A Brief History of Piston-valved Cornets[1]

Niles Eldredge

The bewildering array of cornet design over the past 175 years or so has defied simple description, categorization, and classification. Yet major themes in cornet design readily emerge on closer study—and while no straightforward classification of cornets is possible,[2] historical analysis of the sequence of major design changes does have the effect of reducing the welter of cornet variation to a manageably simpler picture than heretofore available.

I shall restrict my analysis to B♭ soprano brasswinds of approximately 4 1/2 feet in length, equipped either with the earlier Stölzel valves, or with the succeeding Périnet valves—mentioning cornets pitched higher (especially in E♭, but also in C where designs differ from those in B♭), as well as in lower pitches, only in passing.[3] Likewise, I consider only "mainstream" instruments most commonly used by amateur and virtuoso professional alike—but excluding such instruments as "echo bell" and "pocket" cornets. Finally, in confining my gaze to cornets, and thereby excluding trumpets and fluegelhorns (again, except in passing), we immediately confront the question: What, exactly, is a cornet?

What Is a cornet?

Conventional wisdom has it that a cornet is a soprano brasswind of some 4 1/2 feet of tubing that (1) has, at least ideally, approximately 2/3 of its length in conical shape, 1/3 cylindrical (the reverse being said to be optimal for trumpets[4]); (2) tubing coiled in two complete 360° turns (typically 1 1/2 such turns to the "leadpipe" section between mouthpiece and valves, and a final 180° turn after the bell tubing exits the first valve); thus cornets are usually shorter than Périnet-valved trumpets, which retain the much older single 360°-turn design of most natural trumpets; and (3) a deep, funnel-shaped cup mouthpiece—more similar to a horn, than to a trumpet, mouthpiece.

Carse, Baines,[5] and many others have commented that, whatever their differences at their origin may have been, cornets have long since ceased to be effectively different in timbre from trumpets, due at least in part to the adoption by most cornetists of the shallower, bowl-shaped trumpet-cup mouthpiece. Yet historical consensus has always had it that the cornet was initially derived from the valveless post-horn, and thus was at least in the beginning to be seen as a member in good standing of the horn family,[6] whereas valved trumpets were derived entirely separately—by simply fitting two or three valves to a natural trumpet.

Thus the problem of the design history[7] of the modern B-flat cornet can be put in the following way: What were the steps that led from the earliest valved cornets that took them effectively out of the realm of the horn family into being, for all practical purposes, variant versions of trumpets? (Figure 1). And were those changes in design the result of (1) engineering improvements (i.e. acoustical or otherwise), (2) a reflection in changes of musical style and/or player's demands, (3) a reflection of wider socio-economic factors, or (4) attributable solely to the vagaries of stylistic and marketing whim? Interestingly, all four categories of explanation appear to have played their role in cornet design history.

Figure 1.
Muck "Citation" B♭ trumpet [serial no. 2549; bell length: 19" (48.26 cm.); restoration by Frank Griesemann] and B♭ cornet [serial no. 2040; bell length 15¾" (40 cm.)], photographed side by side for comparison; 1950s. 1A: View from the right side, illustrating especially relative lengths, number of turns to the leadpipe, disposition of tuning slide, and relative size of appropriate (contemporary Bach Corporation) mouthpieces. 1B: View from the left side; note especially position of intervalve tubing (so-called "coquilles"), by then long-since the valve configuration standard of the industry. Author's coll.

The basic "anatomical" landmarks of a typical late-nineteenth-century cornet are specified in Figure 2 (see also Figure 5). In England, the Stölzel-valved *cornet à pistons* was commonly called the "cornopean," though at first the term was generally reserved for instruments equipped with a "MacFarlane" clapper key on the bell, used for trilling effects. The term "cornopean" has long since come to be a shorthand synonym of "Stölzel-valved *cornet à pistons*" on both sides of the Atlantic, while the term "cornet" has come to be equated with Périnet-valved instruments.

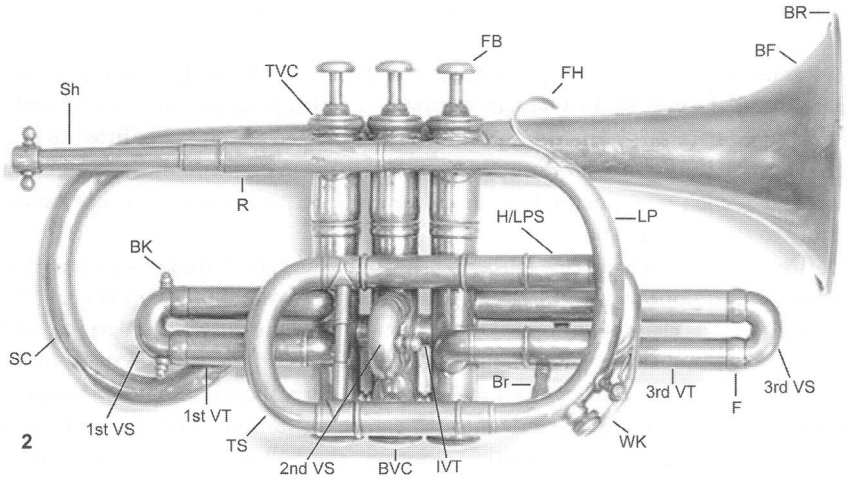


Figure 2.

Besson (Paris) "Soliste" model single-waterkey cornet [serial no. 77523; ca. 1911; bell length 13" (ca. 33 cm.); author's coll.]. View from right side illustrating main features of cornet "anatomy": 1st VS—first valve slide; 1st VT—first valve tube; 2nd VS—second valve slide; 3rd VS—third valve slide; 3rd VT—third valve tube; BF—bell flare; BK—bow knob; BR—bell rim; Br—brace; BVC—bottom valve cap; F—ferrule; FB—finger button; FH—finger hook; H/L PS—high/low pitch slide; IVT—intervalve tube; LP—leadpipe; R—receiver (shank); SC—shepherd's crook (rear bell bow); Sh—shank; TS—tuning slide; TVC—top valve cap; WK—waterkey

In the beginning: the earliest piston-valved cornets

With the advent of industrial technology in the early nineteenth century, the ability to construct a valve capable of redirecting windway passages with a minimal amount of leakage had finally been developed.[8] Baines, Carse, Dullat, Haine and De Keyser, Heyde, Kampmann, Mahillon, Myers, and others have discussed the history of the many valve types that appeared soon after the technologies had been developed.[9] At long last, chromaticism of soprano brasswinds had been attained—as hand stopping methods, key systems (keyed, or Royal Kent, bugles) and slides produced less satisfactory results—despite the mastery of these instruments by some early virtuosos.

