2.09 Passionate Industry: The Taylor Style.

David M.Quinn

William and Charles Taylor, originally of Drogheda, set up shop in New York City in about 1872. They later moved to Philadelphia and remained there until their deaths. While in New York and Philadelphia, they produced an impressive quantity of work, establishing a reputation as pipe-makers, which is rightly or wrongly held in awe by many even to this day. According to Captain Francis O'Neill in his 1913 work *Irish Minstrels and Musicians*, William Taylor learned his craft from his father, who was also a piper and pipe-maker. Charles Taylor is referred to as the stepbrother of William, and O'Neill reported that he was "a fine mechanic but not a musician." At this point, it is difficult, if not impossible, to say which of the Taylor brothers executed which parts of the pipes known by their name, so I will follow the convention of attributing everything to both.

The Taylors are popularly credited with pioneering what is known as the wide-bore concert pitch pipes, ostensibly in response to performance demands in the New World. They also developed a particular style of key work which is now firmly linked to their name. I leave the discussion of historical and organological aspects of their work to others, and in this article I will only try to set out some of the features of the Taylor-style key work, which have made it so widely, admired and so often imitated.

I will be giving examples from four specimens of the work of the Taylor brothers, and I would here like to thank the owners of these instruments for allowing me access to them. To these gentlemen I owe a great debt of gratitude, for certainly without their cooperation this article would not have been possible. One of the owners has asked that I not mention his name in this article, so if only for the sake of evenhandedness I will refer to the various instruments not by their current owners' names but, where possible, by the names of earlier or original owners.

The 'Scott' set is a fine instrument of typical configuration, and is so called because a previous owner scratched this name on each piece of the set. The 'Beatty' set is a truly amazing instrument of great complexity, and the story of its commissioning by Mr. John K. Beatty is also mentioned in *IM&M*. The earliest set of the four is of rather unusual configuration, having an inboard bass regulator and a chanter executed in fine mastodon ivory. I have been unable to identify the original owner of this set, so I will refer to it here only as the 'Early' set. The 'Cummings 'set is depicted in *IM&M* p.283, in the hands of Professor John Cummings of San Francisco. In my opinion, the workmanship and lines of the Cummings set are the finest I have seen, and it is without doubt the best sounding Taylor set I have yet come across.

In terms of appearance, Taylor-style keys represent a striking departure from traditional block-mounted key work. One fairly common opinion regarding the reason or reasons the Taylors adopted this style is that such keys are more robust than traditionally mounted keys. This may have some truth in it, but the style alone is not proof against damage. I personally do not believe that the Taylor style of regulator key work offers any advantage or suffers from any particular drawback in terms of playability. The typical Taylor style chanter key work may present problems for players who are used to other arrangements, but the same may be said for any layout. My own crackpot theory, which I have neither the conviction to elaborate upon further, nor the energy to defend, is that this style of key work evolved in the era that saw the birth of Art Nouveau, and was in its time a challenging expression of modernism. It still looks fresh today, set off by a traditional style, which continues, more or less unaffected by the work of these two upstart immigrants.

Where did the ideas come from? Why did the Taylors do things the way they did? The answers to these questions will probably always remain in the realm of speculation. What they did and how they did it are questions which may be easier to deal with.

Almost all of the key work we categorize as “in the Taylor style” is based upon methods of working sheet metal. I have seen three chanters reliably attributed to the Taylors which featured forged keys in traditional block mounts, but even these were executed in a quirky fashion with long single blocks for the long keys (C natural and high D) rather than the more common multiple annular blocks. In a way these chanters, which were as much carved as turned, may be seen as precursors to the later sculpted chanter style, which we now regard as the typical Taylor design. With the exception of stop-valve keys and parts of one of the double-bass regulator keys, all of the keys for chanters and regulators were formed by bending or forming sheet metal. When a piece of sheet metal is folded, it can take on a structural rigidity which can be put to good use. More will be said about this later on. Another structural advantage of keys formed this way is that the pivot bearings are spread relatively far apart, and this effectively reduces side-to-side play.

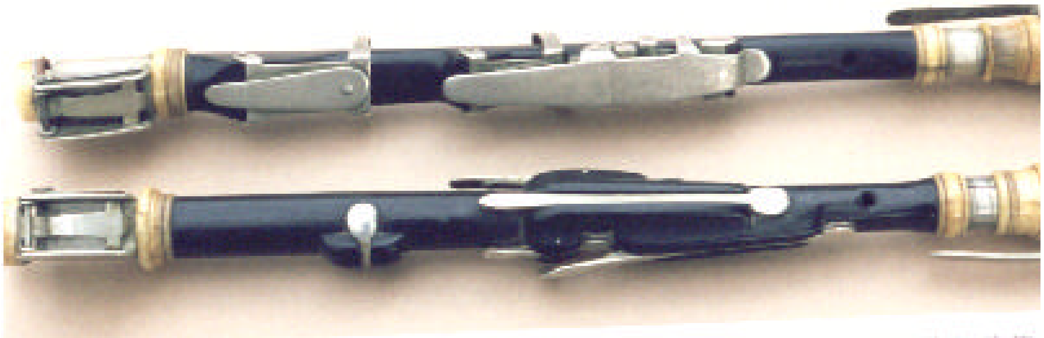

Figure 1 Taylor chanters

The idea of forming keys from sheet metal by folding did not originate with the Taylors. Many earlier examples exist of woodwind instruments fitted with keys sawn or otherwise cut from sheet metal, with tabs folded down or up to form bearing points and surfaces. Such keys are common on baroque oboes. The regulator documented by Ken McLeod in Volume 1 of the *Sean Reid Society Journal* is an earlier example of such key work applied to the Irish pipes. Where the Taylors departed from this idea was in their mounting technique. Instead of mounting a key between pillars or blocks integral with the wood of the pipe, they either set metal tabs into the wood to serve as mounting 'ears,' as can be seen in their regulators, or extended the bearing tabs around corners left in the wood of the pipe, as can be seen on most of their chanters. This latter idea has been developed by other pipe makers since the Taylors and has been applied also to regulators, yielding key work, which looks, at some distance, similar to that of the Taylors. This type of regulator key work is much easier to accomplish but it lacks the art and sophistication of the Taylor style.

