nach oben oder in die Mitte kommen soll, sowie auch die Bauart kurz oder lang gewünscht wird.[60]
>
> Finally, for instruments going to south Germany, one should determine whether the small 1/2-tone valve should be on top or in the middle, also whether one desires the short or the long construction.

A similar remark is found in Wilhelm Paulus' *Haupt-Katalog über Musik-Instrumente und Saiten* of ca. 1906, also from Markneukirchen:

> Ferner ob bei Instrumenten nach Süd-Deutschland der halbe Ton auf den 1. oder 2. Finger zu legen ist, bitte ich ebenfalls angeben zu wollen.[61]
>
> Further, for instruments destined for south Germany, I should like to know whether the semitone should be placed for the first or the second finger.

In a catalogue by the Markneukirchen dealer Wilhelm Kruse from ca. 1932, the south-German destination is specified more clearly as Bavaria:

> Bei Bestellungen aus Bayern bitte ich anzugeben, ob der Halbton auf dem **ersten** oder **zweiten** Ventil gewünscht wird.[62]
>
> For orders from Bavaria I would like to know whether the semitone should be placed at the first or the second valve.

Herbert Heyde mentions a similar entry in the main catalogue no. 39 of the dealers Meinel & Herold in Klingental, near Markneukirchen, as late as ca. 1935.[63]

In Andreas Masel's book on bands in Bavaria, several photos clearly show the use of brass instruments with reversed valve order well into the twentieth century, for example in the Musikkapelle Bichl near Benediktbeuren, ca. 1890/1900; the Kapelle Schmid in Prien, shortly after 1900; the Feld-Artillerie Regiment "Prinzregent Luitpold," ca. 1910; and as late as 1924 in the Stadtkapelle Pfaffenhofen.[64]

The valve sequence semitone, whole tone, minor third is still known today as a historical phenomenon in south Germany and in organology as a whole under the term "Catholic" valve order or fingering.[65] To date, no historical source for this term has been found, nor is there a plausible explanation for its use, other than the fact that the areas of its largest occurrence are Catholic. In Protestant areas the term "Catholic" was often used in a rather broad sense:

> Für den typischen Protestanten ist dabei evangelisch gleichbedeutend mit normal und katholisch mit andersartig, fremd, ja exotisch. [66]
>
> For the typical Protestant, "evangelical" is synonymous with normal and "Catholic" with different, strange, even exotic.

One possible source for this term might therefore be identified in the suppliers of such instruments later in the nineteenth century: the citizens of Markneukirchen. This town was Protestant, since it was founded by Protestant refugees from Bohemia. It is not unlikely, then, that instruments with semitone first were called "Catholic" in Saxony, since they were sent predominantly to Catholic areas and also because they were considered to be strange and exotic. From there this term could have come into use in south Germany as well, where it then survived until the present time in organological writings.

From the list of instruments compiled here it is obvious that Ireland, which is mostly Catholic as well, had a strong predilection for this valve sequence. That there was some association of the reversed valve order with Ireland can be surmised from an entry entitled "The Besson B♭ Cornet with Echo Attachment," in a catalogue of *Besson & Co., London, Eng. Band Instruments* from ca. 1907-08. The following model is offered:

> The Besson 'Irish' Cornet
> Is of the same grade in every point of manufacture as are all other Besson instruments. The only difference between this and the regular models is that the first and second valves are reversed; otherwise they are identically the same. The prices are the same as those of regular models. [67]

A Paris Besson B♭ cornet with such a valve configuration was on display at the Royal Military Exhibition in London in 1890, lent by Besson and Co.[68] Perhaps the Irish association with the reversed valve sequence contributed to the genesis of the term "Catholic" valve order as well.

Finally, there are also some American documents that mention the use of the reversed valve order.[69] An undated *Catalogue of Music and Musical Instruments* by Harvey B. Dodworth in New York from ca. 1855 contains the following remark:

> I have several different sizes for all of the above Instruments; therefore it is necessary, when ordering, to state what purpose the Instrument is intended for.… Also, which valve the Semitone is to be made with.

A "card" or handbill for *Rotary Valve Musical Instruments* by David C. Hall in Boston, dated 1862, states,

> Persons in ordering should be particular and mention the style and size they want.… Also, whether they wish the 4th valve for right or left hand, Semitone for first or second finger.

A contemporary statement, summarizing and confirming the observations, gathered here, is found in Allen Dodworth's *Brass Band School* (1853):

> The valve with the shortest tubing attached to it, is the half-tone valve, No. 2; on most instruments, played with the second finger. Many German, and some few English instruments, have this valve for the first finger.[70]

Brass-playing European immigrants, coming to the U.S.A., quite naturally preferred to use fingerings that were familiar to them, hence the occurrence of the reversed valve order in America.

Summary and Conclusion

The reversed valve order, in which the semitone is positioned at the first and the whole tone at the second valve, is not so bizarre and rare as it appeared to the authors before this study was undertaken. In fact, surviving instruments as well as written documents show that it was one of two options of approximately equal importance in early two-valve instruments. Friedrich Blühmel chose to position the semitone valve first, while Friedrich Stölzel placed it second. This led to two different traditions in German-speaking regions at first, one following Blühmel's valve order mainly in Saxony, Mainz, south Germany, and Switzerland; the other following Stölzel's valve order in Prussia and Austria. The material in this article also demonstrates that this phenomenon was quite universally known outside German-speaking regions in the early history of valve development, namely in Belgium, Bohemia, England, France, Ireland, Italy, Russia, and the United States.

More or less all types of instruments and all the different early valve types can be found with reversed valve order. Almost half of the instruments gathered here have only two valves. More than two-thirds of them were made before 1850 and approximately three-fourths were made before 1860. The only valve type that is present throughout the entire time period is the rotary valve. Bavaria was the main center, for it was here that instruments with the reversed valve order, called "Catholic" fingering, were in continuous use in substantial numbers over the entire period from the 1820s through the 1920s, and even beyond. And Bavaria is also where the custom of right-handed and left-handed instruments survived the longest.

The origins of the reversed valve order with consecutive half-tone steps may perhaps be traceable—at least for Bavaria—to the keyed bugle. It also may have been influenced by the semitone sequence of trombone slide positions. On the other hand, the better-known valve brass tradition, in which the whole-tone step was positioned first, might have been fostered by the idea that a diatonic step is more important than a semitone step. For three-valve-instruments, placing the shortest valve loop in the middle was apparently considered a constructional advantage. This eventually led to the predominance of the modern fingering, whole tone/semitone/minor third, over the consecutive semitone system. The question as to whether the chromatic valve sequence versus the modern one might have some advantages for the performance of a certain repertoire would require further investigation. However, we suspect that it was more a matter of habit and regional tradition than a clearly demonstrable advantage of one system over the other.

While the results of this study may come as no surprise to some readers, the authors have endeavored to engender a greater awareness of the phenomenon of reversed valve order in brass instruments. May this study lead not only to more careful examination of surviving instruments, but also to further research on related repertoire.

Acknowledgements
We would like to thank the employees of all institutions listed in Table 1, who were extremely helpful in granting access to and providing information about the holdings under their care. We especially want to thank several private collectors, also mentioned in Table 1, for opening their homes to us and providing valuable information.

Joe R. Utley (1935-2001) was a cardiologist, holding the M.D. degree from Washington University School of Medicine, St. Louis. He gathered an important collection of high brass instruments, dating from the seventeenth through the twentieth centuries. He and his wife Joella Utley donated this collection to the National Music Museum: America's Shrine to Music/The University of South Dakota, Vermillion, in 1999.

Sabine K. Klaus is the curator of this collection. She received her Ph.D. from Tübingen University, Germany, and worked previously as curatorial assistant in the departments of historical musical instruments at the Germanisches Nationalmuseum in Nuremberg and at the Historisches Museum Basel.