The precise origin of the piston-valved cornet has, until recently, been the subject of uncertainty and some dispute. Baines' account is perhaps typical:

> Forestier's *Méthode pour le Cornet à Pistons* contains a historical introduction contributed by Dauprat above the date 1834 saying that "it occurred to Halary to apply the valve system as perfected by Meifred to the *Post-horn des Allemands*, known in our military bands by the name *petit cornet*.... The statement refers to some seven years previously, and must be true so far as it goes."[10]

Baines was not alone in wondering how it happened that a French atelier was the first to fit German-invented valves to the German version of a coiled posthorn, and not all authors agree that it was necessarily a *German* posthorn that first had piston valves fitted to it,[11] as Carse reports that the French *cornet simple* was indeed in use in France in the early nineteenth century, and as such serves as the best candidate as the natural instrument that served as "ancestor" to the *cornet à pistons.*[12]

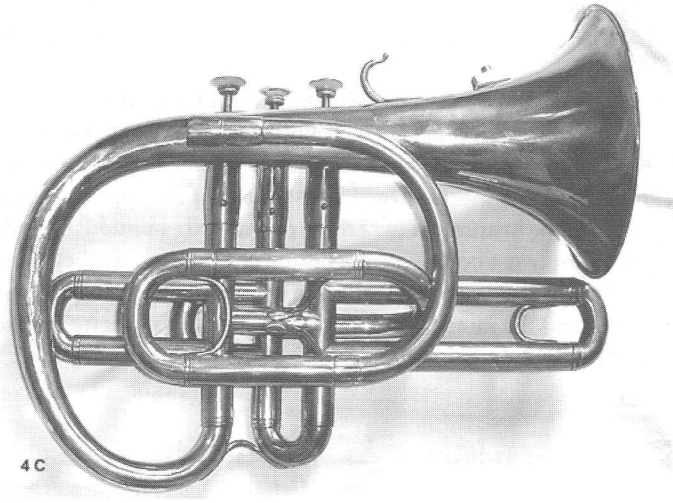
Be that as it may, no one to my knowledge has published an illustration of a completely coiled posthorn equipped with Stölzel valves and dating from the appropriate era (ca. 1825-1840), though Carse claims (without citation) that "some of the early specimens [i.e., of the *cornet à pistons*] retain the original circular form."[13] To retain the true circular posthorn shape, such an instrument almost surely must have had a very short leadpipe (with a tunable mouthpiece receiver) running directly into the valves;[14] assuming that the pistons would have been oriented in the usual, vertical position, the bell would have been directed downwards or to the rear: acceptable and traditional in French horns, but presumably less desirable in a soprano instrument where hand stopping and muffled tones are neither traditional nor particularly acceptable. To be sure, the posthorn solo of Mahler's Third Symphony, impossible to play on a natural horn, is often performed on a three-valved (usually rotary valves with direct mechanical linkage) circular posthorn, but this instrument clearly had a separate (and arguably later) appearance than the piston-valved cornet in France.

Various authors[15] have presented slightly conflicting versions of this "origin myth" of the two-valved *cornet à pistons* (Figure 3). It is only recently that Myers and Parks have been able to narrow down at least the time of appearance (if not the inventor) of the earliest cornets as ca. 1825, confirming at the same time that two-valved *cornets à pistons* did indeed precede the three-valved version (Figure 4) by some four years as has been commonly presumed. Myers and Parks cite the opening statement of Périnet's "French Patent 4149 of 1829 on a three-valved cornet"; in translation, the passage reads: "The so-called piston cornet, known for about four years, only had two valves in the beginning; since then, a third has been added."[16]

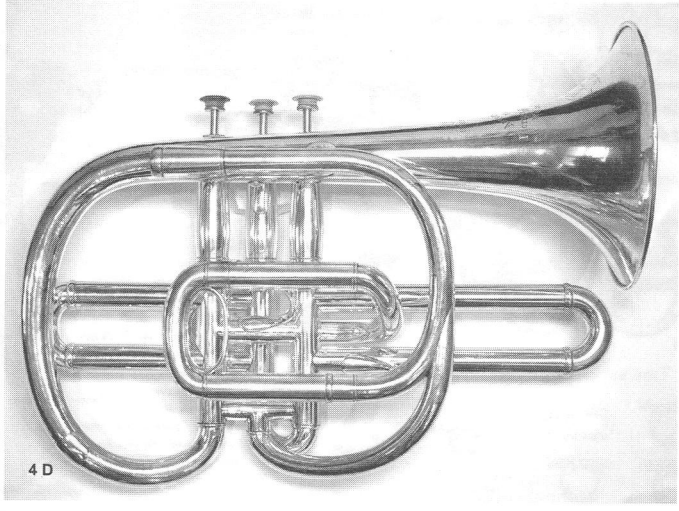
Figure 3A, B.
Right and left side views of two-Stölzel-valved cornet ("cornopean") by Labbaye; no serial number; between 1825-1848; bell length 10 1/2" (ca. 26.67 cm). Note external pins (*vis*) especially visible on left side of instrument. Author's coll.

Figure 4.

Three three-Stölzel-valved *cornet à pistons*. 4A, B: Collin (Paris), no serial no., ?1830s. Short model (10 1/2"—26.67 cm.); note especially "knot" convolution of distal end of third valve tube. Author's coll. 4C. Early (1842-1845) Besson (Paris) model, without front droop, leadpipe entering the second valve; bell length 11" (ca. 27.94 cm.); Delile coll.; 4D: Courtois (Paris); ?early 1850s; no serial no.; bell length 11" (ca. 27.94 cm.); note false tubing imparting symmetrical profile in restoring front "droop"; also, note the lack of external pins—an early use of the internal system for maintaining valve support and orientation. Author's coll.; restoration by Robb Stewart. Left sides of the Besson and Courtois instruments configured as in the Collin instrument.



4 C



4 D

In short, the earliest known surviving *cornets à piston* do not look at all like coiled posthorns simply equipped with two Stölzel valves—i.e., like a miniature version of a "French" horn. Instead, the earliest surviving piston-valved soprano brasswinds all have the bell directed forward, much as they do today, and have done throughout their long history. Baines usefully points out that at least one German maker (Schott) was offering a (valveless) posthorn *en forme de trompette*—perhaps a clue to the shape of the posthorn to which piston

valves were first applied. [17] In any case, the upshot is simply that many of the essential elements that have become standard in cornet design appear to have been present at the outset.

The instrument is designed to be held with the left hand, with the bell pointing forward (see Figure 5). Two-valved cornopeans are typically some 10 1/2" (26.67cm.) long, measured as bell length (measured from bell rim to rear bell bow, i.e., excluding mouthpiece and shanks); 6 1/4" (15.87cm) deep, as measured from the top of the upper valve caps vertically to the lowest portion of the instrument (whether a downward extension of windway tubing, or, in later cornets, simply the bottom of the bottom valve caps); the bell flare is typically 5 1/4" (13.33cm). Three-valved cornopeans, while commonly retaining the relatively wide bell flare of ca. 5 1/4", and the same 6 1/4" depth, show greater variation,: towards narrower bell flares, longer bells, and deeper bodies. Additionally, some earlier "pocket" models are known.