As far as I have been able to determine, the Taylors worked exclusively with alloys variously known as German silver or nickel silver. This class of alloy consists primarily of copper and nickel, and rarely contains any silver at all. (I have heard a rumour of a set executed in gold, but have yet to see such.) The metal which the Taylors used has proven to be exceptionally strong and in all examples I have seen, has held up well against the ravages of sweat, wear, and environment. Authentic pipes by the Taylors are characteristically heavy, and the reason is not hard to see – they used a lot of metal, and the sheet stock they used was almost always thicker than would be absolutely necessary. One feature which seems to run through the work of later imitators of the Taylor style is the tendency to use thinner sheet metal. The Taylors also used the same metal to make the springs that hold the keys shut, and these also tend to be on the heavy side, in terms of both mass and stiffness. It can be safely said that the

Taylors made their springs to last, if perhaps sometimes at the expense of comfortable use.

Regulator keys on Taylor sets are mounted between projecting tabs of metal which are let into the wood of the pipes. One occasionally sees rough patches where file marks are left in the wood and metal, but on the whole, a hallmark of the real thing is exceptionally accurate fitting of the metal tabs into their rebates, and careful smoothing of the wood and metal to form almost organic curves. The junctures between wood and metal are almost impalpable in most cases, and after well over a hundred seasons of the shrinking and expanding that the ebony they used is inevitably prone to, this fine fitting is a testament to the Taylor brothers' high level of craftsmanship.

Much of the execution of the Taylors' regulators testifies to an attitude towards the work which is rarely seen today in the craft of bagpipe making. Many small touches are most definitely not necessary for the proper functioning of the instrument, and one has to wonder what possessed the brothers to put as much time and effort into their work as they did. For instance, if you examine the underside of the bass regulator on the Cummings set, you will see that a true flat surface was left along the entire length of the pipe. The curves of the pipe blend into this flat surface in an almost perfectly symmetrical way, but the bottom flat is not compromised. The baritone and tenor started with the same concept, evidently, but the bass shows the ideal executed. When one compares this to the Early bass regulator, the evolution of the idea seems clear. The Early bass regulator shows relatively long regular conical sections between the key mounting tabs, with a rather abrupt shift from the round sections between keys to the rectilinear surfaces of the mounting tabs. This design is intriguing in its own right, but many cracks have developed in the wood supporting the tabs, a sad fact that was probably not lost on the makers. Later examples show a more gradual blending of forms, leaving more wood in place around the tabs, and in fact, cracks next to, as opposed to under, the tabs are rare.

When one looks closely at the way the mounting tabs are set into the wood, it can be seen that there is a subtle dovetail used on each piece. At first glance, the angles of the sides of the mounting tabs are clear enough. In only a few rare cases were mounting or guide tabs set in with parallel sides. Most frequently, the upper end of the tab is wider than the bottom end, and the wedge or keystone shape is usually aligned so that its centerline is perpendicular to the axis of the pipe. There are notable exceptions to this, particularly in the Beatty set. Imitators have often borrowed the characteristic keystone shape, but have rarely gone the extra mile and set the tabs into the wood using what we may call the double dovetail. When the rebate is cut in this way, it becomes possible to wedge the tab firmly into place, and as one pushes the keystone-shaped mounting tab down into its rebate, the dovetail in effect pulls the tab closer to the body of the pipe.

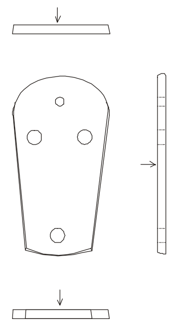

Figure 2 Regulator key mounting tab

In the Figure above is depicted a typical regulator key mounting tab, which I refer to as an 'ear,' shown in plan and with three elevations. The small arrows indicate the outer side. The small circle near the top of the plan indicates an approximation of the location of the pivot hole. In many cases, the pivot pin will be somewhat tapered, allowing the pin to be firmly wedged in place, the pivot pin hole on one plate being slightly larger than the hole on the other. (On the Early set, the pivot pins are threaded on one end and cranked over on the other to form a lever by which the pins can be unscrewed.) The three larger circles show approximate locations of the rivets, which secure the plates to the wooden body of the regulator. The plates are neatly let into the wood, and the end views give some indication of the degree of taper along the edges.

Figure 3 Dovetailing

The tabs are invariably riveted in position in pairs. For tabs which serve as proper mounting brackets for the keys, there are usually at least three rivets – two at the top and one at the bottom. When the mounting tab is quite wide, as it sometimes is for the larger keys on the bass or baritone regulators, one may see four rivets – two at the top and two at the bottom. Tabs, which serve only as guides generally, have only two rivets – one each at top and bottom. The Taylors seem to have used fairly heavy nickel-silver rod for their rivets, generally about 2mm in diameter or a little larger. The rivets pass through the wooden body of the pipe above or below the bore.

