Dec. 1, 1936. P. B. LIMINA 2,062,792

MEANS FOR INCREASING THE RANGE OF WIND INSTRUMENTS

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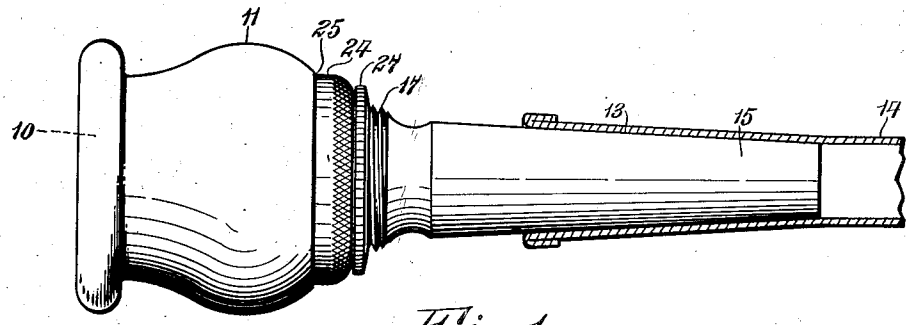


Fig. 1.

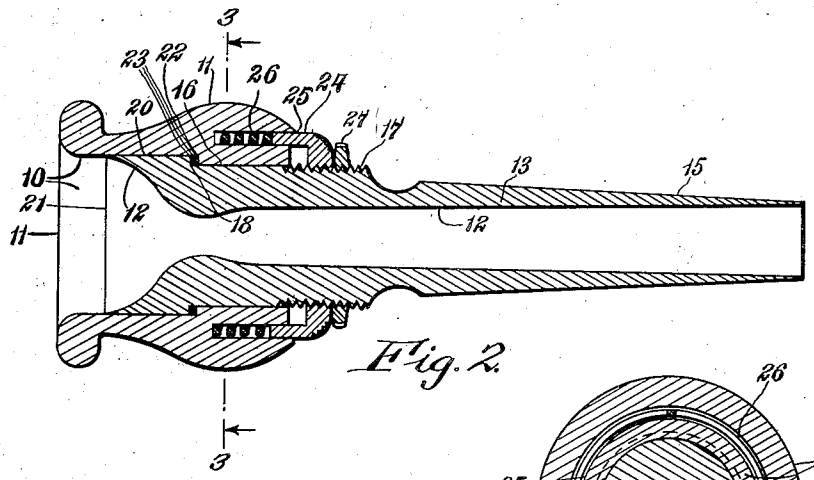


Fig. 2.

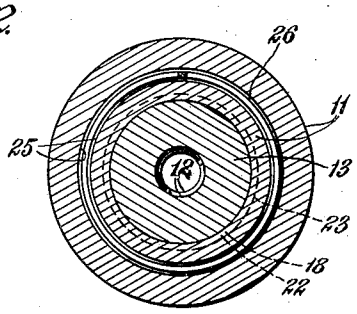


Fig. 3.

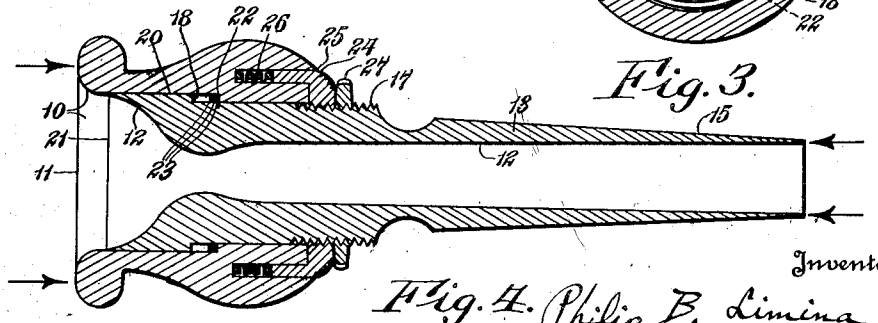


Fig. 4.

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MEANS FOR INCREASING THE RANGE OF WIND INSTRUMENTS

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2 Claims. (Cl. 84—399)

This invention relates to musical instruments of the brass wind or non-reed type, such as trumpets, horns, trombones etc. in which the lips of the musician are vibrated to initiate the musical notes.

