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VALVE ACTION FOR CORNETS, TRUMPETS, AND LIKE INSTRUMENTS

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This invention relates, in general, to musical instruments, and has particular relation to an improved valve action for cornets, trumpets and like instruments.

It is known that every note on an instrument of the class described is derived as a harmonic from a given prime or fundamental note, the pitch of which is determined by the length of the tube, and that notes not in the harmonic series of the original prime or fundamental note are obtained by altering the length of the tube. In cornets, trumpets and like instruments the alteration of the length of the tube is accomplished by a valve action which is operable to add a crook or tubing of the length required, for example to flatten the pitch of the instrument by one or more semitones.

In general, in these valve actions, pistons work in casings or cylinders, and usually there are ways or passages one of which, when the piston is in its normal position, forms part of the main tubing of the instrument; the other ways or passages being so placed that, when the piston is depressed, they introduce into the circuit an extra length of tubing sufficient, for example, to lower the pitch one or more semitones.

The early piston valves were cumbersome, and the passages through them were either constricted in diameter or so placed as to introduce sharp angles instead of gently flowing curves. The many attempts to overcome these defects have resulted in various forms of valves.

In one existing form of valve, for example, the coiled spring for returning the piston to normal position is disposed inside the spring barrel or tubular extension on the piston, and abuts against an abutment member which is also disposed inside the spring barrel and has three prongs which extend for longitudinal sliding movement through three circumferentially spaced and longitudinally elongated slots in the wall of the barrel. The abutment member for the spring also serves as a guide, and for this purpose the extending prongs enter guideways within the cylinder.

The disposition of the spring inside the spring barrel limits the diameter of the spring, and the abutment or guide above described is free to tilt. With the springs of these prior valve actions limited to relatively small diameters, the action is not as velvety and sure as desired, and tilting of the abutment or guide will cause it to stick or to fail to function properly, thus interfering with full register and proper operation of the instrument.

Moreover, in these prior valve actions, as above

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described, the contact of the three prongs of the abutment or guide member with the sides of the slots through which the prongs extend increases the friction. Where there are three guideways, one for each of the prongs, the piston valve can be inserted in the valve casing otherwise than with its ways or passages in proper functioning position.

One of the main objects of the present invention is to provide an improved valve action of the class described which will have a more velvety and surer action by providing for the use of a large diameter spring; also by the provision of a non-tilting guide or abutment member and less friction.

Another object of the invention is to provide a valve action having the improvements set forth and of such character that it is foolproof, because the piston valve can be inserted into the valve casing only in the correct way or in proper functioning position.

Another object of the invention is to provide a valve action in which the spring is disposed outside the spring barrel and is combined with an abutment or guide member in the form of a collar disposed outside and encircling the spring barrel and held against tilting by the barrel.

Another object of the invention is to provide a valve action having the features set forth, combined with a pair of diametrically opposite lugs one of which cooperates with a guideway in the cylinder so that the piston valve can be inserted into the casing only in the correct way. The lugs are adapted to receive a diametrical pin, preferably formed of stainless steel, which passes through a pair of diametrically opposite slots in the spring barrel to hold the abutment or guide member against turning on the barrel, and, in the preferred form of device, the lugs are carried by the inner side of the abutment or guide member to provide for the functioning set forth and, in addition, to dispose the pin where it will not interfere with proper operation of the spring.

In order to acquaint those skilled in the art with the construction and operation of the invention, I shall describe in connection with the accompanying drawing a certain preferred embodiment of the invention.

In the drawing:

Figure 1 is a perspective view of a cornet embodying the valve action of the present invention;

Figure 2 is a longitudinal sectional view through one of the valve casings or cylinders

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showing the improved piston valve action therein;

Figure 3 is an enlarged fragmentary longitudinal section through the outer end of the piston and the spring barrel, spring and abutment or guide member, with the finger piece in section and its stem partially in elevation;

Figure 4 is a transverse detail section taken on the line 4—4 of Figure 2; and

Figure 5 is a fragmentary elevational view of the spring barrel and the adjacent end of the piston valve with the spring and abutment or guide member in section.

