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R. W. LAWRENCE

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SLIDE FLUTE

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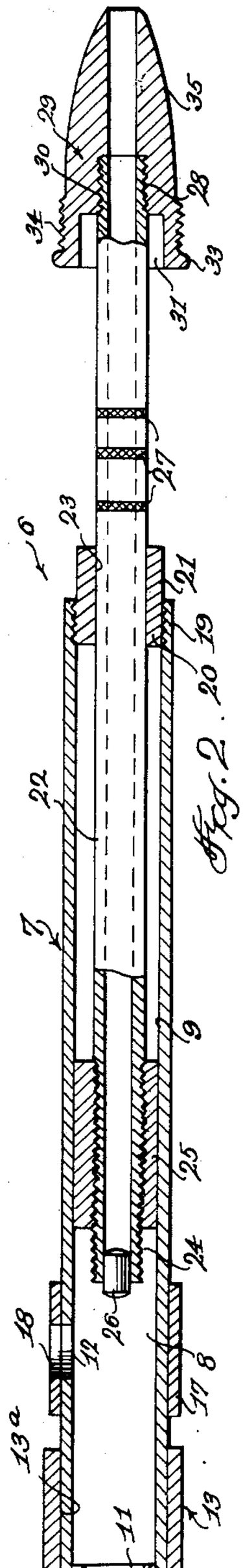

Fig. 2.

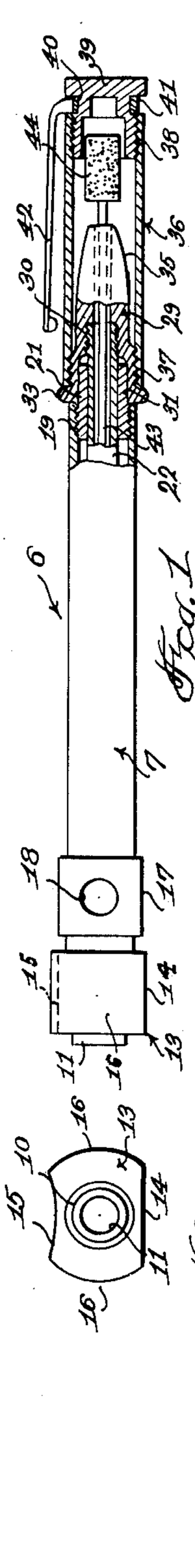

Fig. 1

Fig. 3.

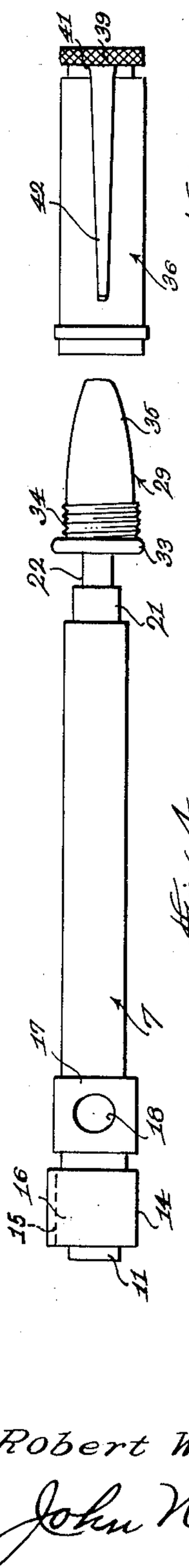

Fig. 5.

Fig. 4.

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SLIDE FLUTE

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6 Claims. (Cl. 84—384)

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This invention relates to a novel construction of slide flute which may be readily constructed of a size capable of being carried in the pocket yet which constitutes an efficient piston-operated musical instrument rather than a mere musical toy and which is musically and structurally efficient for accomplishing its intended result.

More particularly, it is an aim of the present invention to provide a slide flute having open hole embouchures enabling the instrument to be played in a manner which will be fully responsive to lip control so that the instrument may be played with expression for producing any note within its range from the softest degree of pianissimo to the loudest degree of fortissimo together with the humoring of notes and the playing of effective double and triple tonguing, none of which results can be accomplished with toy instruments employing a whistle or a fipple mouth-piece.

