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LUBRICATING MEANS FOR MUSICAL INSTRUMENTS

Filed Feb. 26, 1948

2 Sheets-Sheet 1

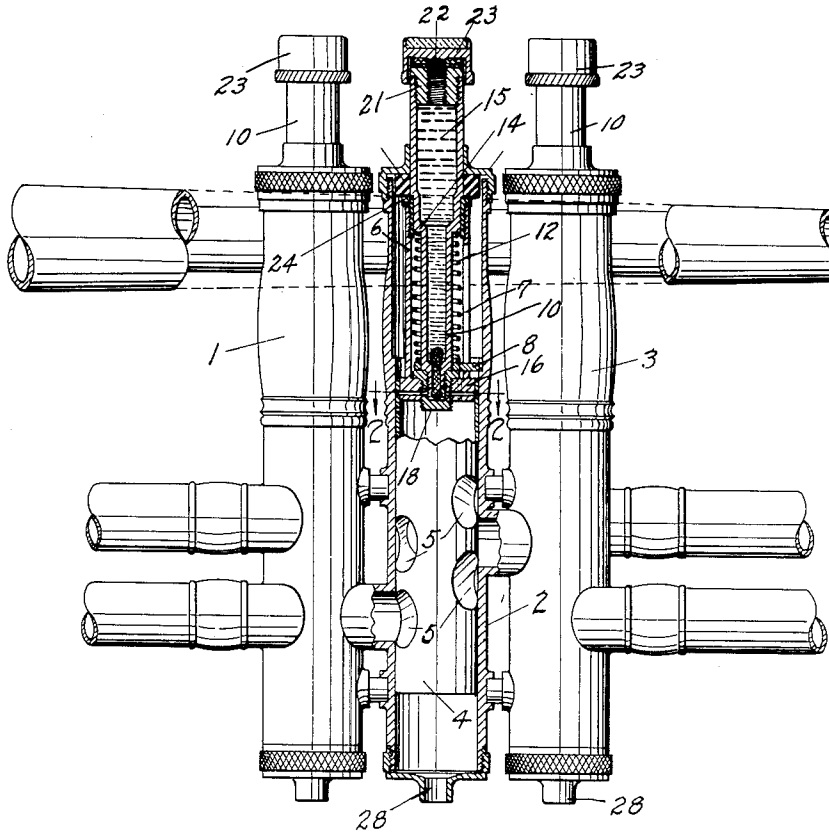


FIG. 1

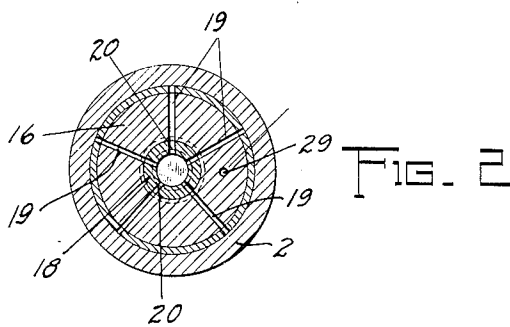


FIG. 2

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2 Sheets-Sheet 2

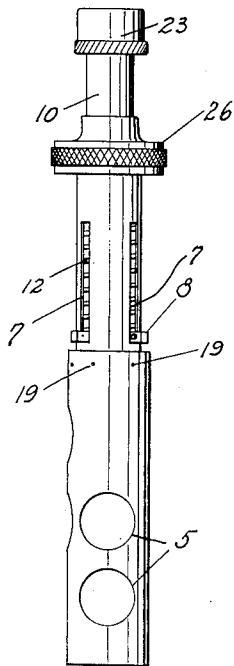


FIG. 3

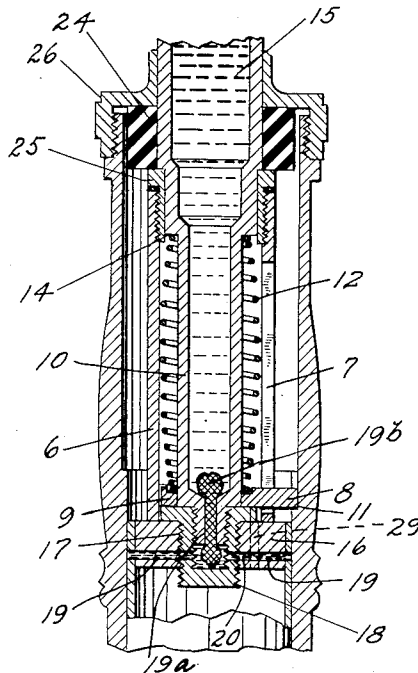


FIG. 5

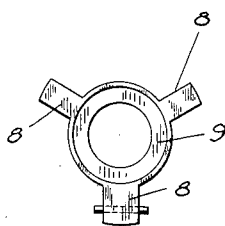


FIG. 4

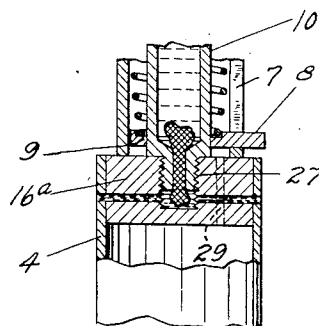


FIG. 6

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UNITED STATES PATENT OFFICE

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LUBRICATING MEANS FOR MUSICAL INSTRUMENTS

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7 Claims. (Cl. 84-388)

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My present invention has relation to musical wind instruments of the type employing piston valves during the playing of the instrument, such as French horns, trumpets, cornets, tubas, and the like.

During the playing of an instrument of the above character it is highly requisite that the valves which are of the piston type shall operate easily in their respective cylinders, with which they have a snug and accurate machine fit. Lubrication of the valve is therefore necessary to maintain their freedom of movement, actuating movement by the pressure of the fingers of the player, and restoring movement effected by use of expansion spring coacting with the valve unit within the cylinder. The ordinary method of lubrication heretofore has been to unscrew the top cap of a cylinder containing the valve and removing the valve unit bodily from the cylinder, applying oil or suitable lubricant to the external surface of the piston valve, and replacing the valve in its casing or chamber.

The disadvantages of the method of lubricating above referred to are self-evident to players of instruments of the class to which I have referred.

It is a primary object of my present invention to devise a new structure of valve in which the outer wall of the valve piston will be automatically lubricated during the playing of the instrument.

In the carrying out of my invention I have provided a new construction of operating stem for the valve, which stem has been converted into an oil reservoir, fine ports being formed in the upper end portion of the valve piston or body leading from said reservoir to the outer cylindrical surface of the valve or piston section to supply the lubricant to the latter to maintain the same in a lubricated condition at all times. By my construction of valve unit, including particularly the lubricant reservoir