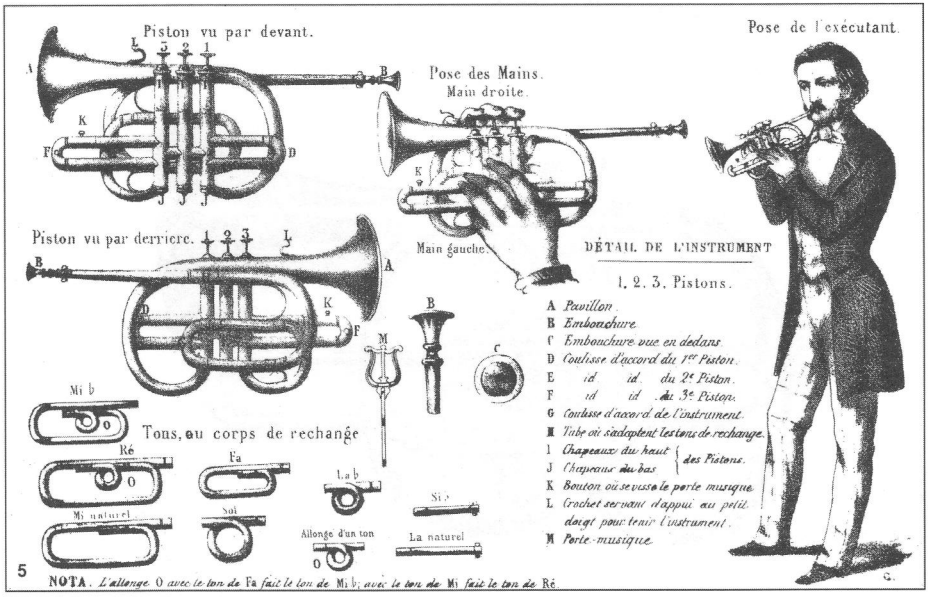


Figure 5.

"Figures démonstratives de la méthode de cornet de A. Brulon." Ca. 1865-1878.
The "Périnet cornopean" shown is virtually identical to those depicted in Figures 6, 7.
Note, in addition to the manner of grasping the instrument, the numerous shanks for changing pitch, the horn-like mouthpiece—and the labeling of various parts of the instrument.
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The mouthpiece—deep and conical, rather like that of a true horn—is fitted into a removable shank; the shank in turn is fitted into a receiver, which in turn is connected with the "leadpipe" tube which typically continues to run forward, then turns downward and is reflected back to form the first turn; the second, smaller 180° turn is formed as the tubing is reflected upward and forward again—the site of the tuning slide crook. Beyond the tuning slide, the leadpipe tubing runs forward, then curves downward to form a deep loop before entering the bottom of the second Stölzel valve. A short tube connects the two valves (which, in the interest of economy of manufacture, are usually identical). The windway leaves the bottom of the first valve, and is reflected up and back in a graceful curve (the forerunner to the "shepherd's crook" of later nineteenth-century cornets) before running forward and expanding into the terminal bell flare at the front of the instrument.

The first-valve tubing (lowering the pitch a full step when the first piston is depressed) is directed straight back, while the half-step crook of the second valve is directed forward. Thus the typical early two-valve cornopean has a balanced, nearly symmetrical appearance, one that superficially may recall its supposed curved, coiled post-horn ancestry, but one which, nonetheless, deviates significantly from it: once again, these early two-valved *cornets à pistons* do not resemble the miniature French-horn configuration that one would assume would have been the result of simply adding valves to a coiled natural posthorn.[18]

Both leadpipe and bell were positioned to the right of the valves from the perspective of the player. Though later Stölzel-valved cornets were to assume a longer shape and, significantly, came to be constructed with the bell to the *left* of the valve assemblies, these innovations were actually first achieved in early Périnet-valved cornet design, and applied retroactively to cornopeans. For reasons discussed below, cornets with the bell and leadpipe to the right—the original design—came to be known as the "French model" (*modèle français*), while later cornets with the bell to the left of the valves were known as the "English model" (*modèle anglais*).[19]

The springs of the valves of most early cornets were housed in the upper part of the chamber. Screw pins (Fr. *vis*), inserted from the left side of the valve, passed through a slot in the inner spring housing, through the spring itself (at or near its bottom), exiting the slot on the opposite side of the housing, and screwing securely into the valve casing on the right side of the instrument (again, from the player's perspective). These pins prevented the valve from rotating, thus keeping the porting aligned properly, and served simultaneously to keep the valve in its upright ("open") position until depressed by the player.

With the addition of the third valve, options for the construction of the windway immediately presented themselves.[20] The basic overall dimensions of the instrument remained the same (see above). The third valve was literally that: an additional valve governing a tube that lowered the pitch 1 1/2 steps, added beyond (from the player's perspective, i.e., in the direction of the bell flare) the existing valves. This longer tube immediately presented problems in the removal of its tuning slide: in many designs, the third valve slide came perilously close to intersecting the edge of the typically rather wide bell flare (often 5 1/4"), and any slight damage to the bell or third valve tubing could easily hamper removal of the third valve slide. Makers solved this problem primarily by changing the

direction of the distal end of the third valve tube,[21] by literally forming it into a convoluted knot (Figure 4A, B), or by narrowing the bell flare (to 5" or even slightly less). This topological problem involving long third valve tubes and bell flares was to persist in the design of later, Périnet-valved cornets, and to inspire still other solutions.

Also, with the addition of the third valve, the second valve tube had to be reconfigured—and the solution generally was to reflect it at a sharp angle backwards, still on the left side of the valve assembly. Inasmuch as the instrument is designed to be grasped with the left hand, the second valve tube could not in any case project out directly from the valve—and presumably to facilitate a more nearly posterior direction to the second valve loop, most three-valve cornopeans of the 1830s-1850s had the second valve offset, deflected to the left of the plane of the first and third valves.[22]

Addition of the third valve presented some additional design options to these early *cornets à pistons.* In many of the three-valved cornopeans of the period 1830-60, the leadpipe entered the bottom of the third valve, after completing the symmetrical loop that held the tuning slide (Figure 4A, B). The windway then passed back to the second valve via a simple porting tube, and thence back to the first valve through a curved tube connecting the bottoms of the second and first valves. There no longer being the option of the bell to exit from the bottom of the first valve (as had been the case in the two-valved forerunner design), the bell now had to exit from the side of the first valve (usually near the bottom on the right side). These instruments tended to retain the length, depth, and bell flare width dimensions of the two-valved models.