The riveting procedure is inherently risky to the wood which supports the tabs, considering that the rivet must be upset on both ends with a certain amount of force, that is, enough to form a sound mechanical head which will hold the tab in place. The Taylors managed to pull off this risky job with great skill, although it must be said that where I have observed cracking in Taylor regulators, it has often been associated with a rivet.

The Taylors made no attempt to hide the rivets on their regulator key mounting tabs, although rivets used to fasten springs to keys are typically, but not always, made with an invisible finish where the rivet is present in an area that will be fingered. A rivet set to be invisible is necessarily weaker than one which has more of its peened head present. To make a rivet truly invisible it is necessary to use for the rivet exactly the same alloy as that of the key or tab. A slight countersink is usually given to the outside end of the hole through which the rivet passes, and when the rivet is peened out, the metal is upset in such a way as to perfectly fill the countersink. It can then be filed and finished flush with the surrounding surface, and if this is done carefully, the rivet will then be invisible except under magnification. For such a rivet to remain invisible when finished, there can be no possibility of any motion in its hole, however slight. This is why single rivets holding springs in place can often be detected even though their makers probably intended them to remain invisible. Double rivets eliminate the possibility of rotation, but they cannot eliminate the slight motion, which is inevitable with flexing of the spring. In examples of more complex keys, such as those found on double-bass regulators, where extension bars and touches are riveted to formed or folded keys, the additional parts are fixed with multiple rivets. This virtually eliminates the chance of relative motion between the parts, and on such pieces the riveting is usually quite invisible, peened heads only being visible from the undersides of the keys. It certainly would have been possible to make the rivets of their regulator key mounting tabs invisible, but the Taylors almost never did this. It is perhaps also worth noting that leaving rivet heads which stand proud of their surrounding surfaces and more or less consistent in their appearance is even more difficult than making them invisible, and this is a fairly regular feature of the Taylor brothers' work.

With the keys removed it is possible to see some of the wires or rods used to rivet the mounting tabs in place. Since each key has tabs bent down on each side through which pass the pivot pins, and these pins are generally positioned either in the same plane as the top of the wood or just slightly above it, clearance for the key-bearing tabs themselves must be made just below the top surface of the wood. The Taylors accomplished this by making a second rebate, roughly corresponding in shape to that of the key-bearing tabs, although somewhat larger. In many if not most cases, the rebate intersects the holes drilled through the wood for the mounting tab rivets, and portions of the top rivets are exposed. You will usually also see either a scribed line across the wood marking the intended center position of the tabs, or a shallow groove just under where the pivot pin passes, although in most cases where this shallow groove exists, additional clearance for the pivot pin is not strictly necessary.

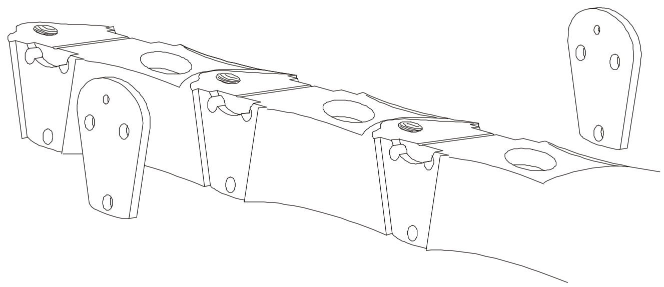

Figure 4 Wooden body plus pair of mounting tabs

Figure 4 is an exploded view of the regulator wooden body and one pair of mounting tabs. The rivets are not shown in this drawing, but the holes for the three rivets usually found fastening each pair of mounting tabs to the body are indicated. The rebate is made to accommodate the dovetailed edges, and a semi-circular area is relieved at the top of each rebate to allow clearance for the bearing tabs of the keys. The rivets are usually exposed in this relief area, and we must assume that the relief was cut before mounting tabs were riveted in place.

Figure 5 Fitted mounting tabs

Most regulator keys are fitted with heavy nickel-silver springs. The springs are riveted under the touches of the keys, the free ends of the springs bearing upon the wood just above the pivot pins. The springs are typically very efficient and fast-acting. The thickness and strength of the various keys' springs vary according to the demands of the design, so for instance, the spring for the bass regulator G key is typically very much thicker and stronger than a spring for one of the short keys on the tenor regulator. The bearing point (or area) of the spring is usually well rounded and always polished very smooth. The fact that the pivot pin is either in the same plane as the top of the wood or only just slightly above it means that the point of bearing is usually close to an imaginary line from the pivot to the rivet. With keys sprung this way, there will always be a certain amount of friction between the spring and the wood, as the motion of pressing the key open will move the spring's bearing point along a small area of the surface of the wood. The closer the bearing point can be to the pivot pin, the smaller this motion will be, but its mechanical advantage is also reduced the closer it comes to the center of key rotation. The Taylors were masters of the art of regulating the regulator keys. They always managed to find the best compromise positions for the spring bearing points to afford smooth, trouble-free action and sufficient closing force.