Referring now to the drawing, the invention is shown, for purposes of illustration, embodied in a cornet, which is designated in its entirety at 10 and comprises, in general, the tapering or conical tube 11, usually formed of brass and having at one end the conventional cupped mouth piece 12 and, at its opposite end, the outlet 13 of bell form. The length of the tube is increased and the tone of the instrument chromatically lowered by opening, as well understood in the art, into small crooks or bends 14, 15, and 16 by valves, three of which are shown at 18, 19, and 20. Each of these valves 18, 19, and 20 embodies the improved valve action of the present invention, and therefore the detailed showing and following description of the valve 18 will suffice.

The valve 18 comprises a valve casing or cylinder 21, preferably formed of brass, in which the piston valve 22 is mounted for reciprocatory movement. The valve 22 has the conventional ways or passages 23 for passage of the sound straight through the tube 11 when the valves are in their outwardly projected or normal positions, and through the respective crooks or bends 14, 15, and 16 when the piston valves 22 are depressed.

The valve 22 carries, at its outer end, a tubular spring barrel 25, preferably formed of brass and provided, for example, at its inner end with a collar 26 having a reduced portion secured in the outer end of the piston valve 22 by a diametrical pin 27. The spring barrel 25 has a pair of diametrically opposite and longitudinally elongated guide slots 28. The abutment member 29 comprises a collar which is on the outside of the barrel 25 and freely encircles the barrel. The abutment member 29 is held against tilting by cooperation with the barrel 25, with the result that sticking or failure of the abutment member 29 to operate properly is prevented.

The outer end of the barrel 25 is provided with an abutment in the form of a flange 30 on the inner end of a stem 31; the flange 30 having a reduced threaded shank 30' which screws into the outer end of the barrel 25. A relatively large diameter coiled spring 32 is disposed outside the spring barrel 25, with its convolutions encircling the barrel and abutting at opposite ends with the abutment member 29 and abutment 30. The relatively large diameter spring 32 provides a more velvety and surer valve action for the instrument and improved performance or functioning of the instrument.

The abutment member 29 carries, preferably on its inner side as shown in the drawing, a pair of diametrically opposite lugs 33 and 34. A pin 35, having a kerf or slot 36 for a screw driver or other suitable tool, extends through an opening in one lug 34 and through the guide slots 28 in the spring barrel 25, and is screwed, at its opposite end, into a threaded opening in

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the lug 33. The pin 35, which is preferably formed of stainless steel, holds the abutment member 29 against turning on the spring barrel 25. There is less friction because there are only two points of contact between the pin 35 and the spring barrel 25, i. e., only along the sides of the two slots 28. With the pin 35 of stainless steel and the spring barrel 25 formed of brass, the parts of contact are steel against brass, which makes a better bearing and provides a valve action which gives better service and outlasts prior forms of actions.

The valve casing 21 has an internal substantially annular shoulder 33 upon which the annular abutment member 29 is adapted to have substantially complete annular seating engagement, which further makes for improved functioning of the valve action. One lug 33 only extends radially beyond the outer periphery of the piston valve 22 for engagement, as shown in Figure 4, in a single guideway 39 in the valve casing 21. The engagement of the lug 33 in the guideway 39 holds the guide member 29, and thereby the piston valve 22, against turning in the valve casing 21. And the use of only one lug 33 and a single guideway 39 makes the device foolproof because the piston valve 22 can be inserted in only one way in the valve casing 21, i. e., in the way in which the ways or passages 23 are positioned to function properly. The disposition of the lugs 33 and 34 on the inner side of the abutment member 29, with the pin 35 inserted as shown in the drawing, disposes the pin 35 where it will not interfere with the proper operation of the spring 32.