stem above mentioned, a very considerable quantity of fine grade oil may be contained in the lubricant chamber of the stem and the supply of such oil may be constantly effective to lubricate the inner wall of the casing or cylinder containing the valve and the outer surface of the valve at its piston portion. By the practice of my invention the common method of lubricating valves of musical instruments of the class referred to, a method which is crude and unsatisfactory, is entirely done away with, and non-sticking operation of the valves of the instrument thus definitely assured, with obvious resultant advantages.

The construction of my lubricating means for the valves of wind instruments is such that it may be incorporated in the structure of the valve unit such as already in use in the instru-

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ment possessed by players, and with facility such construction may be incorporated in the building of instruments originally at the time of their manufacture.

5 My invention involves certain other details of construction pertaining to the lubricating means above treated, all of which will be more fully apparent upon reference to the following description, in conjunction with the accompanying drawings.

10 In the drawings:

Figure 1 is a view largely in side elevation of the valve assembly of an ordinary trumpet or similar wind instrument, the casing of the middle valve unit being broken away and shown in section, as well as the valve structure at the upper end of the latter, to bring out the lubricating means of my invention.

15 Figure 2 is a cross sectional view taken through the middle valve casing and valve unit, about on the line 2-2 of Figure 1.

20 Figure 3 is a view of the valve unit of my invention, looking at the same in side elevation, as when removed from the cylinder in which it would ordinarily be mounted.

25 Figure 4 is a detail plan view of the spider abutment for the lower end of the valve return spring mounted in the casing of the valve, as seen in Figure 1.

30 Figure 5 is an enlarged sectional view of the lower end of the valve stem and adjustable portions of the valve to bring out more clearly the manner in which the valve stem is fitted into and connected with the piston portion or section of the valve unit.

35 Figure 6 is a detail sectional view similar to Figure 5, but showing how my valve stem may readily be connected to the piston section of the valve when installed originally in the musical instrument at the time of manufacture, under which conditions one of the parts used in the preferred showing of my invention may be dispensed with.