APPENDIX

TABLE I

year	instrument type	maker	nation	city/region	# v	# k	valve type	pitch	r/l	fixed/inter	location	inventory #	reference
1825 ca.	baritone	unknown	R?	unknown	3		Stölzel, horizontal screw	C 8-ft	r.	f., no slides	St. Petersburg	2125	Private communication Arnold Myers, EUCHMI, and Herbert Heyde, MMA
1825 ca.	tenor horn	Tranzschel, Ch. G.	R	St. Petersburg	3		Stölzel, horizontal screw	F 6-ft	r.	f., no slides	St. Petersburg	1544	Private communication Arnold Myers, EUCHMI, and Herbert Heyde, MMA
1825 ca.	trumpet	Adams, Nathan, attributed	USA	Lowel, Mass.?	3		rotary, short levers in capsules	F 6-ft	r.	f.	Missouri	22	Eliason 1970, 88, pl. XI*
1825 ca. (1820-1830)	horn	Hirsbrunner	CH	Sumiswald	2		double piston, flat-spring, pulling	B♭ 9-ft	l.	f.	Hirsbrunner	none	private communication Peter Hirsbrunner, Sumiswald
1825 ca. (1823-1873)	trumpet, bass	Schuster, Friedrich Wilhelm	G	Karlsruhe, Baden	3		box	B♭ 9-ft	r.	f., no slides	Berlin	3104	Droysen-Reber, 169*; Krickeberg/Rauch, 154-155*; Heyde 1987, 154*
1825 ca. (1823-1873)	trumpet	Schuster, Wilhelm & Co.	G	Karlsruhe, Baden	2		box	E♭ 6½-ft	r.	f., no slides	GNM	MIR 130	Van der Meer 1979, 82-83, 197*; Herne, 102*; Montagu, 77
1825 d.	trumpet	Adams, Nathan	USA	Lowel, Mass.	3		twin-vane valves, short levers in capsules	F 6-ft, E♭ 6½-ft	r.	f.	USS Constitution	390.1	Eliason 1970, 88, pl. XI*
1825-1833 (a 1810-1867)	trumpet	Roth, Johann Gottlieb	G	Adorf, Saxony	2		double piston, short levers	B♭ 4½-ft	l.	f.?	BNM	?	Heyde 1987, 138*
1828 d.	trumpet	Saurle, Michael sen.	G	Munich, Bavaria	2		double piston, long levers	B♭ 4½-ft	l.+r.	f., 1 no slide, 2 o.	Nördlingen	759	Tremmel, 410; private communication Joseph Focht, Munich
1829 d.	trumpet	Saurle, Michael sen.	G	Munich, Bavaria	2		double piston, clock-spring	D 7-ft	r.	f.	MMA	89.4.1098	Heyde 1987, 145*; Heyde 1999, 120-121*; Bate, pl. 16, F*
1829 d.	trumpet	Hirsbrunner	CH	Sumiswald	2		double piston, long levers	E♭ 6½-ft	l.+r.	f.	Hirsbrunner	none	private communication Peter Hirsbrunner, Sumiswald
1830 ca.	trumpet	unknown	CH?	unknown	2		Stölzel, springs in seperate tube	B♭ 4½-ft	r.	f., o.	DM	16797	Seifers, 138
1830 ca.	trumpet	J.S.	G	Munich?, Bavaria	2		double piston, long levers	B♭ 4½-ft	l.+r.	f., 1 no slide, 2 o.	BNM	MU 205	Tremmel 407
1830 ca. (?-1873)	horn	Dürrschmidt, Christian Wilhelm	G	Adorf near Markneukirchen, Saxony	2		double piston, long levers	B♭ 4½-ft	l.+r.	f., o.	Ingolstadt	2683	Dittmar, 13*, 14; Hart, 6; Menzel
1830 ca. (1817-1840)	horn	Hirsbrunner	CH	Sumiswald	2		double piston, long levers	F 6-ft, D 7-ft	l.+r.	f., o.	Burri	587	Kälin, 45, 46*
1830 ca. (1817-1840)	trumpet, bass	Hirsbrunner	CH	Sumiswald	2		special construction, similar to Samson	E♭ 6½-ft	l.	f.	HMB	1980.2069.	Klaus 1998, 36*, 52; Klaus 2000a+b, 135*-137*
1830 ca. (1818-1845)	cornet	Ellard, Andrew	Ir.	Dublin	3		Stölzel, horizontal screw	B♭ 4½-ft	r.	f.	Cologne	273	Hoyer, 225*
1830 ca. (1823-1861)	horn, hand and valve horn	Kersten, Johann Gottfried jun.	G	Dresden, Saxony	2		rotary, clock-spring, oldest form horseshoe stop	B♭ 9-ft to B♭ 18-ft	l.	f.	EUCHMI	204	Heyde 1987, 129*; Myers 1997, 27; Myers 1990, 121*; Melville-Mason, pl. XV*
1830 ca. (1826-1834)	cornopean	Garrett, Richard	E	London	3	1	Stölzel, younger model	B♭ 4½-ft, A, A♭, G 5½-ft	r.	f.	NMM	0438	Larson, 81, 82*, 83
1830 ca. (1828-1831)	horn	unknown	G	Saxony	2		three-passage rotary, kind of clock-spring	G 11-ft	l.	f., no slides	Markneukirchen	1175	Heyde 1987, 113, 129*
1831 d.	trumpet	Saurle, Michael sen.	G	Munich, Bavaria	2		double piston, long levers	B♭ 4½-ft	l.+r.	f., 1 no slide, 2 o.	DM	39149	Seifers, 138
1832 ca. (1830-1834)	horn	Pace, Charles	E	London	2		Stölzel, younger model	F 12-ft crook only	l.	f.	RCM	164	Ridley, 52*
1832 d.	trumpet	Saurle, Michael sen.	G	Munich, Bavaria	2		double piston, long levers	B♭ 4½-ft	l.+r.	f., 1 no slide, 2 o.	DM	56114	Seifers, 138

year	instrument type	maker	nation	city/region	# v	# k	valve type	pitch	r/l	fixed/inter	location	inventory #	reference
1832 d.	trumpet	Saurle, Michael sen.	G	Munich, Bavaria	2		double piston, long levers	B♭ 4½-ft	l.+r.	f., 1 no slide, 2 o.	Armee-museum	B 1036	
1833 ca. (1831-1835)	trumpet	Sandbach & Wyatt	E	London	2		Stölzel, younger model	F 6-ft, C 8-ft	r.	inter?	Horniman	14.5.47/150	Boston, 94, pl. 73*; private communication Bradley Strauchen
1833 d.	trumpet, bass	Barth, Andreas	G	Munich, Bavaria	2		double piston, long levers	B♭ 9-ft	l.+r.	f., 1 i., 2 o.	DM	44538	Seifers, 139
1833/34	cornopean	Sax, Charles-Joseph	B	Brussels	2		Stölzel, horizontal screw	B♭ 4½-ft	r.	f.	Brussels	M 1290	Haine/De Keyser, 94,95*; Dumoulin 2001, 4*; Dumoulin 2002a, 42*; Day pl. XI B*, 198, no. 381
1833/34	cornopean	Sax, Charles-Joseph	B	Brussels	2		Stölzel, horizontal screw	B♭ 4½-ft	r.	f.	Brussels	M 1289	Haine/De Keyser, 92, 93*; Dumoulin, 4*; Dumoulin 2002a, 42*
1834 d.	trumpet	Barth, Andreas	G	Munich, Bavaria	2		double piston, long levers	F 6-ft	l.+r.	f., 1 i., 2 o.	GNM	MIR 131	Van der Meer 1979, 83, 198*; Heyde 1987, 146*; Herne, 102*
1835 ca.	trumpet	J.H. (Hirsbrunner?)	CH	Sumiswald?	2		double piston, long levers	B♭ 4½-ft, E♭ 6½-ft	l.+r.	f.?	Burgdorf	RS XIII/1128	Leutenegger, 2-3; Klaus 2000a, 129
1835 ca.	trumpet	unknown	G	unknown	2		double piston, short levers	G 5½-ft	r.	f., i.	GNM	MI 380	Van der Meer 1979, 83, 196*
1835 ca.	horn	unknown	G	unknown	2		double piston, clock-spring	C 8-ft	r.	f., o.	GNM	MIR 87	Van der Meer 1979, 63, 176*; Herne 102*
1835 ca. (1817-1840)	trumpet	Hirsbrunner	CH	Sumiswald	2		double piston, long levers	F 6-ft	l.+r.	f.	HMB	1980.2111.	Heyde 1987, 146*
1835 ca. (1817-1840)	trumpet	unknown	G	Saxony	2		double piston, short pulling levers	G 5½-ft	l.+r.	f., o.	Markneu-kirchen	69	Heyde 1987, 114-115*
1835 ca. (1817-1840)	horn	Hirsbrunner	CH	Sumiswald	2		double piston, piston-operated	F 12-ft, E♭ 13-ft	l.	f., i.	Burri	103	
1835 ca. (1817-1840)	posthorn	Hirsbrunner	CH	Sumiswald	2		double piston, piston-operated	B♭ 4½-ft, A♭ 5-ft	r.	f.	HMB	1908.256.	Klaus 2000a, 134
1835 ca. (1817-1840)	trumpet	Hirsbrunner	CH	Sumiswald	2		double piston, long levers	B♭ 4½-ft	l.+r.	inter	GNM	MIR 132	Van der Meer 1979, 84, 198*; Heyde 1987, 146*
1835 ca. (1817-1840)	trumpet	Hirsbrunner	CH	Sumiswald	2		double piston, long levers	B♭ 4½-ft, E♭ 6½-ft	l.+r.	f.?	Burgdorf	RS XIII/1101	Leutenegger, 2-3; Klaus 2000a; 129
1835 ca. (1824-1872)	trumpet	Schneider, Joseph	G	Regensburg, Bavaria	2		double piston, long levers	C 4-ft	l.+r.	f., o.	BNM	MU 199	Tremmel, 413
1835 ca. (1825-1850)	horn	unknown	I	Province Emilia?, Northern Italy	2		rotary, piston operated	E♭ 13-ft	r.	f.	Bologna	1840	Van der Meer 1993, 79-80; pl. 85*
1835 ca. (1835-1859)	trumpet	Saurle, Joh. Georg sen.	G	Munich, Bavaria	2		double piston, long levers	B♭ 4½-ft [D crook lost]	l.+r.	f.	HMB	1956.597.	Klaus 1998, 52
1835 ca. (1835-1859)	trumpet, bass	Saurle, Joh. Georg sen.	G	Munich, Bavaria	2		double piston, long levers	C 8-ft	l.+r.	f., 1 i., 2 o.	Armee-museum	B 1033	
1835 ca. [1806]	trumpet	[Kerner, Anton und Ignaz]	[A]G	[Vienna], Bavaria?	2		double piston, long levers	G 5½-ft	l.+r.	f., 1 i., 2 o.	Bad Tölz	8200/869	Heyde 1987, 145*, 195
1835 d.	trumpet	Barth, Andreas	G	Munich, Bavaria	2		double piston, long levers	B♭ 4½-ft, A	l.+r.	f., 1 i., 2 o.	IfV	D 109	Münster, 135; Steinmetz/Griebel, 53*, 61
1835/40 ca.	trumpet	unknown	G	Markneukirchen, Saxony	2		double piston, clock-spring	C 4-ft	r.	f., o	Markneu-kirchen	70	Heyde 1987, 150*
1835/40 ca. (1824-1872)	trumpet	Schneider, Joseph	G	Regensburg, Bavaria	2		double piston, long levers	C 4-ft	l.+r.	f., 1 no slide?, 2 i.	Ingolstadt	2695	Hart, 6; Tremmel, 413
1837 ca. (1799-1845)	trumpet	Saurle, Michael sen.	G	Munich, Bavaria	2		double piston, long levers	D 7-ft	l.+r.	f., 1 i., 2 o.	BNM	MU 209	Tremmel, 410