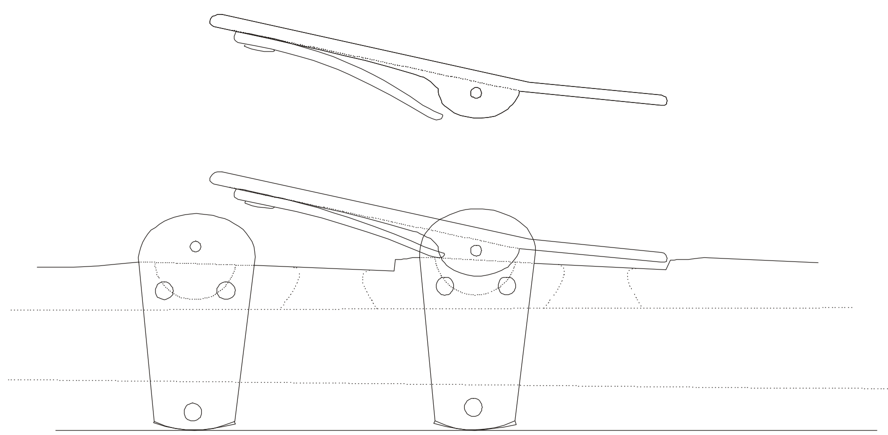

Figure 6 Typical regulator key

Figure 6 is a representation, as transparent, of a typical regulator key in closed position, showing the approximate relationships between the pivot, the spring bearing area and the rivet. The pad is not shown in this drawing or in any of the accompanying drawings. The key's bearing tabs are seen to extend below the top surface level of the wooden body, into the semi-circular rebates. When the key is removed from the regulator, its spring must return to its relaxed state, as shown in the diagram above.

Placing a fold in a flexible sheet can impart a structural stiffness to it. The Taylors seem to have taken full advantage of this fact, and upon close examination it is clear that most of their regulator keys were made from channel. Rather than simply bending down a pair of projecting tabs to form the bearings, the Taylors first formed a U-shaped channel by bending the entire long edges of each key, or most of the long edges, and then removing enough metal to leave a small tab for the pivot pin to pass through. This may seem wasteful, and must certainly have been a troublesome process, but the evidence is clear – on most keys there are still vestiges of the removed sides, and the stiffness that these edges still impart to the keys must have been the payoff. On some of the larger keys, the channel legs are still quite evident, and the Taylors most likely thought they were desirable for the strength that the longer keys ought to possess. The Taylors lived and worked in America at a time when both muscle- and steam-operated presses were coming into their own in the manufacture of metal products and pieces of all sizes. I believe it is reasonable to think that the Taylors may have used a die-press of some description, if not for the cutting of the distinctive shapes of their key work, then almost certainly for the extensive bending and forming that was necessary.

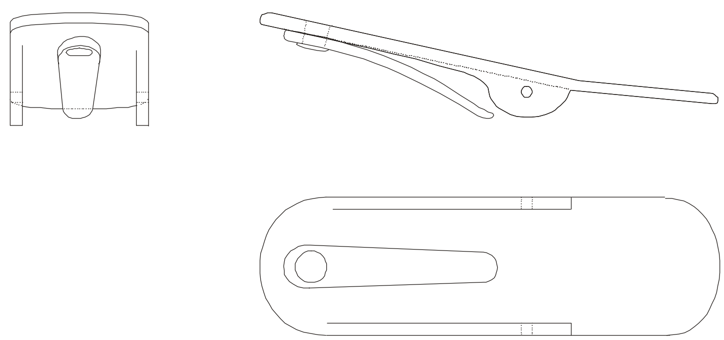

Figure 7 Short regulator key

Figure 7 shows a typical short regulator key, with traces of the formed channel remaining along the underside of the touch. Since it was necessary to make a bend in the key just forward of the pivot bearing tabs, this area is typically filed completely flat, and nothing of the channel is left there to impede bending. The nature of the outside corner formed by bending the metal down to form the stiffening channel continues along the entire straight side of the key on both sides.

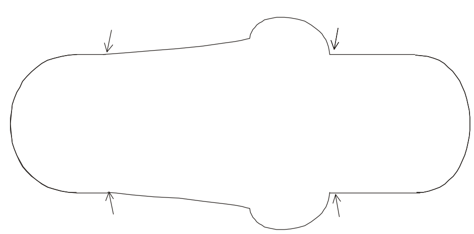

Figure 8 Unlikely blank for regulator key

If the tabs had been formed by bending from a shape such as that shown above (Figure 8) we might expect to see a different kind of distortion in the top surface at the points indicated by the arrows. Filing could mask such distortion, but the thickness of the metal on Taylor keys does not indicate that this has been done. One has to conclude that for most of the standard regulator keys, the finished shape was arrived at by removing metal from a formed channel which was most likely bent from a more or less rectangular blank. Some of the unusually shaped keys on the Beatty set display signs of the kind of distortion that one would expect from localized bending, so it is not safe to say that the Taylors made all of their keys from formed channel. Since some of the keys on the Beatty set required bends on one side of the key but in two different planes, it is understandable that they should be an exception to the rule.

One can see extensive exploitation of the possibilities of work in sheet metal in other features of the Taylors' work, such as in several novel configurations for the chanter popping valve, hinges and shields for bellows, and fold joints for the bass drone slide, bass and double bass regulators. In fact, apart from some examples where the upper section of the bass regulator is folded, one rarely sees bent tubing in the work of the Taylor Brothers. Their triple-bore bass drone under joint eliminated the need for conventional U-bends, and where other makers might have employed a J-bend for the bass drone slide, the Taylors seem to have preferred either mitered joints or, more often, a soldered H pattern.

The configuration of most of the Taylor brothers' regulators can be said to be typical: five-keyed tenor, four-keyed baritone and four-keyed bass, arranged in the usual manner, each pipe having a single bore and all tone-holes on top. When a double or extended bass regulator is present, it is usually mounted inboard with its reed in a socket on the face of the main-stock, the pipe itself located on the near side of the stock. Most examples of the double-bass regulator I have examined are of a similar pattern which calls for a clever arrangement of articulation so that the touches for the descending notes will be in what may be considered a logical order. Since the double-bass regulator usually folds near the midpoint of the bore, the tone hole for its lowest note is in fact the one closest to the stock. The accompanying figures (9-11) show the usual arrangement.

