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VALVE FOR WIND INSTRUMENTS

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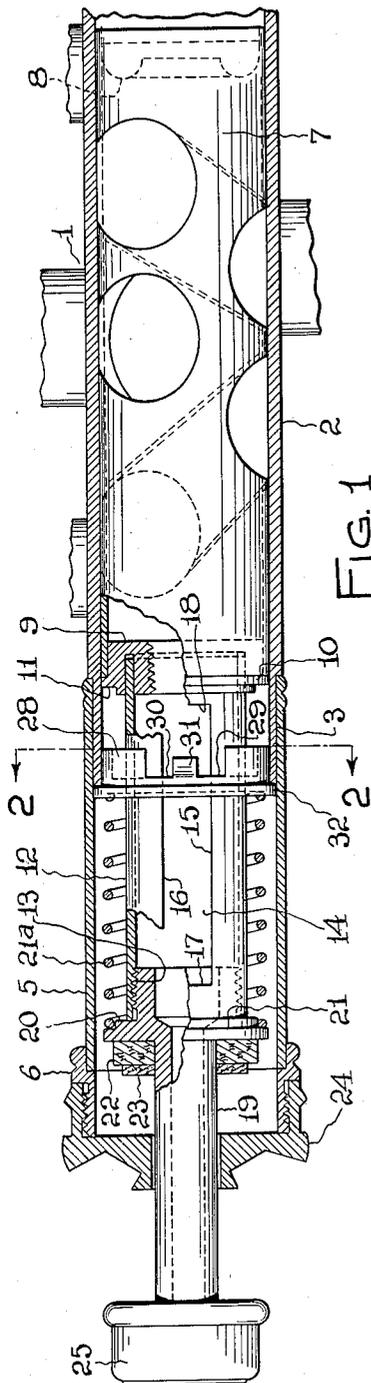


FIG. 1

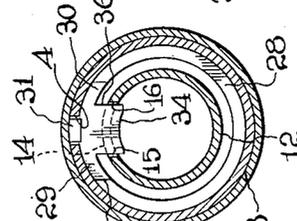
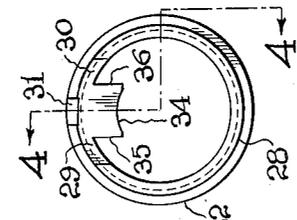
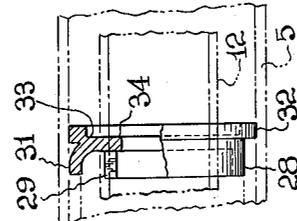
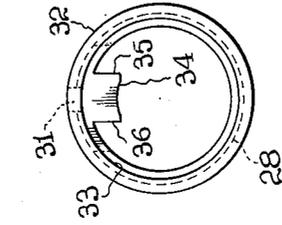
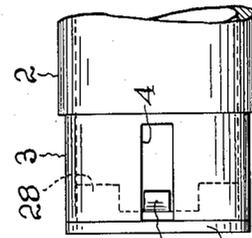


FIG. 2

FIG. 3

FIG. 4

FIG. 5

FIG. 6

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## VALVE FOR WIND INSTRUMENTS

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This invention relates, as indicated, to wind instruments, but has reference more particularly to the piston or valve structure of wind instruments of the trumpet or cornet type.

A primary object of the invention is to provide an improved construction of piston assembly for instruments of the aforesaid type.

Another object of the invention is to provide a novel one-piece piston guide having spring-retaining and other functions.

A further object of the invention is to provide an instrument of the aforesaid type which is remarkably free from noises in the operation of the piston.

A still further object of the invention is to provide an instrument of the aforesaid character which is characterized by precision machining, enabling perfect functioning thereof.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings, forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same,

Fig. 1 is a longitudinal cross-sectional view of a piston assembly embodying the novel features of the invention, with the piston stem elevating spring somewhat compressed, in order to more clearly show certain elements of the construction;

Fig. 2 is a transverse cross-sectional view, taken on the line 2-2 of Fig. 1;

Fig. 3 is a plan view of one face of the novel piston guide of the invention;

Fig. 4 is a view, partly in elevation, and partly in section, taken on the line 4-4 of Fig. 3;

Fig. 5 is a plan view of the other face of the piston guide, and

Fig. 6 is a fragmentary elevational view, showing the keyway for the piston guide in the valve case body.