year	instrument type	maker	nation	city/region	# v	# k	valve type	pitch	r/l	fixed/inter	location	inventory #	reference
1837 d.	trumpet	Leicher, Dominicus	G	Augsburg, Bavaria	2		double piston, short levers	C 4-ft	r.	f., o.	Ingolstadt	2693	Dittmar, 13*, 14; Hart, 6; Menzel; Tremmel, 400
1837 d.	trumpet	Barth, Andreas	G	Munich, Bavaria	2		double piston, ?	B♭ 4½-ft	?	f.	Linz	MU 178	Wessely, 34; Tremmel 381
1837 d.	trumpet	Saurle, Michael sen.	G	Munich, Bavaria	2		double piston, long levers	B♭ 4½-ft	l.+r.	f., 1 i., 2 o.	BNM	MU 202	Tremmel, 410
1837/40 ca. (1832-1868)	trumpet	Barth, Andreas	G	Munich, Bavaria	2		double piston, long levers	B♭ 4½-ft	l.+r.	f., 1 i., 2 o.	Utley/NMM	7058	
1838 ca.	cornopean	attr. to J. A. Heckel	G	Dresden, Saxony	2		Stölzel, horizontal screw	B♭ 4½-ft	r.	f., i./o. each	Markneu-kirchen	71	Heyde 1987, 140*
1838 d.	trumpet	Saurle, Joh. Georg sen.	G	Munich, Bavaria	2		double piston, clock-spring	C 4-ft	r.	f.?	BNM	MU 201	Tremmel, 407
1838 d.	trumpet	Saurle, Michael sen.	G	Munich, Bavaria	2		double piston, long levers	C 4-ft	l.+r.	f., o.	Ingolstadt	2694	Hart, 6; Menzel; Tremmel, 410
1840 ca.	trombone, tenor	unknown	G	unknown	3		rotary, clock-spring	B♭ 9-ft	r.	f., i.	GNM	MIR 151	Van der Meer 1979, 101
1840 ca.	cornopean	unknown	G	Markneukirchen?, Saxony	3		Stölzel, younger model	B♭ 4½-ft	r.	f., i./o each	Markneu-kirchen	72	Heyde 1987, 116*
1840 ca.	horn	unknown	G	unknown	2		double piston, clock-spring	C 8-ft	l.	f., 1 o., 2 i.	GNM	MI 384	Van der Meer 1979, 63,176*
1840 ca.	trumpet	Maurhofer, Johann	CH	Trubschachen	2		double piston, long levers	F 6-ft	l.+r.	f.	Hirsbrunner	none	private communication Peter Hirsbrunner, Sumiswald
1840 ca.	trumpet	unknown	G	unknown	2		double piston, clock-spring	A♭ 5-ft	r.	f.?	GNM	MI 291	Van der Meer 1979, 84, 199*
1840 ca.	trumpet	unknown	G	unknown	2		double piston, clock-spring	B♭ 4½-ft	r.	f., 1 o., 2 i.	GNM	MIR 133	Van der Meer 1979, 85
1840 ca. (1799-1845)	posthorn	Saurle, Michael sen.	G	Munich, Bavaria	2		rotary, clock-spring, internal stop	G 5½-ft	l.	f., i.	Bad Tölz	8202	
1840 ca. (1799-1845)	valve ophicleide	Saurle, Michael sen.	G	Munich, Bavaria	3		double piston, clock-spring	C 16-ft	l.	f.	Leipzig	1767	Heyde 1987, 168-169*; Heyde 1985, 68-70, Tafel 36*
1840 ca. (1812/13-1853)	horn, hand and valve horn	Key, Thomas	E	London	2		Stölzel, younger model	B♭ 9ft, A, G, G♭, F, E, E♭, D, C 16-ft	l.	f.	Bate	62	Melville-Mason, pl. XVI*
1840 ca. (1832-1868)	trumpet	Barth, Andreas	G	Munich, Bavaria	2		double piston, long levers	F 6-ft	l.+r.	f., 1 i., 2 o.	M Stadtmuseum	53-15	Tremmel, 381
1840 ca. (1832-1868)	trumpet	Barth, Andreas	G	Munich, Bavaria	2		double piston, long levers	C 4-ft	l.+r.	f., i.	M Stadtmuseum	42-134	Tremmel, 381
1840 ca. (1832-1868)	horn	Barth, Andreas	G	Munich, Bavaria	2		rotary, clock-spring, pin stop	F 12-ft	l.	f., 1 i., 2 o.	Halle	MS-289	Heyde 1980, 76-77*; Heyde 1987, 130*
1840 ca. (1832-1868)	trumpet	Barth, Andreas	G	Munich, Bavaria	2		double piston, long levers	F 6-ft	l.+r.	f., i.	BNM	MU 208	Tremmel, 381
1840 ca. (1834-1849)	cornopean	Pace, Frederick	E	London	3	1	Stölzel, younger model	B♭ 4½-ft, A♭, G, F 6-ft	r.	f.	Webb	none	Made for Music, no. 139*; private communication John Webb
1840 ca. (1834-1863)	trumpet	Köhler, John August	E	London	2		swivel	F 6-ft	-	f.	MMA	89.4.2532	Heyde 1999, 121, 144*; Day, 205-207
1840 ca. (1836-1842)	trumpet	unknown	G	Markneukirchen, Saxony	2		Berlin	B♭ 4½-ft	r.	f., i.	Markneu-kirchen	77	Heyde 1987, 140*
1840/45 ca. (1834-1863)	trumpet	Köhler, John August	E	London	2		early disc	F 6-ft	-	f.	MMA	89.4.2531	Heyde, 1999, 121, 144*; Day pl. X E*, 205-207

year	instrument type	maker	nation	city/region	# v	# k	valve type	pitch	r/l	fixed/inter	location	inventory #	reference
1841/42	cornopean	Metzler/Corcoran/ unknown	E/Ir./G	London/Dublin	3	1	Stölzel, horizontal screw	B♭ 4½-ft	r.	f.	EUCHMI	1553	Myers 2000, 21; http://www.music.ed.ac.uk/euchmi/ucj/ucjg1553r_s.jpg
1845 c [sic!] (1871-1894/5)	horn	attr. to Lorenz, E	G	Braunschweig, North Germany	2		Berlin	G 11-ft	l.	f.	Eisenach	173	Heyde 1976, 259*, 261
1845 ca.	trumpet	unknown	G	unknown	3		rotary, clock-spring, horseshoe stop	C 4-ft	l.	f., i.	GNM	MIR 139	Van der Meer 1979, 87, 200*; Heyde 1987, 147*
1845 ca. (1799-1845)	horn	Saurle, Michael sen.	G	Munich, Bavaria	2		rotary, clock-spring, internal stop	D 14-ft	r.	f.	HMB	1980.2143.	Heyde 1987, 131*; Klaus 1999, 27
1845 ca. (1830-1850)	trumpet/ cornet	Graves & Co.	USA	Winchester, NH	3		double piston, short levers	B♭ 4½-ft	r.	f., o.	Fiske	B 76	Private communication Robb Stewart and Al Rice, Fiske
1845 ca. (1832-1868)	trumpet	Barth, Andreas	G	Munich, Bavaria	3		rotary, clock-spring, pin stop	C 4-ft	l.	f., i.	HMB	1980.2119.	Heyde 1987, 147*; Klaus 1998, 38*, 52-53
1845 ca. (1832-1868)	trumpet	Barth, Andreas	G	Munich, Bavaria	3		double piston, clock-spring	C 4-ft	l.	f., i.	M Stadtmuseum	79-38	
1845 ca. (1832-1868)	baritone	Barth, Andreas	G	Munich, Bavaria	4		rotary, clock-spring, internal stop	C 8-ft	l.	f., i.	M Stadtmuseum	40-136	Tremmel, 383
1845 ca. (1840-1846)	trumpet	Leicher, Dominicus	G	Augsburg, Bavaria	3		double piston, clock-spring	G 5½-ft	r.	f., i.	Utley/NMM	7189	
1845 ca. (1840-1846)	trumpet	Leicher, Dominicus	G	Augsburg, Bavaria	2		double piston, long levers	F 6-ft	l.+r.	f.	Bad Säckingen	14404	Tarr/Fermi, 32*; Tarr 2001,121
1845 ca. (1841-1871)	cornet	Wright, E. G.	USA	Boston	3		double piston, short levers	E♭ 3 ¼-ft	r.	f.	Fiske	B471	Private communication Albert Rice, Fiske
1845 ca. (1842-1846)	trumpet/ cornet	Allen, J. Lathrop	USA	Boston, Mass.	3		double piston, short levers	B♭ 4½-ft	r.	inter?	Beveridge	none	Eliason 1981, 16
1845 ca. (1842-1872)	trumpet	Sanner, Carl	G	Würzburg, Bavaria	2		double piston, short levers	B♭ 4½-ft	l.	f., o.	Markneu-kirchen	1 003	Heyde 1987, 116*
1845 ca. (1845-1849)	cornopean	Bradshaw, Robert	Ir.	Dublin	3		elliptical piston, serpentine windway	B♭ 4½-ft	r.	f.	Brussels	M 3163	Dumoulin 2001, 14*; Dumoulin 2002b, 36*
1845 ca. (ca.1845 p1854)	trumpet, bass	Binder, Carl	G	Stuttgart, Württemberg	2		double piston, piston-operated	C 8-ft	r.	f., i.	GNM	MI 381	Van der Meer 1979, 84, 197*; Heyde 1987, 155*
1845/50 ca. (1841-1871)	trumpet	Wright, E. G.	USA	Boston	3		double piston, short levers	C 4-ft, B♭ 4½-ft, A, A♭, G 5½-ft	r.	f.	MMA	2002.388a-j	Private communication Herbert Heyde, MMA
1845/50 ca. (1845-1850)	trumpet	Saurle, Joseph	G	Munich, Bavaria	3		rotary, clock-spring, internal stop	F 6-ft, D 7-ft	l.	f., i.	DM	35712	Seifers, 142; Tremmel, 408
1845/50 ca. (1845-1850)	tuba, contrabass	Saurle, Joseph	G	Munich, Bavaria	4		rotary, clock-spring, pin stop	C 16-ft	l.	f., i.	BNM	MU 182	Tremmel, 408
1846/50 ca. (1846-1861)	flugelhorn, bass	Schneider, Johann Joseph	G	Augsburg, Bavaria	3		double piston, clock-spring	C 8-ft	r.	f.	Leipzig	1752	Heyde 1985, 53-54, Tafel 16*; Heyde 1987, 120-121*
1847 ca. (1846-1849)	trumpet/ cornet	Allen, J. Lathrop	USA	Norwich, Connecticut	3	1	double piston, short levers	B♭ 4½-ft	r.	inter	Colby	18	Private communication Robert Eliason, Lyme, NH; Hall, no. 18
1848 ca. (1830-1850)	trumpet/ cornet	Graves & Co.	USA	Winchester, NH	3		double piston, short levers	B♭ 4½-ft	r.	f.	Fiske	B472	Private communication Albert Rice, Fiske
1848 patented.	alto horn	Paine, Thomas D.	USA	Woonsocket, RI	3		Paine improved three-passage rotary	A♭ 5-ft	r.	inter?	Rhode Island	1903.6.2	Eliason 1981, 10*
1850 ca.	flugelhorn	Lippold & Hammig	G	Markneukirchen, Saxony	3		double piston, clock-spring	C 4-ft	r.	f., 1 o., 2 + 3 i.	GNM	MI 318	Van der Meer 1979, 42