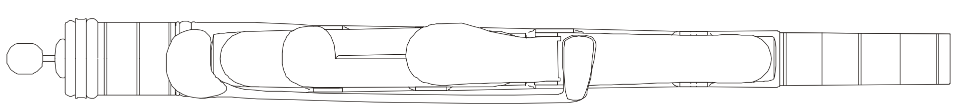

Figure 9 Assembled double-bass regulator keyed section, from above

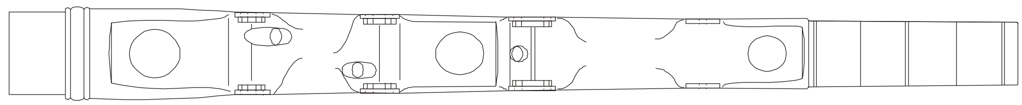

Figure 10 Body from above with keys removed

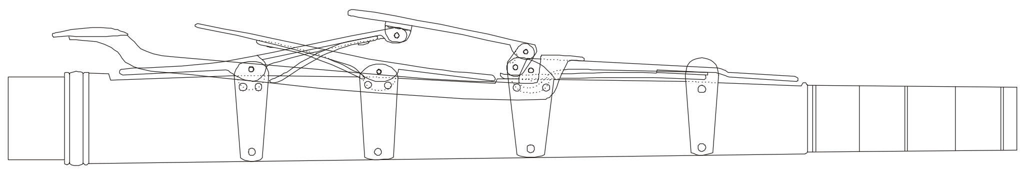

Figure 11 Regulator from the side with keys (as transparent) in position

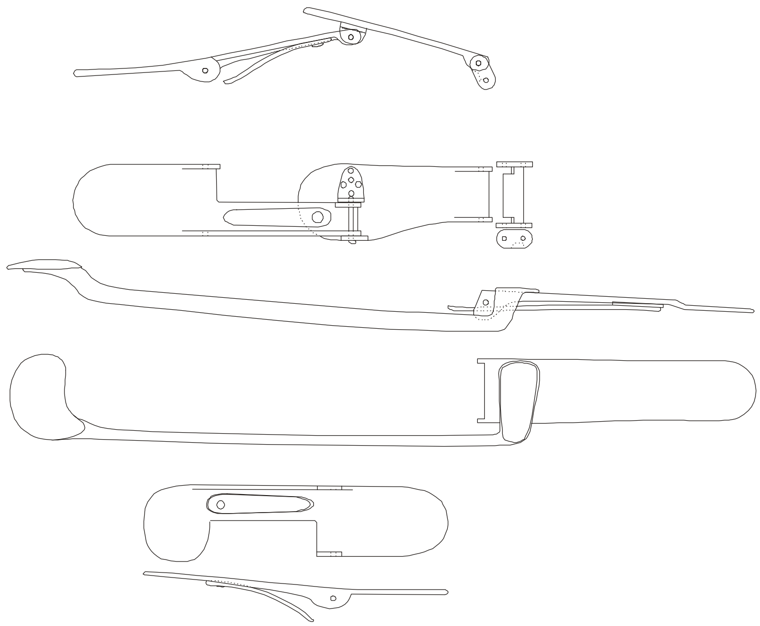

Figure 12 The keys shown separately

The Scott set is fitted with a double-bass regulator of a truly remarkable design. In terms of its overall length and bore, it is approximately the same as was achieved with the more conventional two-part double-bass with wooden pipes, but the Scott pipe is constructed entirely with telescoping metal tubing. There is nothing new under the sun. Inside the tubing of the first stretch of the regulator, at least, the bore is executed in a wooden pipe. As the Scott double-bass regulator is folded twice, the final stretch, in which the tone holes are located, is oriented in the logical way with the lowest note farthest away from the stock and the highest note closest to it. Time has not been kind to the fit of the metal tubes but it is clear that the makers intended some degree of relative sliding motion, presumably for tuning, since the keys are also fitted with extendable slides. This would allow the player to adjust the acoustical location of either or both of the lowest two notes, while maintaining the positions of the key touches relative to the keys of the other regulators.