Another common cornopean design of this period (Figure 4C) eliminated the front "droop" completely. As early as ca. 1845, Besson constructed an instrument with the leadpipe passing through the upper and lower branches of the third valve tubing, entering the offset second valve rather than the third valve; the windway then passed back to the third valve via a curved tube connecting the bottom of the valves. From the third valve the windway passed to the first valve via a direct porting tube (to the right of the offset second valve), the bell exiting from the bottom of the first valve. This configuration, coupled with the smaller bell flare, contrived to give the instrument a trumpet-like look that presages the more elongated designs of later cornets. Indeed, cornopeans of this design tended to be longer (up to 11"), deeper (7") and with narrower bell flares. Several makers, including Antoine Courtois and Gustave Besson, adopted the same droopless configuration of the leadpipe before it entered the second valve, but nevertheless retained the conventional, deep-droop look of the leadpipe by adding a section of false tubing (Figure 4D).[23]

Moreover, two different configurations of leadpipe are known from the earliest three-valved "cornopeans." One was the already familiar design seen on the two-valved and three-valved instruments, as described above in its various versions. Often slender braces (sometimes suggesting musical motifs; cf. the Périnet-valved cornet of Figure 9) ran between the upper portion of the leadpipe and the top tube of the tuning slide crook; and again from the bottom tube of the tuning slide crook to the deep droop of the leadpipe just before it entered the third valve. Similar braces sometimes ran from the top tube of the first valve tubing to the bell; these braces often were present in the earliest-designed Périnet-valved cornets.

But there is another way to configure a leadpipe that offers the same opportunity for one or more crooks (at least one for tuning): this is the so-called (reverse) "S" configuration, so familiar in much later phases of cornet design history. Here the leadpipe, after running forward, is reflected downward into a much shallower curve (at this stage in cornet history, apparently never with a removable crook), then running backward horizontally, and then downward again to form the site of the tuning crook, the tubing then running forward again before entering the third valve. The third turn of the leadpipe thus pointed forward, and lay horizontally or at an angle before the pipe reversed and entered the third valve, sometimes retaining a distinctive "droop," as in the other, by then already conventional, leadpipe design. Thus the S-shaped leadpipe that became so popular on American Périnet-valved instruments in the first decade of the twentieth century was already in place in cornet design at least by the 1840s, if not somewhat earlier. Inasmuch as Périnet-valved cornets were already in production in the 1840s (see below), however, it is impossible at this point to decide whether the S-leadpipe was originally invented for cornopeans—or was retrospectively fitted to Stölzel-valved instruments after first being designed for Périnet-valved cornets.

Addition of the third valve (opening onto a tube that lowers the tone by one and one-half steps), of course, provided the full chromaticism unattainable in the lower register of two-valved instruments—where the valve system lowers the open tone by one half, one, or (when used together) one and one-half steps.[24] There can be no question that the Stölzel (and other early competing systems) valve system constituted a true acoustical design advance over other, non-valve methods in achieving chromaticism. Similarly, addition of a third valve so soon after the invention of the two-valved *cornet à pistons* was a rapid and definite advance. Interestingly, the two-valved cornet seems to have remained in production at least throughout the 1830s, and, as Myers and Parks have pointed out, an inexpensive two-Stölzel-valved instrument was still being offered by Gautrot Ainé & Cie as late as 1867—marketed as a *cornet de poste.*[25]

Though I have as yet found no definite contemporary statement to the effect that Stölzel-valved cornets were mechanically less than satisfactory, it is worth noting that perhaps the majority of critics (apparently following the lead of Hector Berlioz) consistently pronounced the sound of the *cornet à pistons* as "vulgar" or "coarse." Though there are several possible musicological and sociological explanations for this persistent derogation of the cornet, it is also possible that the early Stölzel-valved cornets were in fact not as effective mechanically as later—especially Périnet-valved—instruments proved to be.

The Stölzel valve differs from the Périnet valve primarily in that the path of the windway of the instrument travels along the length of the inside of the Stölzel valve for some distance, entering or exiting the valve through the bottom in all but some of the last-produced Stölzel-valved cornets. This meant, of course, that the internal diameter of the Stölzel valve had to be the same as the "bore size" (the internal diameter of the windway of the instrument as it enters and exits the valve system, as well as in the tubing associated with each of the valves), making a Stölzel-valve necessarily much narrower than a Périnet-valve (where the windway simply transits the valve in porting tubes).

Authors have always assumed that the Périnet valve replaced the earlier Stölzel valve since the former was obviously superior—somehow more efficient—than the latter. For example, Baines writes, "With the Périnet valve, fitted to the best French cornets from the mid 1840s, the instrument acquired the classic format with three reversals of the tube before this enters the third valve. The cornet became heavier to hold but more solid in sound thanks to the improved valves."[26] It is anecdotally the case that period cornopeans leak on average worse than most near-contemporary Périnet-valved cornets do, though most speculation as to why Périnet-valved cornets sound better than Stölzel-valved instruments has centered on the sharp right-angle turn of the windway as it enters or exits the Stölzel valve.[27] As emerges later in this paper, many of the subsequent design changes encountered in the history of the Périnet-valved instruments have to do with minimizing bends and deflections in the windway, especially at or near the valves.

However, properly restored Stölzel-valved *cornets à pistons* demonstrate (at least to my satisfaction) that high tonal quality (integrity of sound as well as intonation) can be achieved with a well-made Stölzel-valved instrument. I am therefore inclined to agree with brass expert Robb Stewart, who doubts that Stölzel valves inherently leak more than Périnet valves due simply to their design. Rather, Stewart suggests, the lighter construction of piston and casing is the culprit, as Stölzel-valves too tightly fitted will seize up in the casing "with only a small amount of squeezing on the left hand."[28] This suggests that Stölzel-valves were prone to leakage simply because they could not be as tightly fitted as Périnet valves. If this line of reasoning is generally correct, it may also explain why these instruments were designed to be grasped, not around the valves per se, but in a more relaxed fashion, and in part by the bottom loops of the first and/or third valves, or by the loop of faux tubing to the third valve in those instruments where the leadpipe entered the side of the second valve (see Figure 5).[29] More than aesthetics may have been afoot in the deep-droop design of the original cornopeans and their immediate Périnet-valved successors.

The Périnet valve and the early days of the modern cornet

To my knowledge, no three-valved cornets attributable to François Périnet survive.[30] Yet, as we have seen, it was Périnet whose application in 1829 for a patent to add a third (Stölzel) valve to a cornet gives us the firmest reckoning on the origin of both two- and three-valved *cornets à pistons.* And it was of course this same man who patented a decade later the valve design that bears his name. Though modern trumpets and cornets (not to mention other piston-valved brasswinds) are commonly said to utilize an "improved" version of the valve design first patented by Périnet in 1839,[31] it is unclear what the nature of the subsequent improvements over the original design might have been—apart, that is, from modifications in windway passage through the valves developed by Besson and other makers, as discussed below.