The stem 31 extends outwardly through the usual cap 40 screwed upon the outer end of the valve casing 21, and the usual cork and felt pads or washers may be provided at 41 and 42, respectively, the stem 31 extending through openings in these pads or washers, as known in the art. The outer end of the stem 31 of each valve 18, 19, and 20 is provided with the conventional or any suitable finger key 45. The finger key 45, as illustrated in Figure 3 in the drawing, is shown as having a reduced shank 46 screwed into the outer end of the stem 31. The valves 18, 19, and 20 are manipulated by pressing the finger keys 45 with the fingers, as well understood in the art. The length of the tube is increased and the tone of the instrument chromatically lowered by pressing the valves inwardly to open the tube into the small crooks or bends 14, 15 and 16.

The embodiment of the invention shown in the drawing is for illustrative purposes only, and it is to be expressly understood that said drawing and the accompanying specification are not to be construed as a definition of the limits or scope of the invention, reference being had to the appended claims for that purpose.

I claim:

1. In a valve action of the class described, in combination, a valve casing, a piston valve operable in said casing, a tubular spring barrel on the outer end of said valve and provided with a pair of diametrically opposite and longitudinally elongated guide slots, an abutment member comprising a collar encircling the inner end of said spring barrel and held against tilting by cooperation with said barrel, an abutment on the outer end of the spring barrel, a relatively large diameter coiled spring disposed outside said spring barrel with its convolutions encircling said barrel and abutting at opposite ends said abutment member and said abutment, a pair of dia-

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metrically opposite lugs carried by the inner side of said abutment member with one lug only extending radially beyond the outer periphery of the piston for engagement in a single guideway in the valve casing, and a diametrical pin passing through the guide slots in the spring barrel and engaged at opposite ends in said lugs to hold the abutment member against turning on the spring barrel.

2. In a valve action of the class described, in combination, a valve casing, a piston valve operable in said casing, a tubular spring barrel on the outer end of said valve and provided with a pair of diametrically opposite and longitudinally elongated guide slots, an abutment member comprising a collar encircling the inner end of said spring barrel and held against tilting by cooperation with said barrel, an abutment on the outer end of the spring barrel, a relatively large diameter coiled spring disposed outside said spring barrel with its convolutions encircling said barrel and abutting at opposite ends said abutment member and said abutment, a pair of diametrically opposite lugs carried by the inner end of said abutment member with one lug only extending radially beyond the outer periphery of the piston for engagement in a single guideway in the valve casing, a diametrical pin passing through the guide slots in the spring barrel and engaged at opposite ends in said lugs to hold the abutment member against turning on the spring barrel, and a substantially annular shoulder in the valve casing upon which said abutment member is adapted to have substantially complete annular seating engagement.

3. In a valve action of the class described, in

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combination, a valve casing, a piston valve operable in said casing, a tubular spring barrel on the outer end of said valve and provided with a pair of diametrically opposite and longitudinally elongated guide slots, an abutment member comprising a collar encircling the inner end of said spring barrel and held against tilting by cooperation with said barrel, a pair of diametrically opposite lugs carried by the inner side of said abutment member with one lug only extending radially beyond the outer periphery of the valve casing, and a diametrical pin passing through the guide slots in the spring barrel and engaged at opposite ends in said lugs to hold the abutment member against turning on the spring barrel.

4. In a valve action of the class described, in combination, a valve casing, a piston valve operable in said casing, a tubular spring barrel on the outer end of said valve and provided with a pair of diametrically opposite and longitudinally elongated guide slots, an abutment member comprising a collar encircling the inner end of said spring barrel and held against tilting by cooperation with said barrel, a pair of diametrically opposite lugs carried by the inner side of said abutment member with one lug only extending radially beyond the outer periphery of the piston for engagement in a single guideway in the valve casing, a diametrical pin passing through the guide slots in the spring barrel and engaged at opposite ends in said lugs to hold the abutment member against turning on the spring barrel, and a substantially annular shoulder in the valve casing upon which said abutment member is adapted to have substantially complete annular seating engagement.

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