40 Referring now to the drawings and describing my invention specifically, I note that in Figure 1 there are shown the several valves of the valve assembly of the wind instrument, a trumpet in this particular instance, the valve assembly being connected up with the tubes of the instrument and the several valve casings being connected together after well known practice, the bell of the trumpet tube being omitted as well as the mouthpiece.

45 The valve assembly comprises, generally speaking, in the type of instrument referred to, the several valve cylinders or casings designated 1, 2, and 3. The casing 1 is illustrated in section in order to bring out internal construction of the same as well as the construction of the valve unit mounted to move therein.

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The valve unit of my invention consists of the customary piston section 4 at the lower end thereof, this section being provided with the usual ports 5 therein. The valve section 4 is adapted to be reciprocated in the well known manner in order to vary the effective length of the air column of the instrument. At the upper end portion thereof the valve section 4 of my valve unit has attached thereto what I term the spring cage section 6, which is nothing more than a cylindrical hollow member formed in the side portions thereof with a series of vertical slots 7, three in the present instance, which slots receive the divergent or radiating arms 8 of the spider-like abutment 9. The abutment 9 consists of a washer-like structure having an opening therein at its center through which the lower end of the valve stem 10 may slide. The outer ends of the arms 8 of the abutment member 9 are adapted to rest upon a shoulder 11 located some distance from the upper end of the cylinder 2 now being described and formed on the internal wall of the cylinder as readily seen upon reference to Figure 1.

Surrounding the stem 10 of the valve unit is the spring 12 which is a coil spring of the expansible type, the lower end of which spring rests on or abuts with the abutment member 9, and the upper end of which spring engages an annular enlargement or shoulder 14 formed externally on the upper portion or really the middle portion of the stem 10. From the shoulder 14 of the stem 10 said stem is preferably of larger diameter than at the lower half portion of the same, whereby to obtain a little larger capacity for the lubricant designated 15 and which is enclosed in the chamber or reservoir formed by the hollow portion of the stem.

The construction of my valve unit as illustrated in Figure 1 is intended to be used when a valve assembly is to be converted from the ordinary type found in completed instruments in use today, to the lubricating type of the present invention. With the foregoing in view the head 16 which is located at the top of the valve section 2 and closes the latter at such portion is bored at its center and the bore is tapped to provide screw threads. Into the bored opening or recess designated 17, of the head 16, is screwed a thimble 18 above which is disposed the abutment member 9. The thimble 18 is formed with a center opening which is internally tapped for threading the same and the lower end of the stem 10 is formed with an oil exit passage 19a and also said lower end is externally threaded so as to screw into the opening or recess of the thimble 18 aforesaid.

Now in order that the oil in the reservoir of the stem 10 may pass through the exit opening at the lower end of the stem to the external periphery of the valve section 4 and the internal wall or surface of the casing 2 in which the valve or piston section 4 is mounted, there are provided a series of very fine passages 19 which lead radially through the head 16 to the outer surface of the valve section 4, said passages 19 registering with similar fine openings or passages 20 drilled through the side walls of the thimble 18. Under the foregoing conditions it will be observed that during the reciprocation of the valve unit by means of the stem 10 in the playing of the instrument, and even to a certain extent while said valve unit is stationary, oil or other lubricant of a suitable nature may pass from the internal reservoir of the stem 10 through the passages 19 and 20 to the external surface of the piston section of the

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valve unit, designated 4, and the wall portion of the casing 2 with which said valve section is in operative contact and snugly fits, as previously mentioned.

In the enlarged upper portion of the stem 10 of the valve unit, at the upper end of said stem, I provide a coupling member 21 externally threaded to fit into and screw into the upper internally threaded extremity of the part 10, said coupling member or union 21 having a central threaded opening into which may be detachably screwed the threaded stem 22 of the key member or fingerpiece 23 by which the valve unit is operated after ordinary practice.

The upper end of the spring cage 6 of the valve unit is internally threaded to receive an externally threaded cap member 25 which snugly surrounds the middle portion of the stem and reservoir 10. The upper end of the cap member 25 is adapted to abut the cushion washer or gasket 24 which is seated against the underside of the casing cap member 26 through which the stem and reservoir 10 slides downwardly and upwardly carrying with it, of course, the spring cage 6 and the valve section or piston 4 directly attached thereto and to the stem 12.

For preventing too fast passage of the oil or lubricant 15 in the stem 12, to the contacting surfaces of the valve section 4 and the casing 2, I provide a short piece 19b of wicking, the same passing through the opening at the lower end of the stem 10 by which opening the lubricant is supplied to the passages 19 and 20.