The oldest surviving Périnet-valved cornet yet identified and dated with certainty was built by none another than Adolphe Sax[32] in 1842, not long after his arrival in Paris (Figure 6A, B). The instrument, astonishingly, looks at first glance just like a cornopean. Recall that Périnet valves do not transmit the windway through the length of the tube: thus it is

physically impossible for the windway to exit or enter through the bottom of a Périnet valve. Yet Sax's Périnet-valved cornet—and many others built right up to ca.1860[33]—have the appearance (especially from the right-hand side) that the windways are virtually the same as on a standard three-valved Stölzel-valved instrument. This is nothing short of an optical illusion, with the effect that a purchaser of a cornet in France in the 1840s and 1850s (and perhaps beyond) seemingly had the option to select an instrument with *either* Stölzel or Périnet valves, the instrument being otherwise virtually identical.

Figure 6.
Earliest known Périnet-valved cornet—ca. 1842. Adolphe Sax, serial no. 1056; bell length ca. 11.8" (300 cm.). Bruno Kampmann coll.

Rather as the earliest cars looked like buckboards with an internal combustion (or steam, electric, or still other design) engine substituted for the original horse, the initial substitution of the Périnet for the Stölzel valve on the *cornet à pistons* occasioned no new design (Figure 7). Even though some very late use of the Stölzel-valve eliminated the flow through the bottom of the valve as a means of directing the windway (meaning that the Stölzel valve per se did not absolutely require that the windway exit or enter through the bottom of the valve), nonetheless the fact that the windway was precluded from doing the same in the Périnet valve actually offered design configurations of the windway not, apparently, thought desirable (if possible) to early designers of Stölzel-valved cornets. As we shall see, these possibilities were soon discovered and exploited by French makers.

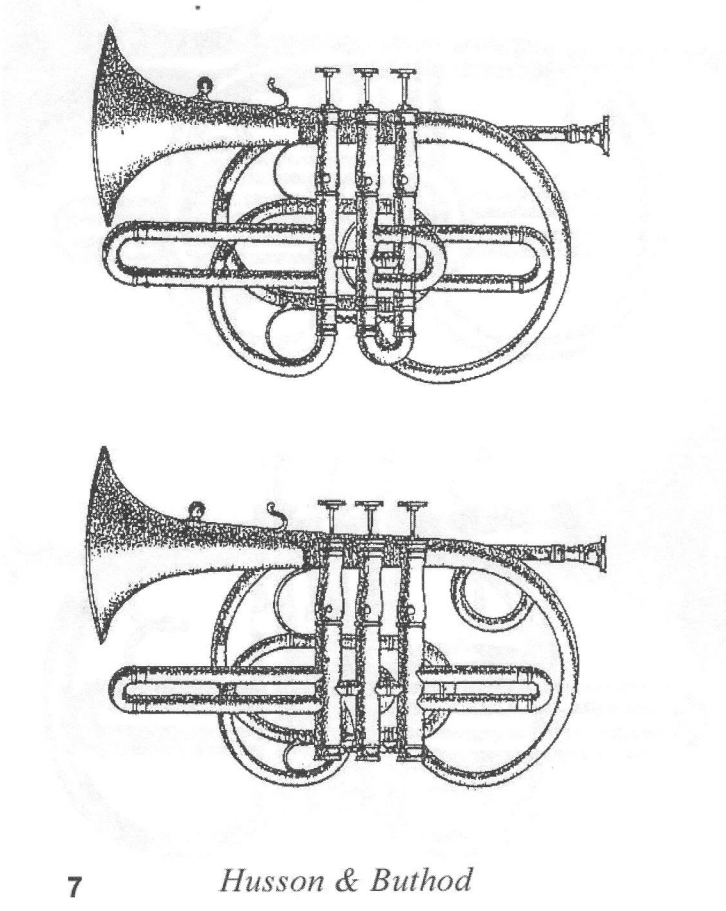

Figure 7.
Husson & Buthod (1848-1857) catalogue illustration of similar Stölzel-valved and Périnet-valved cornets. Courtesy of Al Rice (Fiske Museum).

But not right away—and this is interesting: Why were the earliest Périnet cornets virtual "spitting images" of their otherwise outmoded Stölzel-valved (and for a short time contemporary) predecessors? Especially intriguing is the labyrinthine relationship that the Belgian Adolphe Sax had with the native Parisian makers. Horwood in particular has recounted the details of Adolphe Sax' larger-than life—and especially his ups and downs *vis à vis* his competitors, the native Parisian instrument manufacturers.[34] Lawsuits, death threats (and even an apparent assassination attempt) are legendary, and none other than Gustave Besson (see below) is said to have quit his native France for England, after putting the company in his wife Florentine's name to avoid reprisals as the result of his being party to what was ultimately a failed lawsuit against Sax.[35]

This raises the questions: Were the Périnet-valved cornopean-like cornets designed in the manner of Sax' instrument, from the concerns of E. Courtois, A. Courtois, Halary, Henry and Martin, and undoubtedly others, simple, outright copies? Alternatively, were some independently designed? Or were they, like saxhorns, made under explicit license from Sax?[36] Though the few extant instruments—and the lack of any written documentation—precludes any definitive judgment, it is quite possible that Sax was the first to apply Périnet valves to the *cornet à pistons*, and the closely similar instruments made by other makers may well prove to be examples of the copying in which Sax repeatedly claimed his rivals engaged.

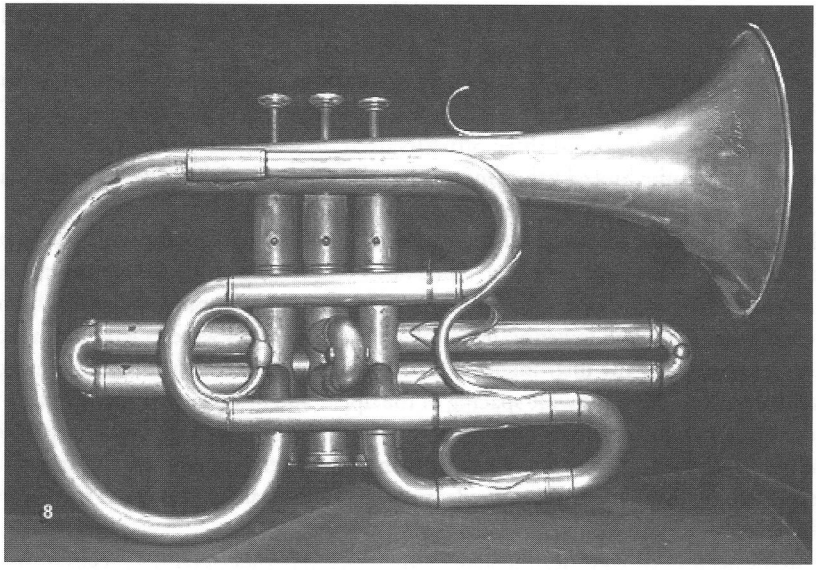

Figure 8.
Sax Périnet-valved cornet with S-shaped leadpipe; serial no. 18529. Frank Hosticka coll.