The principal object of the invention is to provide a means for increasing the range of musical notes which can be played upon said instrument.

Another object of this invention is to obtain this result with a minimum of manual effort and in a substantially automatic manner.

Numerous other collateral objects of the invention and practical solutions thereof are disclosed in the herein patent specification, wherein:

Figure 1 is a side elevation of a mouth piece and its associated parts, showing the same fitted into the small end of the horn of a trumpet.

Figure 2 is a vertical, longitudinal medial section of said mouth piece and associated parts, showing the same in the position which they occupy when the trumpet is being used to play low register notes.

Figure 3 is a vertical transverse section of said mouth pliece and associated parts, taken on line 3—3 Fig. 2.

Figure 4 is a vertical, longitudinal, medial section similar to Fig. 2, but showing the parts in the position they occupy when the instrument is being used to play high register notes.

In the following description similar characters of reference indicate like parts in the several figures of the drawing:

In such brass wind instruments as trumpets, horns, trombones, cornets, baritones, tubas, etc., the musical notes obtained from the same are a result of the action of the musician blowing with vibrating lips into the hollow interior or resonance chamber 10 of the mouth piece 11, from whence the sound waves pass through the amplifying duct 12 of the stem 13, and thence into the horn 14 of the instrument.

The range of musical notes which can be played on the instrument are a direct function of the shape and size of the resonance chamber 10, and the present invention concerns itself exclusively with the increasing of the range of the instrument by this means. Specifically, the invention provides for changing the length of the resonance chamber 10 of the mouth piece 11, the shorter this distance being the higher the notes that can be played upon the instrument.

As is common practice in brass wind instruments, the stem 13 is provided on its peripheral rear portion with a tapered conical surface 15 to enable said stem to be readily and tightly fitted into or removed from the small end of the horn 14 of the instrument. Forwardly of said conical surface 15, said stem is annularly enlarged to form a central, cylindrical, sliding surface 16, the rear end of which is provided with a male screw thread 17. The front end of said sliding surface terminates in an annular shoulder 18. Forwardly of said shoulder the stem 13 is still more enlarged to form a front, cylindrical, sliding surface 20 which extends to the front end 21 of the stem. At this front end 21 of said stem 13, the sliding surface 20 is substantially tangential with the adjacent bell mouthed surface of the amplifying duct 12 of the stem.

Slidably arranged on the front end of said stem 13 is the mouth piece 11. That portion of the bore of said mouth piece which is situated forwardly of the front end 21 of the stem 13 has been herein denominated the resonance chamber 10. The length of this resonance chamber 10 is adapted to be varied as will be apparent from a comparison of Figs. 2 and 4, this variation causing a shifting of the range of musical notes which can be played by the instrument, and consequently an increasing in the total range capable of being played.

The front end of the bore of said mouth piece 11 is suitably formed to slide upon the front sliding surface 20 of the stem 13, while the rear end of the bore of said mouth piece is suitably formed to slide upon the central sliding surface 16 of said stem. The bore of said mouth piece is also provided with an annular stop 22 which is adapted to co-act with the annular shoulder 18 of the stem 13 to limit the forward movement of said stem relatively to the mouth piece 11. The limiting position of said stem 13 and mouth piece 11 relatively to each other is rendered adjustable by the provision of a suitable number of spacing washers 23, the number of said washers being varied to provide a low range position (Fig. 2) of the invention to suit the requirements of the particular musician who is using the instrument. This adjustment can, of course, be obtained by other means, the invention not being restricted to the particular adjustment means shown.

Screwed onto the screw thread 17 of the stem 13 is a cup-shaped adjusting nut or annular collar 24, the front, overhanging cylindrical position of which extends into an annular peripheral recess 25. Arranged in said recess in front of the front edge of the collar 24 is a helical com-

pression spring 26 which may either be rectangular in cross section, as shown, or have other desired cross sectional shape. This spring, by resiliently urging the mouth piece forwardly and the collar 24 rearwardly, causes the stem 13 to be urged rearwardly relatively to the mouth piece 11, i. e. toward the position of Fig. 2 which is the limit of movement in this direction.