The operation of my valve unit is quite similar to the operation of these units as found in instruments of the class to which my invention applies, today. Pressure downwardly on the fingerpiece or key member 23 at the top of the stem 10 will move the stem, the spring cage member 6, the head 16, and the valve piston or section 4 in the same direction, as a unit. The abutment member 9 remains stationary, of course, on the shoulder 11 on the casing 2 of the valve unit, and as the valve unit moves downwardly the spring 12 in the spring cage 6 is compressed and thus energized so that upon release of the pressure on the fingerpiece 23 the spring will move the valve unit upwardly in the casing 2 to its normal upraised position. Obviously, during reciprocation of the valve unit in the casing 2 the liquid lubricant is fed largely by capillarity from the reservoir from within the stem 10 through the openings 19 and 20 to the contacting exterior portion of the valve piston 4 and the interior wall of the casing 2 contacting said portion of the piston section of the valve unit. In its upward movement the valve unit is cushioned by engagement of the member 25 against the cushion part or member 24 as the stem 10 reaches the upper limit of such movement.

While for purposes of converting valve units already in use to a lubricating reservoir type of valve stem structure such as I have described above, I utilize preferably the construction shown in Figures 1 and 5, it is contemplated that in the original manufacture of instruments of the type on which my invention may be used, if desired, the lower end of the reservoir stem 10 may be screwed directly into a threaded opening 27 in the head 16a, and the thimble or insert 18 dispensed with, as shown in Figure 6.

In the ordinary valve unit of trumpets, the stem of the valve attached to the fingerpiece 23 is of smaller diameter than my stem 10, and directly screwed into a cap attached to the upper

end of the cage 6. The usual vents 28 are located at the lower ends of the valve casings 1, 2, and 3.

To refill the reservoir of the stem 10, the fingerpiece 23 is unscrewed to remove it, and, after filling, is replaced.

Leading through the head 16 of the valve section 2, I provide a fine air opening 29 produced by a fine drill.

The action of supplying the lubricant to the outer surface of the valve section or member 4 performs an additional function in that the oil between the part 4 and its casing provides a stoppage means against passage of moisture (saliva) upwardly to the space above the head, this moisture often attacking the spring and adjacent parts with disintegrating results. The oil is obviously heavier than the lighter moisture film that might enter between the parts 2 and 4.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States, is:

1. Valve means for wind instruments comprising a casing, a valve unit operating therein and comprising a piston valve section snugly fitting and slidable in the casing, an operating stem for manual actuation of said valve section, the stem having a lubricant chamber internally thereof, and provided with passages leading therefrom for conducting lubricant, the valve section having passages communicating with those of the stem and leading through the wall thereof to the external surface of the said section and the contacting internal surface of the casing.

2. Valve means as claimed in claim 1, in which the stem is hollow to provide the lubricant chamber.

3. Valve means as claimed in claim 1, in which the stem is hollow to provide the lubricant chamber, and a key member comprising a fingerpiece on the outer end of the stem removable to afford access to the lubricant chamber.

4. Valve means for wind instruments comprising a valve unit composed of a piston valve section, a key stem to operate said section having a lubricant chamber and connected to the valve

section, the valve section having passages leading through the wall thereof to its outer surface and communicating with the said lubricant chamber.

5. Valve means as claimed in claim 4, in which the stem is longitudinally hollow to provide the lubricant chamber, and the passages lead to such chamber adjacent the inner end of the stem, together with a removable closure member for the stem chamber.

6. Valve means as claimed in claim 4, in which the stem is longitudinally hollow to provide the lubricant chamber, and the passages lead to such chamber adjacent the inner end of the stem, together with a removable closure member for the stem chamber, said closure consisting of a fingerpiece for actuating the stem and its valve section and constituting a key member carried on the outer end of the stem.

7. Valve means for wind instruments comprising a casing, a valve unit operating therein and comprising a piston valve section snugly fitting and slidable in the casing, an operating stem for said valve section removably connected to an end of the valve section and comprising a hollow portion forming a lubricating chamber, a spring cage on the valve section surrounding the stem, an abutment engaging the casing interiorly thereof, a spring engaging the stem at one end to push the same out of the casing, and engaging at its other end said abutment, the valve section having small passages leading from its external surface through the removably connected portion of the stem and communicating with the lubricating chamber.

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The following references are of record in the file of this patent:

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