Survival of several instruments[37] reveals that Sax also was making a Périnet-valved cornet with the S-configuration of the leadpipe (Figure 8) at least by the late 1840s. There is no evidence that any other maker was doing so—and indeed I have been unable to locate any definitive evidence that any maker other than Sax was making Périnet-valved cornets much before ca. 1850. All the important Parisian makers to emerge in the 1840s—including *inter alia* but especially Besson, A. Courtois, and Gautrot—appear to have been using the Stölzel valve predominantly, if not exclusively, through the first third or so of the decade of the 1850s.

Thus the Périnet valve did not drive the Stölzel valve to immediate oblivion—perhaps partly explaining why cornets with Périnet valves mimicked the older Stölzel-valved models so assiduously. French makers only began to utilize the Périnet over the Stölzel valve in the mid-1850s, when the firms of Antoine Courtois and Gustave Besson gained ascendancy in the markets of France and Great Britain.

The early, deep-bodied, cornopean-like Périnet-valved cornets retained several features from their Stölzel-valved predecessors. Some still had the pins (*vis*) aligning the valves, though later examples utilized simple "keys" on the side of the top of the valve for lateral alignment, while vertical orientation was supplied by a washer; still others utilized the three-pin system on the washer supporting the top-sprung valves.[38] These latter two methods quickly became the industry-standard replacement of the external transverse pins first introduced in the earliest cornets. Likewise, the ferrule sometimes (though not invariably) covering the seam of the intervalve tubing in two- and three-valve cornopeans persisted in some of these deep-bodied "Périnet cornopeans," and, indeed, in later models produced into the early 1860s. The Sax instrument (Figure 6A, B), for example, has both pins and such ferrules.

More significant, perhaps, is the persistence in these early deep-bodied cornopean-like Périnet-valved cornets of the exact same system of intervalve tubing *vis à vis* position of valve tubes standard in all two- and three-Stölzel-valved *cornet à pistons.* Because passage of air lengthwise within the Stölzel valves meant that the side wall of the valve absolutely had to cut off the air column from the lower valve tube when the valve was in the open (undepressed) position, the upper and lower segments of the valve tubing had to be separated rather far apart from one another.[39] Intervalve connecting tubes and leadpipe or bell connections to the valves were always midway between these upper and lower branches. Moreover, the upper and lower branches of all the valve tubes were exactly in line for the two or three valves of the instrument, contributing to the symmetrical appearance of the Stölzel-valved cornets. This wide spacing of the upper and lower sections of the valve tubes had the further effect of forcing early makers to keep the tubing of the middle valve on the left side of the instrument, further necessitating the offset valves noted above; evidently, there was simply insufficient room to place a wide second valve slide on the right side, as it would collide with the tuning slide.[40]

All the deep-bodied cornopean-like Périnet-valved cornets retained precisely this same valve-tubing configuration *vis à vis* the intervalve tubes and leadpipe/bell connections, though makers beginning as early as Sax (Figure 6) immediately brought the upper and

lower branches of the valve tubes closer together.[41] Indeed, A. Courtois, arguably the premier maker of Périnet-valved cornets in the years 1855-1900, retained this configuration on all its instruments to the very end of the nineteenth century.

There was a further consequence to the narrowing of the space between the upper and lower sections of valve tubing: beginning with the Sax instrument (Figure 6), makers of Périnet-valved cornets were able to place the short second valve tubing on the right side of the instrument, thereby obviating the necessity of offsetting the alignment of the valves and, perhaps not coincidentally, providing a somewhat surer, more secure grip of the instrument. As far as can be determined, no Périnet-valved cornets (or trumpets) with offset valves were produced until the twentieth century.[42] Further, later nineteenth-century cornopeans, when the second valve tubing had been switched to the right side retrospectively, also always had in-line valves.

Thereafter—by the mid-1850s—cornet design "evolution" took several different directions, best followed, perhaps, by examining the effects of the Great Exhibitions (i.e. London, 1851; Paris, 1855) on the industry, the resonance in terms of manufacture, marketing, and purchasing preference between France and England, and the emergence of Antoine Courtois and Gustave Besson as industry leaders.

Courtois, Besson, and the Great Exhibitions: emergence of the classic Victorian cornet

The geographic dichotomy in both manufacture and use of piston- and rotary-valved soprano brasswinds, still so evident in the world today, has been in place since the inception of these instruments: "cornets" (i.e. in the very loose sense of $4^1/_2$-foot-long, conical-to-intermediate-tapered valved brasswinds) have with rare exception been equipped with rotary valves with direct mechanical linkage in Germany, Austria, Italy, eastern Europe, and Russia, while tubular pistons were the valves of choice in France, Belgium, and England. In the United States, rotary valves with the unique string linkage—plus imported instruments with Vienna valves, and rotary valves with mechanical linkage—predominated up through the Civil War, with the manufacture of Périnet-valved instruments commencing in the late 1860s (Boston Musical Instrument Manufactory, e.g.), and becoming the valve of choice in the 1870s and thereafter. To be sure, Sax offered soprano brasswinds with *Berlinerpumpen* (soprano "saxhorns," most similar to valved bugles, i.e., fluegelhorns). In Germany, Périnet-valved horns appear not to have been used with any regularity until the twentieth century, when musical preferences changed and the worldwide success of Périnet-valved trumpets prompted their production (*Jazz Trompete*), though never as a replacement of the traditional rotary-valved cornets and trumpets.

The action in the 1850s, insofar as the originally French *cornet à pistons* was concerned, was focused, then, in France and, increasingly, in England. The famous Distin family of brasswind performers played a role in early cornet history, initially performing on and importing to their native England the instruments of Adolphe Sax.[43] The Distins were among the first to import French-made brasswinds to England, a practice that quickly led to important design innovations in cornets.

The Industrial Revolution was in high gear by the 1850s, with steam harnessed in factories and consequent improvements not only in brass instrument manufacture, but also in the production of uniform quality of brass and other metals themselves.[44] The Great Exhibition of 1851 featured a number of makers of European musical instruments. But it was the Paris Exhibition of 1855 that seems to have cemented the reputations especially of A. Courtois and G. Besson, who were among those receiving the most coveted medals—emblazoned thereafter on the bell of nearly every Courtois cornet manufactured up to at least 1900.

Figure 9A, B.
Gautrot *modèle français* Périnet-valved cornet; bell length 13.5" (34.3 cm.); no serial number, ?1850s. Author's coll.