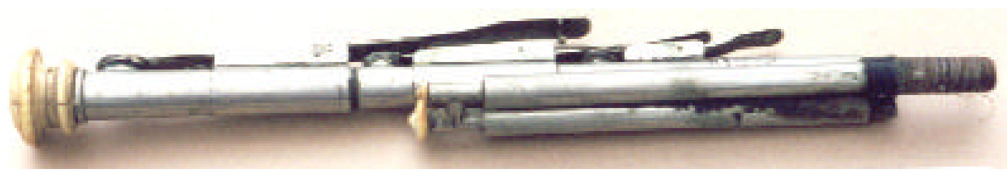

Figure 13 ‘Scott’ double-bass regulator

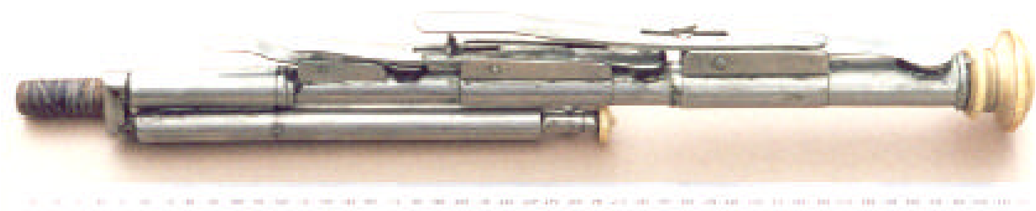

Figure 14 Another view of the ‘Scott’ double-bass regulator

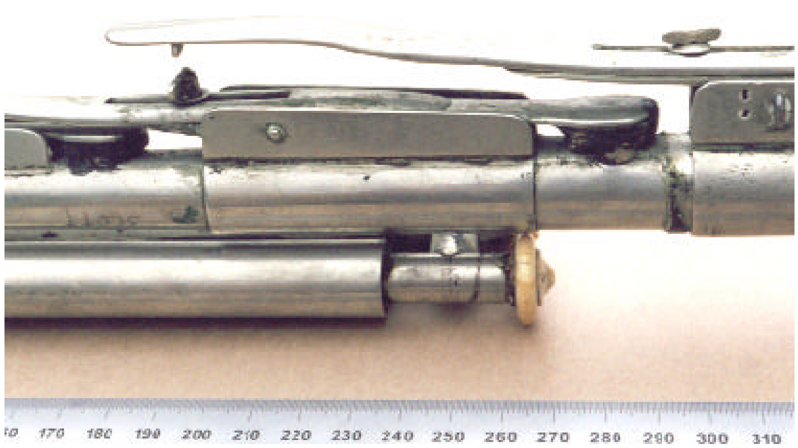

Figure 15 Close-up of part of the ‘Scott’ double-bass regulator

The configuration of the Early bass regulator is worth noting. It is also mounted inboard. Rather than attaching the more usual separator bar to the outside of the main-stock, the Taylors in this case placed a third regulator socket for the bass in the face of the stock. Two bends, one mitered and one a soldered H pattern, allow the keyed section of the bass regulator to be located in a range of positions next to the baritone regulator. The design is admirable for this flexibility, but its mechanical weaknesses are fairly obvious, and this is the only example of this design of which I am aware executed by the Taylors.

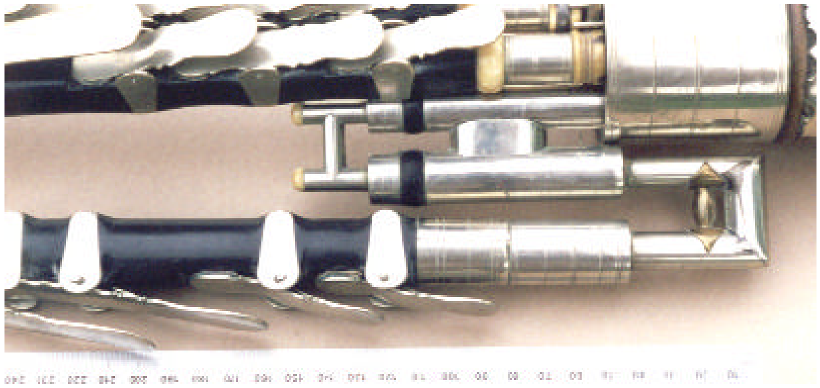

Figure 16 Configuration of the 'Early' bass regulator

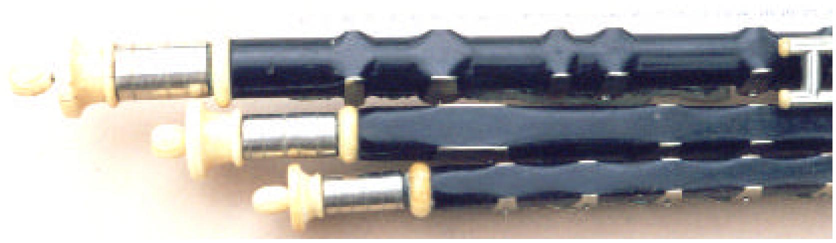

Figure 17 Underside of the 'Early' regulators

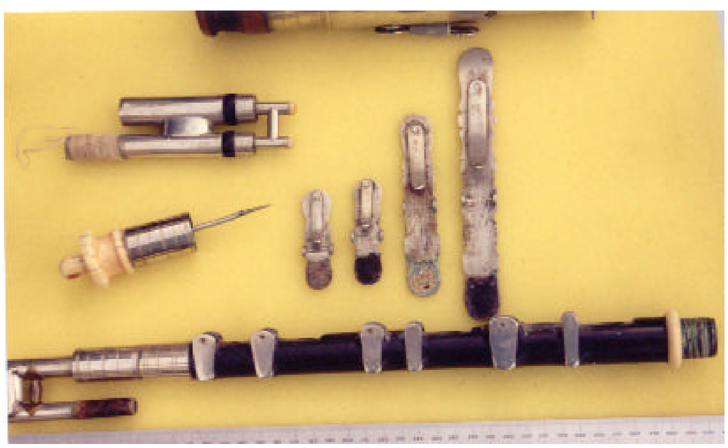

Figure 18 Parts of an 'Early' bass regulator

I have heard reports of the existence of Taylor tenor and baritone regulators with double bores, and have seen two examples of sets by other makers, in the Taylor style, with this feature. The advantages seem obvious enough. With more than one reed available, it is possible to sound more than one note at a time on the same regulator. In fact, the

Taylors did this in at least two sets that I know of, one of them being the grand Beatty set. But why stop with two bores? The Beatty set features tenor and baritone regulators each with four separate bores, each keyed for and capable of playing five notes, with a cacophonous maximum of four at any one time. No doubt this arrangement opens up new musical possibilities, but perhaps more importantly it also makes it possible to tune most of the notes individually and to sidestep some problems with tuning interference. The cost is, of course, considerable weight and mechanical complexity. The four bores are arranged in a square prism in a single, integral piece of wood, and tone holes in the top two bores are keyed in the conventional way, albeit with keys of unusual shapes. Tone holes in the two lower bores are keyed with a truly impressive linkage arrangement which places the touches in their regular positions. The baritone regulator features an articulated two-part E key which extends its touch up above the highest key of the neighboring regulator. The Beatty set was originally built for a right-handed player, but its current owner plays left handed, so the E-key touch falls above the C key of the bass regulator, which has been modified to accommodate this arrangement. In *IM&M* p.280 there is a photograph of a similar set in the hands of Mr. Nicholas Burke, showing the E key- touch in place above the C key of the tenor. On p.479, Mr. John K. Beatty can be seen holding his own set. It is here shown also in the right-handed configuration, Mr. Beatty's right hand appearing only as a blur (the "shower of fingers" he is credited with? – *IM&M* p.282), as it must have been most of the time to take full advantage of the wonderful possibilities of his instrument.