Referring more particularly to the drawings, 1 designates a portion of the valve case assembly of a musical instrument of the trumpet type, such valve case comprising a cylindrical body 2 having various holes or openings in the walls thereof for passage of air therethrough, and having an extension 3, of reduced external diameter, provided at one point in the wall thereof with a keyway 4. A ballaster 5 is secured to the extension 3, and has secured to one end thereof a threaded ring 6.

Slidably mounted within the valve case body 2, for reciprocal movement therein, is a piston

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7 having various air passageways extending therethrough adapted to be aligned with the openings in the walls of the valve case body 2. Secured within one end of the piston 7 is a piston bottom 8, and secured within the other end of the piston is a piston head 9. The head 9 is provided with an annular flange 10 which abuts the end of the piston. A portion of the flange 10 is removed to provide an annular seat 11, which serves a purpose to be presently described.

Rigidly secured to the head 9 is a spring barrel 12, in the form of a cylindrical member, which is internally threaded, as at 13, and is provided with an elongated opening 14 in the wall thereof, said opening being defined by side edges 15 and 16, which are parallel with the axis of the barrel, and end edges 17 and 18 which are perpendicular to the side edges.

Secured to the threads 13 of the barrel 12 is a stem 19 provided with an annular flange 20 which abuts the end of the barrel and has a portion thereof cut away, as at 21 to provide an annular seat for a compression coil spring 21a.

The piston assembly further includes a cork washer 22, a felt washer 23, a top cap 24, and a finger button assembly comprising a finger button 25, the button 25 being threadedly secured to the stem 19.

The present invention is concerned principally with the provision of a novel piston guide which will now be described.

The piston guide comprises an annular member having a short cylindrical portion 28, which normally rests on the annular seat 11 of the head 9. The inner diameter of the cylindrical portion 28 of the piston guide is approximately the same as the diameter of the portion of the head 9 which is surrounded by said cylindrical portion of the guide, so that the guide, when in said normal position, is restrained against lateral displacement from said head. The outer diameter of the portion 28 of the piston guide is slightly smaller than the external diameter of the piston 7.

Portions of the cylindrical portion 28 of the piston guide are removed to form circumferentially-spaced rectangular openings 29 and 30, the metal of the portion 28 between these openings being displaced in a radially-outward direction to a distance of approximately the thickness of the portion 28 to provide a tongue or key 31, which is adapted for entry into the keyway 4 of the valve case body 2.

The piston guide is also provided with a short cylindrical portion 32, the outer diameter of

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which is substantially the same as the outer diameter of the tongue or key 31, and the inner diameter of which is substantially equivalent to the outer diameter of the coil spring 21a. The portions 28 and 32 of the guide are connected by a flange, the upper surface 33 of which forms a seat for the lower end of the spring 21a, the spring being restrained against lateral movement from this seat by the equivalency of the outer diameter of the spring with the inner diameter of the portion 32 of the guide.

The guide also includes a tongue 34 which projects radially inwardly from the flange 33 and is coplanar with such flange. This tongue extends into the opening 14 in the barrel 12, and has parallel sides 35 and 36 which slide along the edges 15 and 16 respectively of the opening 14, thereby constraining the guide against rotation relatively to the barrel.

The outer diameter of the portion 32 of the guide functions to centralize the guide in the valve case, while the tongue 34 functions to maintain the guide in alignment with the spring barrel and prevents the guide from rotating.

The tongue or key 31 is adapted to enter the keyway 4, thereby accurately locating the piston circumferentially with respect to the valve case body, and insuring that the openings in the piston will be accurately aligned or registered with the openings in the valve case body. The key 31 also facilitates assembly of the piston assembly with the valve case.

The provision of the openings 29 and 30 in the guide enable the guide to be rapidly assembled with the spring barrel, these openings forming clearance areas enabling the guide to be canted relatively to the barrel during assembly, so as to permit entry of the tongue 34 into the slot 14.

Through the use of a piston guide of the aforesaid character, in combination with other associated elements of the piston assembly, a number of distinct advantages are obtained, among which are the following:

(a) The piston is extremely quiet in operation, performing more quietly than in instruments embodying conventional construction in the piston assembly and guides.