year	instrument type	maker	nation	city/region	# v	# k	valve type	pitch	r/l	fixed/inter	location	inventory #	reference
1850 ca.	alto/tenor horn	unknown	USA?	unknown	2		Périnet	E♭ 6½-ft	r.	f.	Lititz	18	Mayes, 179*
1850 ca. (1812/13-1853)	trumpet	Key, Thomas	E	London	3		Stölzel, younger model	F 6-ft., E, E♭ 6½-ft., D 7-ft., C 8-ft.	r.	f., 1 o., 2 i.	EUCHMI	226	Melville-Mason, no. 323, pl. XVIII*; Made for Music, no. 153*; Myers 1998, 26-27
1850 ca. (1827-1870)	cornet	Müller, Carl August	G	Mainz, Palatine	3		rotary, flat-spring, pin stop (early form)	B♭ 4½-ft	r.	f., i.	Fiske	B169	Private communication Albert Rice, Fiske
1850 ca. (1832-1868)	horn	Barth, Andreas	G	Munich, Bavaria	2		rotary, clock-spring, pin stop, gear	G 11-ft	l.	f., i.	M Stadtmuseum	9-174	Tremmel, 382
1850 ca. (1842-1887)	saxhorn, soprano	Fiske, Isaac	USA	Worcester, Mass.	3		double piston, piston-operated	E♭ 3¼-ft	r.	f., o.	Utley/NMM	7062	Eliason 1981, 36*; Garofalo/Elrod, 26*
1850 ca. (1845-1864)	trumpet	Gisborne, James	E	Birmingham	2		Stölzel, younger model	F 6-ft	r.	f.	Tomes	170	
1850 ca. (1846-p 1852)	trumpet	Lips, Johann Conrad	G	Gotha, Thuringia	2		double piston, short levers	E♭ 6½-ft, D, C 8-ft	r.	f.	Copenhagen	F 70	Private communication Niles Eldredge and Ture Bergstrøm
1850 ca. (1846-p1852)	trumpet	Lips, Johann Conrad	G	Gotha, Thuringia	2		double piston, short levers	G 5½-ft	r.	f., o.	Berlin	1010	Krickeberg/Rauch, 156
1850 ca. (1848-1886/87)	baritone	Bachlehner, Michael	G	Landsberg, Bavaria	3		rotary, clock-spring, internal stop	C 8-ft	l.	f., i.	Ingolstadt	2684	Hart 6; Menzel; Tremmel, 380
1850 ca. (1849-1852)	cornopean	Bradshaw/Robinson &Bussell	Ir.	Dublin	3		piston, serpentine windway	B♭ 4½-ft	r.	inter	Webb	none	Webb, 154-156, pl. XXVIII*
1850 ca. (-1854-)	flugelhorn	Herold, Fritz	G	Aschaffenburg, Hesse	3		rotary, flat-spring, shape of push rod stops	C 4-ft	r.	f., i.	DM	30808	Seifers, 126*
1850 ca. (ca.1844-1857)	tuba, bass	Paine, Thomas D.	USA	Woonsocket, RI	6		Paine improved three-passage rotary	C 8-ft	l.+r.	f.	Rhode Island	1903.7.D	Eliason 1981, 8*, 12*
1850 ca. (ca.1844-1857)	bugle, valved and keyed	Paine, Thomas D.	USA	Woonsocket, RI	3	2	Paine improved three-passage rotary	E♭ 3¼-ft	r.	f.	Missouri	44.11	Eliason 1981, 11*
1851 d.	cornet, echo	Graves & Co.	USA	Boston	4		top action string-rotary	B♭ 4½-ft, A	r.	f.	NMM	5257	Private communication André Larson, NMM
1853 ca. (1844-1853)	trumpet	Courtois, Antoine	F	Paris	3		double piston, short levers	B♭ 4½-ft	r.	f.	Paris	E.0725	http://servsim.cite-musique.fr/museedelamusique/detail_notice.asp?ExtIDLink=OEUVRE4206
1855 ca.	horn	Dürrschmidt, Christian Wilhelm	G	Adorf near Markneukirchen, Saxony	2		rotary, clock-spring, early pin stop	B♭ 9-ft	l.	f., i.	Ingolstadt	2686	Dittmar, 13*, 14; Hart, 6; Menzel
1855 ca. (?-1873)	horn	Dürrschmidt, Christian Wilhelm	G	Markneukirchen, Saxony	2		rotary, clock-spring, early pin stop	B♭ 9-ft, A, G, F and C 16-ft	l.	f., i.	HMB	1980.2137.	Heyde 1987, 131*; Klaus 1999, 27
1855 ca. (1832-1868)	cornet	Barth, Andreas	G	Munich, Bavaria	3		Stölzel, younger model	C 4-ft	l.	f., i.	M Stadtmuseum	9-689	
1855 ca. (1834-1863)	cornopean	Köhler, John August	E	London	3		disc	B♭ 4½-ft	r.	f.	Tomes	241	
1855 ca. (1841-1871)	cornet, circular/ upright/ o-s-c	Wright, E. G.	USA	Boston	3		top action string-rotary	B♭ 4½-ft, A	r.	f.	Warden	none	Garofalo/Elrod, 12*
1855 ca. (1842-1879)	baritone	Schamal, Wenzel	Cz	Prague	3		special type piston valves	C 8-ft	r.	f.	Prague	91 E	Heyde 1987, 166*