Only three elements were needed to complete the basic story of the development of what became the standard Victorian cornet: (1) elongation of the cornet into the standard 13.5" instrument, a shallower, slimmer-looking model than the cornopean-like earliest Périnet-valved cornets; (2) development of the modern Périnet-valve porting design; and (3) placement of the bell to the left side of the valve assembly.

No definitive evidence for elongation of the Périnet-valved cornet prior to 1850 is as yet forthcoming. A curious page illustrating "various models of *cornets à pistons* made by Gautrot from 1828 to 1847," published in 1912 by Couesnon et Cie (Gautrot's successor)[45] in an advertising document, shows an elongated Périnet-valved *modèle français* cornet, with pins, of a style known to have been manufactured by A. Sax and A. Courtois in the 1850s.[46] The Gautrot instrument (Figure 9A, B), while still offered for sale in 1867, most likely was produced in the 1850s. Besson, meanwhile, patented two elongate models in the years 1854 and 1855. Still being marketed at the end of the century, these two models featured perhaps the earliest fully documentable changes in the porting of the Périnet valves. Besson's 1854 model (Figure 10A, B), for example, has the intervalve tubing aligned with the lower branches of the first and third valve tubes, instead of between the upper and lower branches of the valve tubes, the norm that had been "inherited" from the days of the Stölzel valve.

Besson's 1855 model (Figure 10C, D) features two further innovations in the valve porting system: the intervalve tubes are "knuckled out" (*perce pleine,* or "full bore"), and are additionally offset with respect to one another. This design change reflects, in the analysis of nineteenth-century commentators,[47] attempts to improve the flow of the windway by removing as many angles and turns as possible. Though these early designs of the windway were eventually to disappear, the Besson design of the early 1870s (and possibly of the late 1860s, though not patented until 1874) has long since become the standard industry design of virtually all trumpets and cornets; I return to this topic immediately below.

These early longer-bell cornets are difficult to grasp with the left hand. The early, deep-bodied, cornopean-like Périnet-valved cornets provided a firm, comfortable grasp low on the valve assembly—even more than their Stölzel-valved predecessors, which after all had the second valve slide projecting to the left. With a lengthening and, critically, shallowing of the instrument, it is difficult to grasp the valves of a French-model cornet using all four non-thumb fingers of the left hand. This appears to be the reason behind the advent of the placement of the bell to the left of the valve assembly, no later than 1855.

The French orchestra leader Jullien was a key figure in promoting the cornets of A. Courtois in England; Jullien opened a music store at 214 Regents Street in London in 1845.[48] One of the earliest cornet virtuosos, Hermann Koenig, was in Jullien's orchestra. From at least the early 1850s, Jullien began selling cornopeans and, later, Périnet-valved cornets (plus the "hybrid" mixed Périnet- and Stölzel-valved cornets—see below), all bearing the endorsement of Herr Koenig.

Jullien's store passed to the hands of Alfred Hammond, and by 1862 had been passed along again to Samuel Arthur Chappell[49]; Chappell continued to import and promote Courtois cornets assiduously until his retirement from the business in 1901. According to Rose[50] (p. 173), Chappell later in life said it was Courtois who first placed the bell of the

Figure 10.
Two early Besson (Paris) *modèle français* cornet models.
10A, B: 1854 patent model; serial no. 4193 (92 rue d'Angoulême series),
early 1870s; bell length 13" (33 cm.); Author's coll.

10C, D: 1855 patent model, serial no. 7244 (92 rue d'Angoulême series), early 1870s; bell length 13" (33 cm.); Author's coll. The main differences are in the intervalve tubing patterns (Figures 10B, D), hence internal valve construction. The 1854 (10A, B) intervalve tubing is said to be *perce droite* (i.e. "straight," or "direct bore"), while the 1855 model (10C, D) is *perce pleine*, or "full bore"—the "knuckled out" shape of most modern instruments.

cornet on the left side of the valve assembly. The immediate popularity of this configuration—due, it seems arguably clear, to the more secure grip this configuration offered, as no longer does the valve assembly feel like it will slip from the hand, the bell now resting on top of the left index finger—was so pronounced that left-bell cornets came to be known in France as the *modèle anglais* or *English model.*[51] The traditional, bell-to-the-right model (*modèle français*, or "French model") persisted in France until after the First World War, and apparently remained the model of choice in France at least until the 1870s (see below)[52].

There are a number of extant instruments that appear to confirm Chappell's statement that it was indeed the firm of Antoine Courtois that pioneered the design of the *modèle anglais* cornet. The oldest (serial number A712; Figure 11A, B) is inscribed *nouveau modèle* ("new model"); lacking the circular stamp commemorating a "first class medal" at the 1855 Exposition, equipped with shell finger touch buttons (as in many cornopeans) and, critically, bearing the address of "21 rue du Caire," which they left sometime in 1856,[53] this instrument could not have been made any later than early 1856. This cornet is astonishingly similar to the various *Arban*, *Levy's*, *Arbuckle*, etc. models (Figure 12) that Courtois produced throughout the final four decades of the nineteenth century, though it differs in details primarily of configuration of the first and third valve tubes.[54] Critically, the other three "new model" Courtois instruments known have the term written directly in English; all bear the stamp of Jullien as importer (along with the endorsement of Koenig). Two of these instruments have S-shaped leadpipes; the fourth is a "hybrid" instrument with two Stölzel- and one Périnet-valve.[55] Thus the only thing all four instruments share is a bell to the left of the valves—otherwise they encompass three very different designs. One can only conclude that "new model" means "bell to the left"—i.e., *modèle anglais.*

I have alluded to the combination of Stölzel with Périnet valves (Figure 13) on some of these cornets, particularly some three instruments known to survive, made by Courtois in the late 1850s.[56] Though it would be tempting to speculate that these are, in fact, "transitional" instruments—made, that is, as a tentative, partial, "intermediate" stage in the switch from fully Stölzel- to fully Périnet-valved instruments (i.e., in the form of an argument traditional in evolutionary biology)—such is almost certainly not the case. For one thing, we know of fully Périnet-valved instruments as old as 1841/42 (i.e., the Sax instrument); and though it is negative evidence that we do not as yet know of any cornets of this mixed-valve aspect that are that old, the mélange of Courtois instruments made in the late 1850s—some with all Périnet valves, others with one Périnet flanked by two Stölzel valves; and among these mixed-valved cornets, some in *modèle français* configuration (but at least one a *modèle anglais*) and some with the by now thoroughly old-fashioned external pins (*vis*), others with three-pinned washers guiding the valves—paints a vivid picture of a company (i.e., Courtois) providing virtually all permutations and combinations to the marketplace, most likely in the hope of finding what would sell the best. Rather than constituting a transitional design intermediary, the cornets of mixed-valve type of the 1850s more likely represent a marketing transition—an effort to woo diehard Stölzel-valve devotees over to what had, in effect, already become the industry standard: the Périnet valve. It is striking how effectively this hybrid valve design recaptures the simplicity of line of the original *two*-valved cornopean.