The tension exerted by the spring 26 may be adjusted by suitably screwing the collar 24 in or out, this operation being rendered more convenient by the provision of a knurled portion on the upper, rear, curvilinear position of said collar 24. When said adjustable collar 24 has been screwed to the position desired, it is locked in this position by a knurled lock nut 27 which is threaded onto the screw thread 17 of the stem 13. If, for any reason, the compression spring 26 should break, this lock nut 27 is backed off and the adjustable collar 24 then screwed forwardly as far as it can be screwed. This renders the instrument identical as to its range to what it would be if the present invention had not been applied, i. e., it enables the musician to play the ordinary range of notes but not to play the extremely high notes.

Operation

The musician, to adjust the invention, first inserts the conical or rear end 15 of the stem 13 into the small end of the horn 14 of his trumpet or other brass, wind (non-reed) instrument. He then loosens the lock nut 27 and screws the collar 24 forwardly (to the left) as far as it will go so as to render the compression spring 26 inoperative. He then runs up and down the lower range of musical notes, for instance the scale from low F sharp to high G. He either removes one or more of the spacing washers 23 or adds to their number until he can most comfortably and accurately play this particular range of notes. It is to be understood that, under these particular conditions, the musician might be able to play as high as high C, but any notes beyond high G will be difficult to obtain, and it is not necessary to attain them with the present invention with this particular adjustment.

The musician now slacks off the lock nut 27 and adjustably screws the collar 24 back or forth until he can most easily and accurately play the upper range of notes,—for instance the scale from high G to the octave above high G. In obtaining these upper range notes, the musician pulls the horn 14 toward him with whatever pressure is necessary to move the stem 13 forwardly toward the mouth piece whatever distance is found to be most suitable. If this pressure is too great, particularly when playing in the extreme upper register, the musician backs up the adjustable collar 24.

It has been found in actual practice that this manually actuated movement of the stem 13 relatively to the mouth piece 11 is obtained practically automatically. This is due to the fact that, when a musician is playing a brass wind instrument, as he runs up the scale he exerts an ever increasing pressure by his lips against the front edge or rim of the mouth piece 11. This ever increasing pressure is balanced, naturally, by an ever increased forward force exerted on the horn 14 by the musician's hands. The consequence is that when a brass wind instrument musician uses the present invention for the first time, he finds himself, without thinking, pushing the stem 13 toward his mouth as he reaches the higher notes. This is obviously the very action that is necessary for the functioning of the present invention.

With the present invention as used in actual practice, the compression spring 26 is so adjusted and the parts so constructed that no movement of any of the parts takes place when playing the lower register of notes, for instance from low F sharp to around high G. Thereafter the stem 13 is moved more and more forwardly as the musician runs up the scale above high G, said stem arriving at its limit of movement somewhat before he reaches the octave above high G. The present invention, however, includes broadly the idea of a variable resonance chamber for instruments of this particular type and this includes, of course, the provision of an individual size of resonance chamber for every individual musical note.

It will be noted in the present invention that leakage of wind is reduced practically to zero. This is because any air which might leak out is compelled to first pass longitudinally through the very narrow space between the mouth piece 11 and the front sliding surface 20, and then through the very narrow space between said mouth piece and the central sliding surface 16, and thence through the tortuous passages between the recess 25 of said mouth piece and the front cylindrical portion of the adjustable collar 24.

I claim as my invention:

1. A means for increasing the range of a wind instrument having a horn and comprising: a stem connected with said horn and having an amplifying duct; a mouth piece slidably arranged at the front end of said stem and having a resonance chamber tubularly connected with said amplifying duct and having a peripheral recess in its rear face; and a collar interlockingly connected with said stem and received within said recess.

2. A means for increasing the range of a wind instrument having a horn and comprising: a stem connected with said horn and having an amplifying duct; a mouth piece slidably arranged at the front end of said stem and having a resonance chamber tubularly connected with said amplifying duct and having a peripheral recess in its rear face; means for limiting the forward movement of said mouth piece; a collar interlockingly connected with said stem and receive within said recess; and a spring arranged in said recess forwardly of said collar.

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