year	instrument type	maker	nation	city/region	# v	# k	valve type	pitch	r/l	fixed/inter	location	inventory #	reference
1855 ca. (1842-1887)	cornet, circular	Fiske, Isaac	USA	Worcester, Mass.	3		top action string-rotary	E♭ $3\frac{1}{4}$-ft	r.	f.?	Benkovic	none	Garofalo/Elrod, 27*; Eliason 1981, 37*
1855 ca. (1848-1864)	trumpet	Kraus, Anton	G	Augsburg, Bavaria	3		rotary, clock-spring, pin stop	C 4-ft	l.	f., i.	DM	63055	Seifers, 142; Tremmel 398
1855 ca. (1848-1864)	trumpet	Kraus, Anton	G	Augsburg, Bavaria	3		double piston, clock-spring	F 6-ft	r.	f., i.	Burgau	none	
1855 ca. (1853-1856)	trumpet	Reynolds, James	E	London	2		Stölzel, younger model	F 6-ft (C, D)	(l.)+r.	f.	Bad Säckingen	14301	Tarr 1979, 44-45*; Tarr 2001, 121
1855/60 ca.	trumpet	unknown	G	Markneukirchen, Saxony	3		double piston, clock-spring	F 6-ft	r.	f.	Leipzig	1857	Heyde 1985, 144-145; Heyde 1987, 150*
1855/60 ca. (1845-p1884)	cornet	Gautrot, Pierre Louis	F	Paris	3		Périnet, top-sprung	B♭ $4\frac{1}{2}$-ft	r.	f., i.	M Stadtmuseum	9-357	
1860 ca.	cornet	unknown	USA	unknown	4		top action string-rotary, Allen valves	B♭ $4\frac{1}{2}$-ft, C 4-ft	r.	inter	Utley/NMM	7023	
1860 ca.	cornet	unknown	F or G	France or Saxony	3		Périnet, top-sprung	B♭ $4\frac{1}{2}$-ft	r.	f., i.	Grünwald	none	
1860 ca.	horn	unknown	G	Bavaria or Saxony	3		rotary, clock-spring, pin stop	B♭ 9-ft, G (not original) E, C 16-ft	l.	f., i.	Grünwald	none	
1860 ca.	horn	unknown	G	Bavaria or Saxony	3		rotary, clock-spring, pin stop	B♭ 9-ft, A♭, G, E, E♭, D, C 16-ft	l.	f., i.	Grünwald	none	
1860 ca.	trumpet	unknown	G	Bavaria?	3		double piston, clock-spring	F 6-ft	r.	f., i.	Burri	110	
1860 ca.	flugelhorn	unknown	G	Bavaria?	3	1	rotary, clock-spring, horseshoe stop, gear	C 4-ft	l.	f., i.	Burri	63	
1860 ca. (1832-1868)	trumpet	Barth, Andreas	G	Munich, Bavaria	3		rotary, clock-spring, internal stop, gear	C 4-ft	l.	f., i.	M Stadtmuseum	64-23	Tremmel, 381
1860 ca. (1832-1868)	trumpet	Barth, Andreas	G	Munich, Bavaria	3		rotary, clock-spring, pin stop, gear	F 6-ft	r.	f., i.	Armee-museum	C 320	
1860 ca. (1848-1886/87)	trumpet	Bachlehner, Michael	G	Landsberg, Bavaria	3		rotary, clock-spring, horseshoe stop, gear	C 4-ft	r.	f., i.	Burgau	Dc 20	
1860 ca. (1852-1890)	trumpet	Stegmaier, Ferdinand	G	Ingolstadt, Bavaria	3		double piston, clock-spring	C 4-ft	l.	f., i.	Ingolstadt	2696	Batz, 166*; Dittmar, 13*, 14; Hart, 6; Menzel; Tremmel, 415
1860 ca. (1855-1900)	trumpet/ cornet	Gentner, Alois	G	Dillingen, Bavaria	3		double piston, clock-spring	B♭ $4\frac{1}{2}$-ft	r.	f.	Utley/NMM	6821	Private communication Joseph Focht, Munich
1860 ca. (a1856-1868)	bombardon	Scherlein, Anton	G	Augsburg, Bavaria	3		rotary, clock-spring, horseshoe stop	F 12-ft	r.	f., i.	Berlin	5580	Restle, 83, 84
1860/70 ca. (1855-1900)	trumpet, bass	Gentner, Alois	G	Dillingen, Bavaria	3		double piston, clock-spring	C 8-ft	r.	f., i.	Burgau	Dc 19	
1863 d.	flugelhorn	Barth, Andreas	G	Munich, Bavaria	4	1	rotary, clock-spring, pin stop, gear	C 4-ft	l.	f., i.	GNM	MI 317	Van der Meer 1979, 43, 162*; Heyde 1987, 159*
1865 ca. (1852-1879)	flugelhorn	Ottensteiner, Georg	G	Munich, Bavaria	3	1	rotary, clock-spring, horseshoe stop, gear	C 4-ft	l.	f., i.	M Stadtmuseum	42-32	Tremmel, 403
1865/70 ca.	tuba, contrabass	unknown	G	Bavaria?	4		rotary, clock-spring, internal stop	C 16-ft	l.	f., i.	DM	12672	Seifers, 130-131*; Heyde 1987, 168*
1870 ca.	trumpet, bass	unknown	G	Bavaria?	3		double piston, clock-spring	C 8-ft	r.	f., i.	Burgau	none	
1870 ca.	flugelhorn	Pfeiffer, J.	G	Kempten, Bavaria	3		rotary, clock-spring, horseshoe stop	B♭ $4\frac{1}{2}$-ft	r.	f.	Kampmann	393	Kampmann, 39

year	instrument type	maker	nation	city/region	# v	# k	valve type	pitch	r/l	fixed/inter	location	inventory #	reference
1870 ca.	flugelhorn	unknown	G	Bavaria?	3		rotary, clock-spring, pin stop, gear with wheel	C 4-ft	r.	f., i.	Armee-museum	C 321	
1870 ca. (1859-1885)	helicon	Hornsteiner, Joh.	G	Passau, Bavaria	4		rotary, clock-spring, pin stop, gear	C 16-ft	r.	f., i.	DM	18673	Seifers, 130
1870 ca. (1865-1872)	trumpet, bass	Saurle, Joh. Georg jun.	G	Munich, Bavaria	3		rotary, clock-spring, horseshoe stop	C 8-ft	l.	f.	HMB	1980.2125.	Heyde 1987, 155*; Tremmel, 408, Klaus 1998, 53
1870 ca. (1869-1871)	cornet, soprano	Boston Musical Instrument Manufactury	USA	Boston, Mass.	3		side action string-operated rotary valves	E♭ $3\frac{1}{4}$-ft	r.	f., 1 no slide	Eldredge	NA	Private communication Niles Eldredge
1875/80 ca. (1860-1907)	trumpet	Lang, Georg	G	Munich, Bavaria	3		rotary, clock-spring, pin stop, gear	F 6-ft	l.	f., i.	Armee-museum	E 4174	
1875/80 ca. (1860-1907)	trumpet, bass	Lang, Georg	G	Munich, Bavaria	3		rotary, clock-spring, pin stop, gear with wheel	C 8-ft	l.	f., i.	Armee-museum	H 4192	
1875/80 ca. (1860-1907)	trombone, tenor	Lang, Georg	G	Munich, Bavaria	4		rotary, clock-spring, pin stop, gear with wheel	C 8-ft	r.	f., i.	M Stadtmuseum	40-207	Tremmel, 399
1875/80 ca. (1860-1907)	trumpet, bass	Lang, Georg	G	Munich, Bavaria	3		rotary, clock-spring, pin stop, gear	C 8-ft	r.	f., i.	Burri	281	
1875/80 ca. (1860-1907)	trumpet	Lang, Georg	G	Munich, Bavaria	3		rotary, clock-spring, pin stop, gear	C 4-ft	r.	f., i.	Goldgruber	none	
1875/80 ca. (1860-1907)	trombone, tenor	Lang, Georg	G	Munich, Bavaria	4		rotary, clock-spring, pin stop	C 8-ft	r.	f., i.	DM	79298	Seifers, 148
1875/80 ca. (1869-1895)	baritone	Betzenhammer (-Barth), Anton	G	Munich, Bavaria	3		rotary, clock-spring, pin stop, gear	C 8-ft	r.	f., i.	DM	1976/787	Seifers, 127; Tremmel, 383
1875/80 ca. (1869-1895)	trumpet	Betzenhammer (-Barth), Anton	G	Munich, Bavaria	3		rotary, clock-spring, pin stop, gear	C 4-ft	l.	f., i.	Goldgruber	none	
1875/80 ca. (1869-1895)	posthorn	Betzenhammer (-Barth), Anton	G	Munich, Bavaria	3		rotary, clock-spring, horseshoe stop, gear	C 4-ft	r.	f., i.	Grünwald	none	
1880 ca.	tenor horn	unknown	G	Bavaria?	3		rotary, clock-spring, pin stop, gear with wheel	C 8-ft, B♭ 9-ft	r.	f., i.	Armee-museum	E 4168	
1880 ca. (1852-1890)	trumpet	Stegmaier, Ferdinand	G	Ingolstadt, Bavaria	3		rotary, clock-spring, gear	F 6-ft	l.	f., i.	Verdie	none	private communication J.C. Verdie, Tournefeuille, France
1880 ca. (a 1884)	flugelhorn, bass	Waidlich, Konrad	G	Cham, Bavaria	3		rotary, clock-spring, horseshoe stop, gear	C 8-ft	r.	f., i.	Grünwald	none	
1885 ca.	trumpet	unknown	G	unknown	3		rotary, clock-spring, horseshoe stop, gear	F 6-ft	r.	f., i.	Goldgruber	none	
1890 ca.	trumpet	unknown	G	unknown	3		rotary, springs like in woodwinds	C 4-ft	r.	f., i.	Goldgruber	none	
1890 ca.	trumpet, bass	unknown	G	Bavaria?	3		rotary, clock-spring, horseshoe stop, gear	C 8-ft	r.	f., i.	Hamamatsu	I/B/4/20	Restle, photos 19+20*; restoration report Menzel from 1988
1890 ca.	tuba, contrabass	unknown	G	Bavaria?	3		rotary, clock-spring, internal stop	C 16-ft	l.	f., i.	Bad Tölz	8203	
1890 ca.	flugelhorn	unknown	G	Bavaria?	3		rotary, clock-spring, horseshoe stop	B♭ $4\frac{1}{2}$-ft	r.	inter, short i.	Goldgruber	none	
1890 ca. (1884-1913)	trumpet	Keller, Wendelin	G	Munich, Bavaria	3		rotary, clock-spring, pin stop, gear	F 6-ft, E♭	r.	f., i.	M Stadtmuseum	41-235	Tremmel, 397