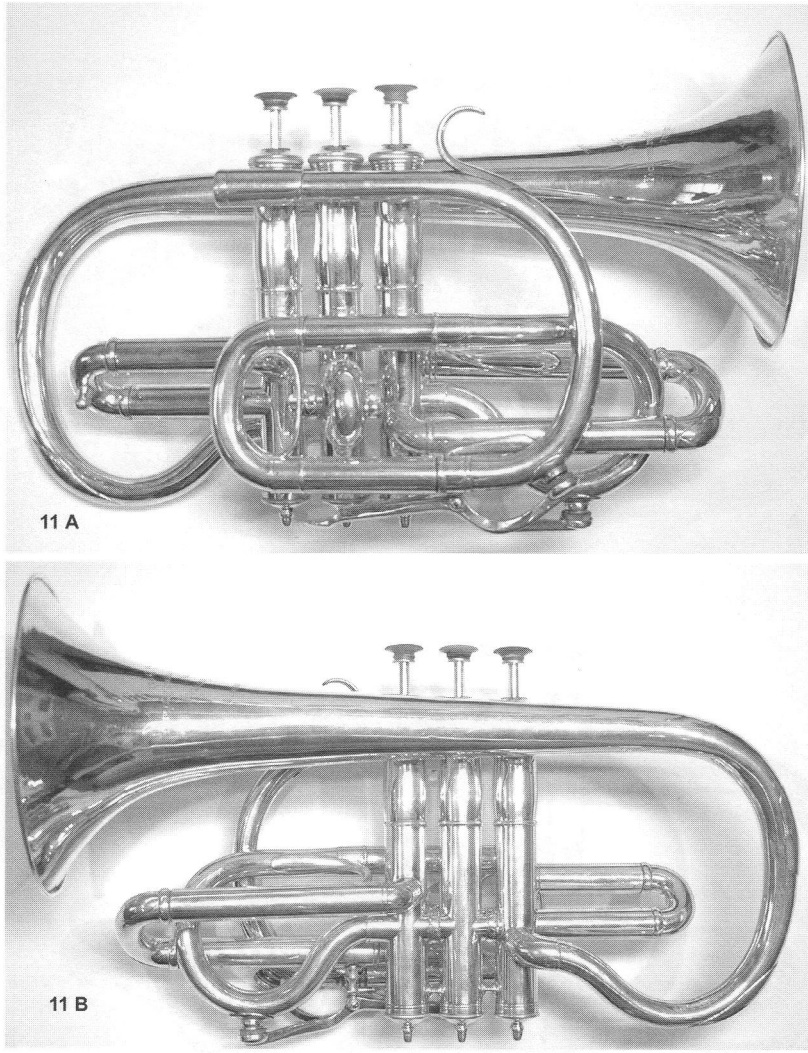

Figure 11.
Oldest known *modèle anglais* cornet; Antoine Courtois *nouveau modèle,* 21 rue du Caire, Paris; A712, ca. 1855. Bell length 12" (ca. 30½ cm.); finger hook not original; note cornopean-like shell finger buttons, configuration of intervalve tubing, and presence of ferrules on intervalve tubes—all cornopean retentions; presence of internal three-pin valve support system (hence absence of external valve pins—see text) and presence of double waterkey are among earliest examples yet recorded. Author's coll.

Figure 12.
Antoine Courtois, 88 rue de Marais, Paris, double-waterkey cornets.
12A: *Arbuckle* model, serial no. 15548 (late 1880s);
bell length: 12½ " (ca. 31¾ cm.); author's coll., restored by Frank Griesemann;
12B: *Arban* Model, serial no. 19108 (early 1890s); bell length: 12½ " (ca. 31¾ cm.);
author's coll. Left side of instruments similar to Figure 11B.

It is fascinating that, by the latest 1850s/early 1860s, Courtois settled in on two *modèle anglais*, strictly Périnet-valved models. They soon dropped their S-shaped leadpipe (i.e., for their B♭-A instruments; they retained this configuration on one of their soprano E♭ models), and made the closely similar *Koenig/Levy's/Arbuckle/Emerson* and *Arban* models (Figure 12).[57] Interestingly, Courtois appears to have sold *modèle anglais* models in France as well as in England, as surviving Courtois *modèle français* cornets are exceedingly rare.

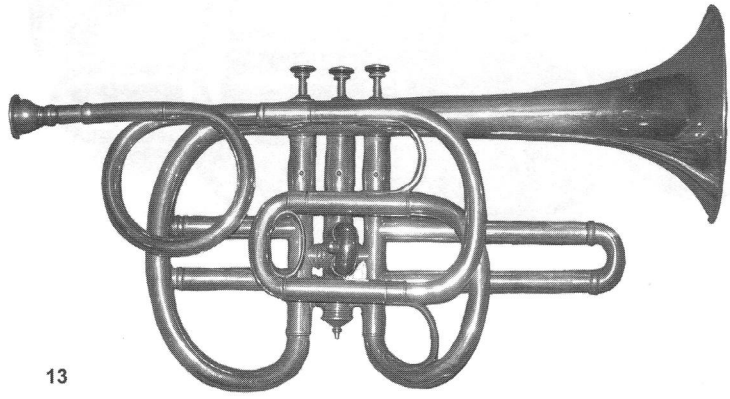

Figure 13.
Antoine Courtois (rue du Caire, Paris) *modèle français* cornet with two Stölzel and a medial Périnet valve; serial no. A242 (early 1850s). Fiske Museum B238.

Besson, meanwhile, apparently did not produce a *modèle anglais* until the late 1860s/early 1870s. The single water key (optional on cheaper models) was located on the bottom of the first 180° bend. Their earliest such model (Figure 14A, B) is in effect a shepherd's crook, removable leadpipe version of what has survived as the standard, modern cornet design: the leadpipe has three turns, with a backward-facing tuning slide and a second slide for high/low pitch changes that faces forward, before the windway enters the third valve; intervalve tubing is exactly as in modern cornets, except that in the earliest Bessons, it is not bowed out (*perce pleine; perce pleine* was added to this basic configuration by the Paris branch, in their *Concertiste* model patented in 1888). In switching the bell from the right to the left side, Besson followed Courtois in placing the bell exit from the first valve to the left side of the first valve tubing. The intervalve tube between the 1st and 2nd valves lay midway between the upper and lower branches of both the 1st and 2nd valve slides; the tubing between the 2nd and 3rd valves was lower, and aligned with the bottom branches of both the 2nd and 3rd valve tubes. This design—identical to the Besson 1874 patent for a slightly differently configured cornet—was quickly adopted throughout most of the industry, and remains the configuration used today in virtually all soprano cornets and trumpets (see, e.g., Figure 1).