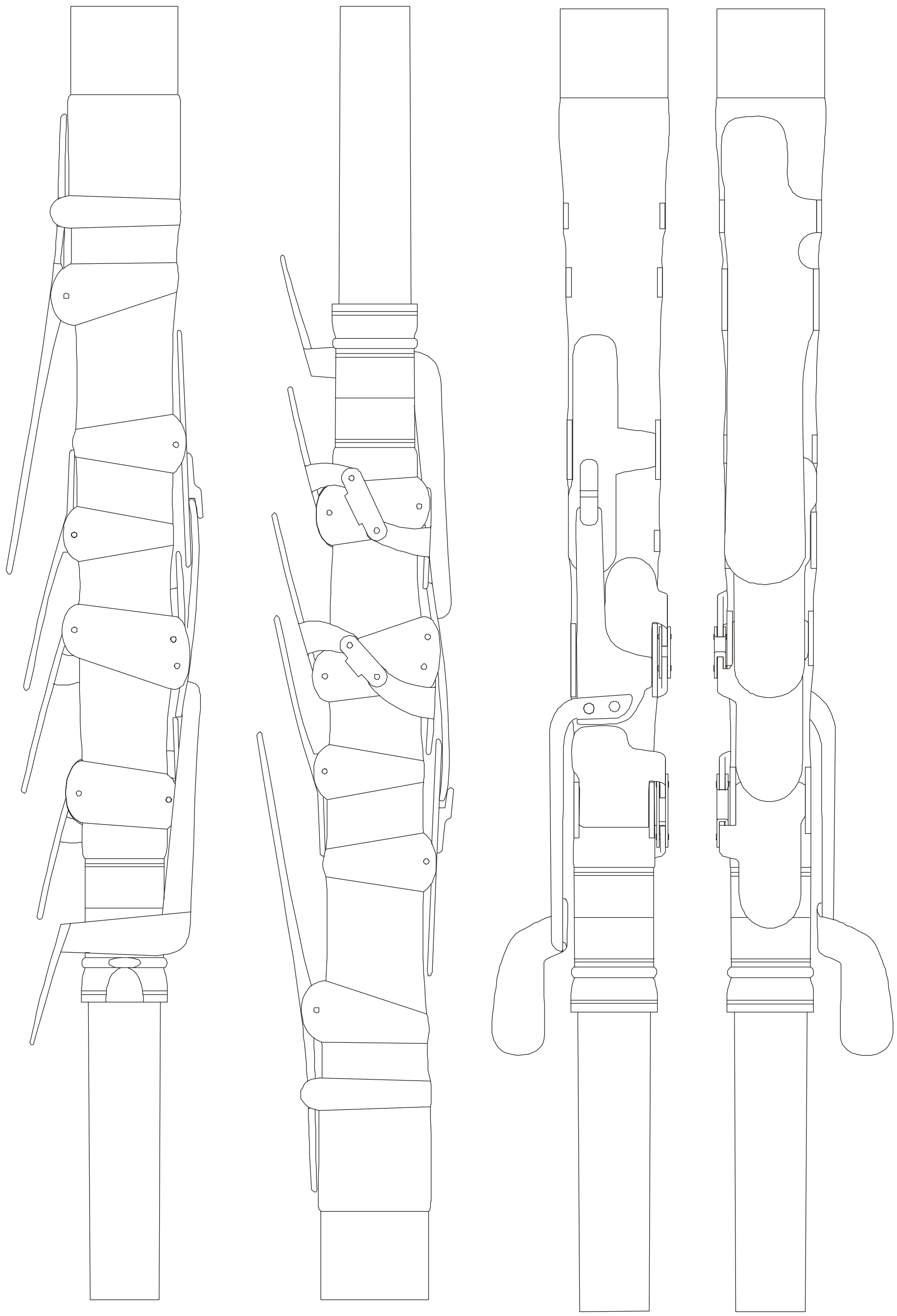

Figure 19 The 'Beatty' baritone regulator – front, rear, top and bottom views

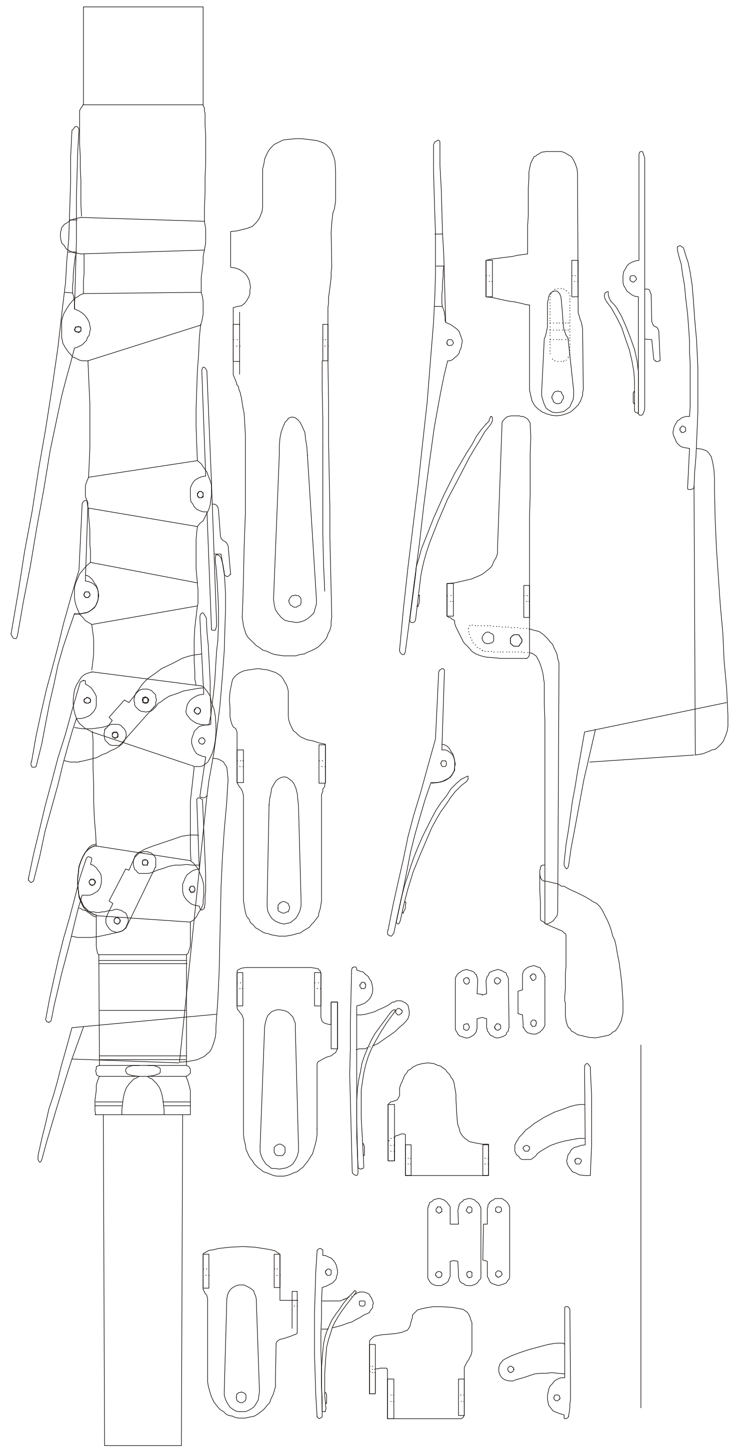

Figure 20 The 'Beatty' baritone regulator, shown with keys as transparent, and keys removed from the pipe. For scaling purposes, the straight line was originally 100mm long

The Beatty set is associated with two chanters – a standard single-bore chanter with more or less typical key work, and a double-bore chanter. A couple of the features of the key work on this chanter are worthy of note. There is a novel arrangement above the left hand (as played by a right-handed player) with two articulated keys available to the thumb and index finger for notes above the back D. Of perhaps more practical use is the F natural key with two touches, one for the right ring finger and the other extending up to within reach of the left little finger. It should also be pointed out that the positions of the holes for the F natural key are *above* the holes for the F#, a feature I have seen only in one other Taylor-style double-chanter.

The Beatty set is a musical and mechanical marvel. It is said to have cost $500 when originally delivered to Mr. Beatty. At that time one could purchase a small but comfortable house just outside Chicago for $500. Upon reflection, I suppose that I would be willing to attempt to duplicate the Beatty set for the cost of a small house on the outskirts of Barre.