year	instrument type	maker	nation	city/region	# v	# k	valve type	pitch	r/l	fixed/inter	location	inventory #	reference
1890 ca. (1884-1913)	baritone	Keller, Wendelin	G	Munich, Bavaria	4		rotary, clock-spring, pin stop, gear with knobs	C 8-ft	r.	f., i.	Tübingen	A 28	Schmid, 78
1890 ca. (1884-1913)	flugelhorn	Keller, Wendelin	G	Munich, Bavaria	3		rotary, clock-spring, pin stop, gear	B♭ 4½-ft	r.	f.	HMB	1980.2758.	private communication Andrea Fornaro, HMB
1890 ca. (1884-1930)	trumpet	Weidlich, Konrad	G	Regensburg, Bavaria	3		rotary, clock-spring, horseshoe stop, gear	C 4-ft	r.	f., i.	Utley/NMM	9977	De Wit 1906, 1925/26, 1929/30
1900 ca. (1864-1909)	trumpet	Kruspe, Eduard	G	Erfurt, Thuringia	3		rotary, clock-spring, pin stop	E♭ 6½-ft	r.	f., i.	Tübingen	B 83	
1900 ca. (1886-p1908)	flugelhorn	Kessler, Adolf	G	Markneukirchen, Saxony	3		rotary, clock-spring, horseshoe stop	B♭ 4½-ft	r.	f., i.	GNM	MI 803	Dating according to Hackelberg list
1900 ca. (1899-1931)	alto/tenor horn	Schöpf, Anton sen.	G	Munich, Bavaria	3		rotary, clock-spring, pin stop, gear	E♭ 6½-ft	r.	f., i.	M Stadtmuseum	40-63	Tremmel, 415
1900 ca. (ca.1900-p1912)	cornet, echo	Fischer, Adolph	G	Hamburg, North Germany	3		rotary, clock-spring	C 4-ft or B♭ 4½-ft	r.	f.	Bad Säckingen	34104	Tarr 1985, 46*
1910 ca. (ca.1907-p1934)	flugelhorn	Böhm, Elias	G	Munich, Bavaria	3		rotary, clock-spring, horseshoe stop	B♭ 4½-ft	r.	f., i.	Grünwald	none	
1915 ca. (1899-1931)	trumpet	Schöpf, Anton sen.	G	Munich, Bavaria	3		rotary, clock-spring, pin stop, gear	F 6-ft	r.	f., i.	Goldgruber	none	
1925 ca. (ca.1914-1931)	bombardon	Schöpf, Anton jun., Bopp Nfl.	G	Munich, Bavaria	6		rotary, clock-spring, horseshoe stop	F 12-ft	l.+r.	f., i.	DM	60633	Seifers, 130
1925 ca. (ca.1914-1931)	trumpet	Schöpf, Anton jun.	G	Munich, Bavaria	3		rotary, clock-spring, horseshoe stop	C 4-ft, B-flat 4½-ft	l.	f., i.	M Stadtmuseum	66-39	Tremmel, 415

TABLE II: LIST OF MAKERS

(Compiled after Eliason 1981, Tremmel, and Waterhouse)

makers
Adams, Nathan (1783-1864): *2 trumpets.* 1824-28 bandmaster aboard USS Constitution. Presumably the earliest American maker to attempt to provide brass instruments with valves.
Allen, J. Lathrop (1815- ca. 1905): *2 cornet/trumpets.* Allen established a keyed brass instrument workshop in Sturbridge, MA, ca. 1838; moved to Boston in 1842; living in Norwich, CT between 1846-51; 1852 back in Boston, and from 1862-72 in New York.
Bachlehner, M (1818-p. 1886/1887): *1 trumpet, 1 baritone* Worked as journeyman with Andreas Barth in Munich. 1848 granted concession as brass instrument maker in Landsberg.
Barth, Andreas (ca. 1797-1868): *12 trumpets, 1 cornet, 1 fluegelhorn, 2 horns, 1 baritone* Barth obtained privilege for improved trumpet in 1832 in Munich, together with permission to manufacture; 1835 license as brass wind instrument maker. Formerly made ladies' bonnets and worked as silver/gold thread embroiderer.
Betzenhammer (-Barth), Anton (1839-95): *1 trumpet, 1 baritone, 1 posthorn* Illegitimate son of Andreas Barth. Established workshop in Munich in 1869.
Binder, Carl (?-?): *1 trumpet* Flourished around 1845-54 in Stuttgart.
Böhm, Elias: *1 fluegelhorn* Flourished between ca. 1907 and p 1934 in Munich. Successor to Georg Lang.
Boston Musical Instrument Manufactory: *1 soprano cornet* Established 1869 by the amalgamation of the partners and workers of Graves & Co. and E.G. Wright & Co.
Bradshaw, Robert **(?-?)**: ***2 cornopeans*** Inventor and clockmaker in Dublin, who registered valve designs in 1845, 1846, and 1849.
Courtois, Antoine (?-1880): *1 trumpet* Established workshop as *fils de Courtois de frère* in Paris in 1844.
Dürrschmidt, Christian Wilhelm (1803-73): *3 horns* Flourished in Adorf near Markneukirchen in mid-nineteenth century.
Ellard, Andrew (?-ca. 1858): *1 cornet* Recorded between 1818 and 1845 in Dublin as military musical instrument manufacturer to the Army.
Fischer, Adolph (?-?): *1 echo cornet* Recorded in Hamburg ca. 1900 until after 1912.
Fiske, Isaac (1820-1894): *1 circular cornet, 1 soprano saxhorn* 1842 workshop established in Worcester, 1887 sold to Conn Company. First American maker to promote instruments by sponsoring a band.
Garrett, Richard (?-?): *1 cornopean* Listed as clarinet, flute and military keyed bugle maker in London from 1826 on. In 1869 his workshop was succeeded by James John Murray.
Gautrot, Pierre Louis (?-1882): *1 cornet* 1845 successor of Guichard in Paris. During the nineteenth century developing as large musical instrument factory.
Gentner, Alois (1825-1900): *1 trumpet/cornet, 1 bass trumpet* Gentner is recorded as musical instrument dealer in Dillingen from 1855.
Gisborne, James (?-?): *1 trumpet* Established ca. 1839 as military musical instrument maker in Birmingham.
Graves & Co.: *1 echo cornet, 1 trumpet/cornet* Workshop established 1824 by Samuel Graves Jr. (1794-1878) in West Fairlee. Flourished in Winchester between 1830 and 1850 and in Boston between 1850 and 1869.
(**Heckel, Johann Adam** (1809-66): *1 cornopean attributed* 1836 established in Dresden.)
Herold, Fritz (?-?): *1 flugelhorn* Recorded in Aschaffenburg around 1854, when he exhibited a trumpet in Munich.
Hirsbrunner: *5 (6) trumpets, 4 horns* Established late 18th century in Sumiswald near Berne by Christian Hirsbrunner (1748-1815) as turner and woodwind workshop. In the 19th century the second generation, comprising Christen, Kaspar, and Ulrich, specializing in brasswind instruments.
Hornsteiner, Joh. (1835-85): *1 helicon* String instrument maker and musical instrument dealer in Passau from 1859.

J. S.: *1 trumpet* Initials might belong to the following makers: Johann Georg Saurle Sr., Joseph Saurle or Joseph Schneider. However, because of the early construction of the instrument it is most likely by Johann Georg Saurle Sr., probably before he established his own shop, while still working in his father's premises. This could be the reason why it is not signed with his full name.
Keller, Wendelin (1831-1913): *1 trumpet, 1 baritone, 1 fluegelhorn* 1858 license as brass instrument maker granted in Augsburg, also installing gaslights. In 1884 moved to Munich, where he worked together with his son-in-law as "Keller & Lehner."
Kerner, Anton (c. 1726-1806) **und Ignaz** (c. 1768-1813): *1 natural trumpet* 1751 citizen's rights in Vienna.
Kersten, Johann Gottfried Jr. (1786-1861): *1 horn* 1823 supplier to the Dresden Hofkapelle, 1828 citizen's rights.
Kessler, Adolf Jr. (?-?): *1 fluegelhorn* Dealer recorded in Markneukirchen between 1886 and after 1908; 1908 advertisement.
Key, Thomas (?-1853): *1 horn, 1 trumpet* 1800 workshop established in London as wind instrument maker and music publisher.
Köhler, John August (ca. 1810-78): *2 trumpets, 1 cornopean* 1835 entered his silver hallmark at the Goldsmith's Hall in London. 1838 bought rights to John Shaw's swivel valve.
Kraus, Anton (1813-1901): *2 trumpets* 1848 granted license to marry Martin Feneberg's widow in Augsburg; after 1864 as Kraus & Schmidt in Augsburg.
Kruspe, Eduard (1831-1919): *1 trumpet* Established in Erfurt 1864. 1893 his son Fritz Krupse successor, who died in 1909.
Lang, Georg (1833-1907): *4 trumpets, 2 trombones* 1860 citizen's rights in Munich, obtaining the license of Georg Saurle Sr.
Leicher, Dominicus (1817-ca. 1845): *3 trumpets* Active in Augsburg at least since 1837. 1840 granted brass instrument maker license in Augsburg, after working as an apprentice for Andreas Barth in Munich from 1835.
Lippold & Hammig: *1 flugelhorn* Recorded ca. 1850 in Markneukirchen.
Lips, Johann Conrad (?-?): *2 trumpets* Dealer in Gotha; from 1841-82 directory listing as tax official.
(**Lorenz, Emanuel** (?-ca. 1896): *1 horn attributed* 1871 succeeded August Paulus in Braunschweig, but must have been active there long before that date. 1894/95 J.W. Künzel's successor.)
Mauerhofer, Johann (1820-74): *1 trumpet* Active near Trubschachen, canton Berne, as trumpeter and trumpet maker.
Metzler & Co./Corcoran, Matthew: *1 cornopean* Metzler & Co. established 1833 as dealers in London; Matthew Corcoran dealer in Dublin between 1840 and 1842.
Müller, Carl August (1804-70): *1 trumpet* Trained in Vogtland, probably with J.G. Roth; settled in Mainz ca. 1824, established workshop there in 1827.
Ottensteiner, Georg (1815-1879): *1 fluegelhorn* 1851 licensed as woodwind maker and 1852 as brass instrument maker in Munich, after years as journeyman in Paris.
Pace, Charles (?-?): *1 horn* Flourished in London between 1830-83. Earlier in partnership with his brother Frederick.
Pace, Frederick (?-?): *1 cornopean* Flourished in London between 1831-65.
Paine, Thomas D. (1812-1895): *1 bass tuba, 1 keyed and valved bugle, 1 alto horn* Earlier a watchmaker; 1841 listed in Boston as musical instrument maker; 1844 relocated in Woonsocket, RI. 1857 firm dissolved.
Pfeiffer, J. (?-?): *1 fluegelhorn* Recorded only by this fluegelhorn in Kempten, ca. 1870.
Reynolds, James (?-?): *1 trumpet* 1848 listed as flute maker, 1853 as music seller.
Roth, Johann Gottlieb Sr. (?-1867): *1 trumpet* Flourished in Adorf ca. 1810-67; probably trained Carl August Müller, who later went to Mainz.
Sandbach & Wyatt: *1 trumpet* 1831 established by Albion Wyatt as successor to William Sandbach in London.
Sanner, Carl (1815-72): *1 trumpet* 1842 married in Würzburg.