(b) The one-piece construction of the piston guide provides a multifunction member in the form of a single element, which can be easily manufactured and is well-adapted to serve all of its functions. In conventional instruments, two or three separate parts are required to serve all of these functions.

(c) The instrument as a whole, is characterized by extremely easy action of the piston assembly, and is remarkably free from clicking and scratching noises.

(d) Conventional forms of guides have a two or three point bearing on the spring barrel, so that tilting of the guide is possible and frequently occurs during the action of the piston, whereas the present guide is guided along one side only, so that it cannot tilt accidentally, once it is inserted in the barrel in the required manner.

(e) The design of the guide and piston assembly is characterized by precision machining, enabling perfect functioning thereof.

Although the guide and piston assembly have been described with reference to a trumpet, it will be readily understood that the invention is also adapted for use in wind instruments generally, such as cornets, altoes, baritones, sousaphones, etc.

It is to be understood that the form of my in-

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vention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of my invention, or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. In an instrument of the character described, a piston assembly comprising a hollow cylindrical barrel having an elongated opening in the wall thereof, a stem secured to said barrel, said stem having an annular flange formed integrally therewith, a piston guide embracing said barrel, said guide comprising an annular member having a tongue formed integrally therewith and extending radially-inwardly into said opening, and a compression coil spring interposed between said flange and said guide, said tongue terminating at a point slightly radially inwardly of said opening.

2. An instrument, as defined in claim 1, in which said opening has side edges parallel with the axis of the barrel, and said tongue has parallel edges slidable along the edges of said opening.

3. A piston guide comprising an annular member having a short cylindrical portion and a tongue formed from said cylindrical portion, said tongue being displaced radially-outwardly from said cylindrical portion, said cylindrical portion having openings therein at opposite sides of said tongue.

4. A piston guide comprising an annular member having a short cylindrical portion constituting a spring seat and piston guiding element, and another cylindrical portion of lesser external diameter than said first-named portion, said second portion constituting means for locating said guide relatively to the piston.

5. A piston guide, as defined in claim 4, in which a tongue is formed from said second cylindrical portion, said tongue being displaced radially-outwardly from said second cylindrical portion a distance sufficient so that the external diameter of said tongue is substantially the same as the external diameter of said first-named cylindrical portion.

6. A piston guide, as defined in claim 5, in which said cylindrical portions are interconnected by a flange disposed in a plane at right angles to the axis of said member.

7. A piston guide, as defined in claim 6, in which a tongue is formed extending radially inwardly from said flange and substantially coplanar with said flange.

8. A piston guide, as defined in claim 7, in which said second tongue has parallel side edges.

9. In an instrument of the character described, a piston assembly comprising a piston, a hollow cylindrical barrel rigidly secured to said piston in an axial alignment therewith, a stem secured to said barrel, a piston guide slidable along said barrel, and a coil spring interposed between said stem and said guide, said guide comprising an annular member having an offset tongue formed integrally therewith and adapted to prevent rotation of said piston and a second tongue formed integrally therewith and adapted to prevent rotation of said guide relatively to said barrel.

10. An assembly, as defined in claim 9, in which said last-named tongue extends radially inwardly of said annular member a short distance.

11. A one piece piston guide comprising an annular member having a short cylindrical portion, a second cylindrical portion of lesser external diameter than said first portion, a tongue formed

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from said second cylindrical portion, said tongue being displaced radially-outwardly from said second cylindrical portion a distance such that its external diameter is substantially the same as the external diameter of said first portion, a flange interconnecting said cylindrical portions and disposed in a plane at right angles to the axis of said member, one surface of said flange constituting a spring rest, and a tongue extending radially-inwardly from said flange and substantially coplanar with said flange, said tongue having parallel side edges, portions of said second cylindrical portion being removed to form openings adjacent said first-named tongue.

12. In an instrument of the character described, a piston assembly comprising a piston, a hollow cylindrical barrel rigidly secured to said piston in axial alignment therewith, and of an external diameter closely approaching the external diameter of the piston, a stem secured to said barrel, a piston guide slidable along said barrel, and a coil spring interposed between said

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stem and said guide, said guide comprising an annular member having an offset tongue formed integrally therewith and adapted to prevent rotation of said piston and a second tongue formed integrally therewith and adapted to prevent rotation of said guide relatively to said barrel, said second tongue extending radially inwardly into the hollow space within said barrel.

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