The Taylors usually arranged the touches for the C natural and F natural keys as they would have been likely to be found on a typical chanter of Irish make of the period. The C natural was available to the right thumb, and the F natural was available to the right ring finger. The arrangement for the B♭ seems somewhat less friendly, the touch being accessible to the right index finger. The G# touch was across from it, accessible to the left little finger, as would be convenient to a player familiar with the simple flutes of the time.

Figure 21 Typical Taylor chanters

Figure 22 Details of Taylor chanter keys

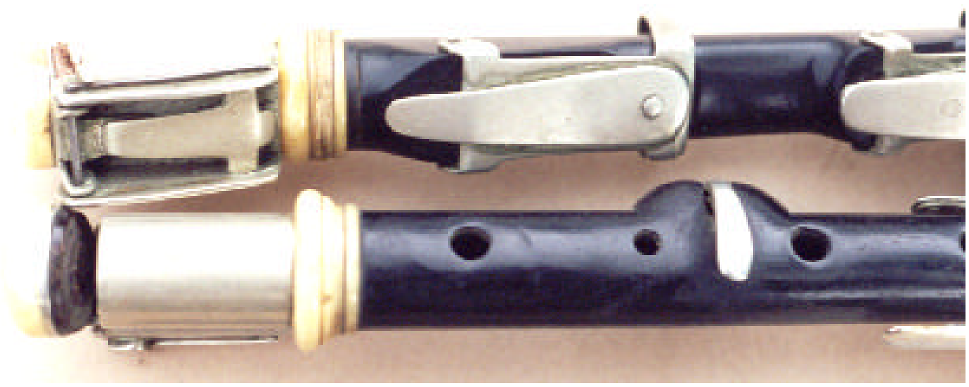

Figure 23 Details of F natural key and popping valve

The work of the Taylor brothers has been a continuing source of inspiration for many pipe-makers over the last 120 years. When one considers that their entire body of work was accomplished without electrically powered tools, it becomes all the more impressive. They were clever innovators with a sense of design that many would describe as inspired, or as some have quipped – from another planet. After more than a century, the Taylors' work still stands as a model of passionate industry.