Saurle, Joh. Georg Sr. (1799-1859): *3 trumpets* 1835 citizen's rights in Munich, working from the premises of his father Michael Saurle; by 1845 in his own workshop; 1851 court title.
Saurle, Joh. Georg Jr. (1843-91): *1 trumpet* 1865 took over the license of his uncle Michael Saurle Jr. (1801-62) in Munich, which he exercised until 1872, later working as a pastry cook.
Saurle, Joseph (1802-50): *1 trumpet, 1 contrabass tuba* 1845 took over the license of his father; on his death 1850 the license was acquired by his brother Michael Jr.; after his death, in turn, it passed on to his nephew Joh. Georg Jr.
Saurle, Michael (1772-1845): *8 trumpets, 2 horns, 1 valve ophicleide* 1799 (or 1796) workshop established in Munich; 1799 citizen's rights, taking over the concession of Augustin Hönig; 1832 court appointment. 1833 Carl Spitzweg wrote that Saurle is exporting to Italy and America.
Sax, Charles-Joseph (1790-1865): *2 cornopeans* Trained as cabinet maker, self-taught as musical instrument maker; 1815 established in Brussels as maker of flute and serpent; 1818 court appointment. After 1853 moved to Paris and worked for his son Adolphe.
Schamal, Wenzel (1818-1904): *1 baritone* 1842 workshop established in Prague, 1879 succeeded by his son Karl. Ca. 1853 first European maker to adopt Thomas D. Paine's string-action valve mechanism.
Scherlein, Anton (1826-before 1868): *1 bombardon* Trained as saddler; 1856 musical instrument dealer in Augsburg; 1862 working as foreman for the widow of Leonhard Lintner (1794-1859); 1863 license as musical instrument maker; 1868 sold out to Gottlieb Dolge (1834-77).
Schneider, Joseph (1792-after 1872): *2 trumpets* 1822 citizenship in Regensburg; 1824 trading rights; directory listings between 1829 and 1872.
Schneider, Johann Joseph (1823-after 1881): *1 bass flugelhorn* Earlier working in Regensburg; from ca. 1845 in Augsburg, working for Leicher; 1846 received license in Augsburg, marrying the widow of Leicher. 1861 granted license as maker of gas-light appliances.
Schöpf, Anton Sr. (1861-1931): *1 trumpet, 1 tenor horn* 1884 clock-spring maker; from 1899 in Munich; 1905 citizen's rights.
Schöpf, Anton Jr., Bopp Nfl. (1886-1931): *1 trumpet, 1 bombardon* Ca. 1914 successor to August Bopp (1836-1918) in Munich.
Schuster, Friedrich Wilhelm (1798-1873): *2 trumpets* Originally from Neukirchen (later Markneukirchen), he established a workshop in Karlsruhe in 1823; 1825 court appointment; evidently also a composer. 1827 his box-valve horn was introduced at the Conservatoire in Paris.
Stegmaier, Ferdinand (?-1892): *1 trumpet* 1852 granted license in Ingolstadt, where he was active until 1890.
Tranzschel, CH.G. (?-?): *1 tenor horn* Recorded in St. Petersburg before 1820 and after 1840. Court instrument maker.
Wa(e)idlich, Konrad (?-?): *1 trumpet, 1 bass fluegelhorn* First active in Cham, Bavaria. Shop founded in Regensburg as wind instrument maker and dealer in 1884; recorded until 1930.
Wright, E.G. (1811-71): *1 trumpet, 2 cornets* 1841 established in Boston. Considered the foremost maker of keyed brasses in the USA.

Abbreviations

A	Austria
a	ante (before)
Armeemuseum	Bayerisches Armeemuseum, Ingolstadt, Germany
attr.	attributed
B	Belgium
Bad Säckingen	Trumpet Museum, Bad Säckingen, Germany
Bad Tölz	Heimatmuseum Bad Tölz, Germany
Bate	Bate Collection, Oxford, U.K.
Benkovic	Fred Benkovic Collection, Wauwatosa, Wisconsin, U.S.A.
Berlin	Musikinstrumenten-Museum, Staatliches Institut für Musikforschung Preussischer Kulturbesitz, Berlin, Germany
Beveridge	Dr. Thomas R. Beveridge, Rolla, Missouri, U.S.A.
BNM	Bayerisches Nationalmuseum, Munich, Germany
Bologna	Museo Civico Medievale di Bologna, Italy
Brussels	Musée des Instruments de Musique, Brussels, Belgium
Burgau	Heimatmuseum Burgau, Germany
Burgdorf	Schlossmuseum Burgdorf, Switzerland
Burri	Musik Burri (Karl Burri), Zimmerwald, near Berne, Switzerland
ca.	circa
CH	Switzerland
Colby	Ralph Gould Collection, Colby College, Waterville, Maine
Cologne	Kölnisches Stadtmuseum, Cologne, Germany
Copenhagen	Musikhistorisk Museum, Copenhagen, Denmark
d.	dated
DM	Deutsches Museum, Munich, Germany
E	England
Eisenach	Bachhaus Eisenach, Germany
Eldredge	Niles Eldredge Collection, New Jersey, U.S.A.
EUCHMI	Edinburgh University Collection of Historic Musical Instruments, U.K.
f.	fixed
ft.	foot
F	France
Fiske	Kenneth G. Fiske Musical Instrument Museum, Claremont, CA, U.S.A.
G	Germany
GNM	Germanisches Nationalmuseum, Nuremberg, Germany
Goldgruber	Maximilian Goldgruber Collection, Munich, Germany
Grünwald	Herbert Grünwald Collection, Garching, near Munich, Germany
Halle	Händel-Haus Halle, Germany
Hamamatsu	Hamamatsu Museum of Musical Instruments, Japan

Hirsbrunner	Private Collection Hirsbrunner + Co. AG, Sumiswald, Switzerland
HMB	Musikmuseum, Historisches Museum Basel, Switzerland
Horniman	Horniman Museum, London, U.K.
i.	inner moving slide
I	Italy
Ingolstadt	Stadtmuseum Ingolstadt, Germany
inter	interchangeable
IfV	Institut für Volkskunde, Munich, Germany
Ir.	Ireland
l.	left
k.	key
Kampmann	Bruno Kampmann Collection, Paris, France
Leipzig	Musikinstrumenten-Museum der Universität Leipzig, Germany
Linz	Oberösterreichisches Landesmuseum, Linz, Austria
Lititz	Lititz Historical Society, Lititz, Pennsylvania, U.S.A.
M Stadtmuseum	Musikinstrumentenmuseum im Münchner Stadtmuseum, Munich, Germany
Markneukirchen	Musikinstrumenten-Museum, Markneukirchen, Germany
Missouri	Central Missouri State University, Warrensburg, Missouri, U.S.A., Don Essig Collection
MMA	The Metropolitan Museum of Art, New York, U.S.A.
Mass.	Massachusetts
Nfl.	Nachfolger (successor)
NH	New Hampshire
NMM	National Music Museum, America's Shrine to Music, The University of South Dakota, Vermillion, South Dakota, U.S.A.
Nördlingen	Stadtmuseum Nördlingen, Germany
o.	outer moving slide
p	post (after)
p.	page (* indicates illustration)
pl.	plate
Paris	Musée de la Musique, Paris, France
Prague	Národni Muzeum, Prague, Czechia
r.	right
R	Russia
RCM	Royal College of Music, London, U.K.
RI	Rhode Island
Rhode Island	Rhode Island Historical Society, Providence, Rhode Island, U.S.A.
o-s-c	over-the-shoulder-cornet
St. Petersburg	Musical Instrument Museum, St. Petersburg, Russia

Tomes	Frank Tomes Collection, London, U.K.
Tübingen	Sammlung Stiftung Dr.h.c. Karl Ventzke/Musikwissenschaftliches Institut der Eberhard-Karls-Universität Tübingen, Germany
USS Constitution	USS Constitution Museum, Boston, Mass.
Utley/NMM	Joe & Joella Utley Collection/National Music Museum
v	valve
Verdie	Private collection Jean-Claude Verdie, Tournefeuille, France
Warden	Carol Warden (owner), formerly Burchuk Collection; on display at Dale Music Company, Silver Spring, Maryland, U.S.A.
Webb	John Webb Collection, Padbrook, Wiltshire, U.K.

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NOTES

1 Initial results of this research were presented in form of lectures by Joe Utley at the 13th Early Brass Festival in Bloomington, Indiana, July 1997; and at the annual American Musical Instrument Society Meeting in Washington, DC, in 1997.

2 Examples of such a change are the trumpet in C by Georg Lang, owned by Maximilian Goldgruber in Munich, and the Elias Böhm fluegelhorn in the collection of Herbert Grünwald, Garching.

3 Such instruments must necessarily have been overlooked by the authors of this essay, since published information concerning them may indicate modern valve order. Of course, it was not possible for two individuals to check all the slides of the world's historic brass instrument holdings for the construction in question.

4 Our special thanks to Joseph Focht, Munich, for drawing our attention to this instrument.

5 Herbert Heyde, *Das Ventilblasinstrument* (Wiesbaden: Breitkopf & Härtel, 1987), 81.

6 Erich Tremmel, *Blasinstrumentenbau im 19. Jahrhundert in Südbayern* (Augsburg: Wißner, 1993),

358-59.

[7] In this chart, instruments with several crooks were counted multiple times—once for each pitch represented.

[8] Three ambiguous trumpet/cornets are also among them, as well as many unambiguous trumpets, such as the dated ones by Michael Saurle from the late 1820s and '30's. We know for certain that he called these instruments *chromatische Trompete* (see below). It is therefore not justifiable to use pitch as a criterion for distinction between cornet and trumpet, at least not in the time period or regions under discussion here.

[9] Robert E. Eliason, "Early American Valves for Brass Instruments," *Galpin Society Journal* 23 (1970): 86-96, here 86-88. See there for an illustration and drawing of this valve construction.

[10] A drawing of this valve type can be found in Sabine K. Klaus, "Outstanding Trumpets, Trombones, and Horns in the Musical Instrument Collection of the Historical Museum, Basel," *Historic Brass Society Journal* 12 (2000): 1-22, here 20.

[11] For detailed description and a drawing, see John Webb, "Bradshaw's Serpentine Valved Cornopean," *Galpin Society Journal* 35 (1982): 154-56.

[12] See Heyde, *Das Ventilblasinstrument,* 72.

[13] A presumably later horn in D with six crooks by Schuster in the possession of Central Moravian Church in Bethlehem, PA, has the valve order whole-tone first, semitone second. Its valves are similar to box valves in principle, but round (see Curtis S. Mayes, "A Descriptive Catalogue of Historic Percussion, Wind, and Stringed Instruments in Three Pennsylvania Museums" (M.A. thesis, Florida State University, 1974), 191.

[14] We thank Herbert Heyde and Arnold Myers for drawing our attention to these instruments.

[15] It was not possible to collect reliable data on this feature for all the Stölzel-valve instruments listed.

[16] Our thanks to Géry Dumoulin for this information.

[17] Tremmel, *Blasinstrumentenbau*, 456.

[18] Sabine Klaus, "Jagd- und Waldhörner in der Musikinstrumenten-Sammlung des Historischen Museums Basel," in *Historisches Museum Basel: Jahresbericht 1999* (Basel: Historisches Museum Basel, 2000): 5-32, here 13.

[19] Heyde, *Das Ventilblasinstrument,* 43-47.

[20] The Saurle trumpet from 1829 might have been later changed to another system, the clock-spring return. However, evidence for such a change is insufficient (Heyde 1999, p. 121).

[21] Perhaps it would have been possible to determine the time of this change more precisely on the basis of the Barth trumpet dated 1837 in Linz. Unfortunately this instrument is preserved only as a fragment, as it is missing its levers.

[22] Since Heyde does not entirely exclude the possibility that the clock-spring returns in Saurle's instrument from 1829 might be original, this system could have been used at a surprisingly early date in Munich, and also before Leopold Uhlmann patented it in Vienna (Heyde 1999, p. 121).

[23] Quoted after Tremmel, *Blasinstrumentenbau,* 452.

[24] Heyde, *Das Ventilblasinstrument,* 263.

[25] Herbert Heyde, private communication.

[26] Another source of inspiration for Barth's construction could be south-German pianos of the time, in which the hammer was also pivoted in such a saddle, called a *Kapsel.*

[27] Although Georges Kastner illustrates them in his *Manuel général de musique militaire* (Paris, 1848), plate XV.

[28] Heyde, *Das Ventilblasinstrument,* 28.

[29] Ibid., 32.

[30] Ibid., 47.
[31] Ibid., 38.
[32] Tremmel, *Blasinstrumentenbau,* 450.
[33] Quoted after ibid., 452. For Michael Saurle the "Vienna valve" was thus a rotary valve!
[34] The "Kuhlohorn" was a fluegelhorn with a very distinct oval shape, as can be seen in Heyde, *Das Ventilblasinstrument,* 304, no. 6. Apparently this form was occasionally also transferred to trumpets.
[35] For detailed description and a drawing see Robert E. Eliason, *Early American Brass Makers* (Nashville, TN: The Brass Press, 1981), 7.
[36] Heyde, *Das Ventilblasinstrument,* 81.
[37] Quoted after Tremmel, *Blasinstrumentenbau,* 451.
[38] Ibid., 473 and 481.
[39] Ibid., 117-21.
[40] *Allgemeine Musikalische Zeitung* 19 (1817): cols. 814-16.
[41] Quoted after Tremmel, *Blasinstrumentenbau,* 118.
[42] John Henry van der Meer, *Verzeichnis der Europäischen Musikinstrumente im Germanischen Nationalmuseum Nürnberg,* Band I: *Hörner und Trompeten, Membranophone, Idiophone* (Wilhelmshaven: Heinrichshofen's Verlag, 1979), 39-40; and Herbert Heyde, *Blasinstrumente, Orgeln, Harmoniums. Katalog zu den Sammlungen des Händel-Hauses in Halle* (Halle an der Saale: Händel-Haus Halle, 1980), 48-49.
[43] Richard J. Martz, "Reversed Chirality in Horns, or Is Left Right? The Horn, on the Other Hand," in this issue.
[44] Heyde, *Das Ventilblasinstrument,* 82. Martz, "Reversed Chirality," discusses similar customs for holding the horn while riding a horse.
[45] Tremmel, *Blasinstrumentenbau,* 451.
[46] Kastner, *Manuel général,* pl. XV.
[47] Quoted after Tremmel, *Blasinstrumentenbau,* 452.
[48] Quoted after Webb, "Bradshaw's Serpentine Valved Cornopean," 153.
[49] For deviations from the normal valve order other than those discussed here, see the comments on early Prussian cornets and Swedish brass instruments with the valve order whole-tone, semitone, major third in Dieter Krickeberg and Wolfgang Rauch, *Katalog der Blechblasinstrumente* (Berlin: Staatliches Institut für Musikforschung Preußischer Kulturbesitz, 1976), 65; Heyde, *Das Ventilblasinstrument,* 205-06; and Ann-Marie Nilsson, "Brass Instruments in Small Swedish Wind Band Ensembles during the Late Nineteenth Century," *Historic Brass Society Journal* 13 (2001): 176-209.
[50] Quoted after Eliason, "Early American Valves," 86.
[51] Andreas Masel, *Das große Ober- und Niederbayerische Blasmusikbuch* (München: Schwingenstein-Verlag, 1989), 81, 83.
[52] Quoted after ibid., 83.
[53] Quoted after Tremmel, *Blasinstrumentenbau,* 481.
[54] Stadtarchiv Ingolstadt, A XIV/183: Zeugnisse u. Lieferungen des Musikinstrumenten-Fabrikanten Ferdinand Stegmaier, 1864-1884.
[55] Tremmel, *Blasinstrumentenbau,* 450-52, 456-63, 471-75, 481-85.
[56] Musikinstrumenten-Museum Markneukirchen, F 29, no. 741. Some parts of this material, which are not discussed further here, were published in Heyde, *Das Ventilblasinstrument,* 270-75.
[57] A fingering chart from Bavaria with reversed valve order is not known to the authors. Tremmel, (*Blasinstrumentenbau,* 453-54) published only Bavarian fingering charts with the normal valve order. One of them specifically refers to a bombardon after Wenzel Riedl in Vienna; therefore it is not

surprising that it is equipped with the whole-tone valve first.

[58] Heyde, *Das Ventilblasinstrument,* 216.

[59] Heidrun Eichler (ed.), *Musikinstrumenten-Museum Markneukirchen* (Munich-Berlin: Deutscher Kunstverlag, 2000), Sächsische Museum, Band 9, 105.

[60] P. 1.

[61] P. 28.

[62] P. 21. We thank Herbert Grünwald for drawing our attention to this source.

[63] Heyde, *Das Ventilblasinstrument,* 81.

[64] Masel, *Das große Ober- und Niederbayerische Blasmusikbuch,* 91, 113, 119, 165. It is striking that there is no such instrument found in the neighboring region around Salzburg (see Kurt Birsak and Manfred König, *Das große Salzburger Blasmusikbuch* (Vienna: Verlag Christian Brandstätter, 1983).

[65] It is used, for example, without further explanation in Manfred Herman Schmid, "Die Musikinstrumentesammlung am Musikwissenschaftlichen Institut der Universität Tübingen, Stiftung Dr. h.c. Karl Ventzke," *Musica Instrumentalis* 3 (2001): 74-78, here 78.

[66] Karl Napf, *Der Schwabe als solcher* (Stuttgart: Theiss Verlag, 1994), 95.

[67] Catalogue from the House of Carl Fischer, U.S. Sole Agent, 4-12 Fourth Ave., Cooper Square, New York, p. 17 (NMM Besson archives). Our thanks to Niles Eldredge for drawing our attention to this source, and Margaret Banks for her help in dating this catalogue.

[68] Charles Russell Day, *A Descriptive Catalogue of the Musical Instruments Recently Exhibited at the Royal Military Exhibition, London 1890* (London: Eyre & Spottiswoode, 1891), no. 400, p. 204. The whereabouts of this instrument are unknown; therefore it was not included in Table 1.

[69] Our thanks to Robert Eliason for passing on the following material to us.

[70] New York: H.B. Dodworth, 1853, 16.