Another object of the invention is to provide a slide flute wherein the training of the lip accomplished in the playing thereof may be used with equal advantage in the playing of a concert flute or piccolo and through the use of which the trained lips of flute or piccolo players may be maintained in condition.

Still a further object of the invention is to provide a slide flute having both an open hole end embouchure and a second open hole side embouchure spaced from the end embouchure and whereby through the use of the two embouchures in conjunction with one another strong and distinct trills, turns and appoggiaturas and a variety of bird calls may be accomplished with a minimum use of the sliding piston.

Still another object of the invention is to provide an instrument which will overcome an inherent defect in open hole flute embouchures for producing a quicker tone response and more resonant notes and which will correct the fundamental note of a particular tone tube.

Another object of the invention is to provide an instrument having means to relieve tense and tired lip muscles and to promote quicker tone response.

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawing, illustrating a presently preferred embodiment thereof, and wherein:

Figure 1 is a top plan view, partly in section, showing the flute in a fully retracted position and with the cap applied;

Figure 2 is an enlarged longitudinal sectional view, partly in side elevation thereof;

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Figure 3 is an end view looking from left to right of Figure 1;

Figure 4 is a side elevational view of the flute with the cap removed and in a partially extended position, and

Figure 5 is a similar view of the cap.

Referring more specifically to the drawing, the novel slide flute in its entirety and as illustrated in Figure 1 is designated generally 6 and is of a length enabling it to be conveniently carried in the pocket. The slide flute 6 includes a tone tube, designated generally 7 which is cylindrical in cross section and of an appropriate length to furnish a desired number of octaves or of a specific length to produce a desired fundamental note. The wall of the tone tube 7 is relatively thin providing a relatively large bore 8. The inner face 9 of the tone tube wall, which is preferably formed of metal, is made perfectly cylindrical and is highly polished and free of all blemishes. One open end 10 of the tone tube 7 which would ordinarily constitute its end embouchure has at relatively short sleeve 11 secured therein and which projects slightly beyond said end and which may be secured to the tone tube in any suitable manner as by a press fit engagement. The bore of the embouchure sleeve or band 11 is somewhat smaller than the tube bore 8 and is of an appropriate diameter, as illustrated, to receive a maximum stream of air from the lips without requiring tightening of the lip muscles too firmly and its prime purpose is to reduce the natural size of the end embouchure 10 to enable the instrument 6 to provide a better tone response and additionally to lower the fundamental note of the instrument into proper pitch. Spaced from but relatively near to said end embouchure band 11, the tone tube 7 is provided in its cylindrical wall with an opening 12 of the same diameter as the bore of the band 11 and which constitutes a part of the side embouchure of the instrument 6.

An end embouchure lip rest 13 comprises a body which may be formed of metal, plastic or wood and which has a bore 13*a* for snug fitting engagement over the end of the tone tube 7, located adjacent the end embouchure band 11, and which may be secured thereto in any suitable manner as by a press fit engagement. As best seen in Figure 3, the end lip rest 13 is provided with a non-circular periphery including a flat surface 14, a concave surface 15, disposed opposite to the surface 14 and oppositely disposed convex surfaces 16, any one of which surfaces may be positioned to rest against the center of the lower lip at the bottom lip line when playing the instrument with the end embouchure

11. As seen in Figure 2, the outer end of the lip rest 13 is disposed flush with the embouchure end 10 of the tube 7.

A side embouchure band or sleeve 17 which is cylindrical in shape externally and internally, is secured around the tube 7 in any suitable manner as by a press fit engagement and is spaced slightly from the lip rest 13 and is provided with an opening 18 of the same diameter as the opening 12 and which aligns exactly with said opening 12 to combine therewith to form the side embouchure 12, 18 of the flute 6. The side embouchure band 17 may be formed of metal, plastic or wood and affords a comfortable lip rest for the side embouchure 12, 18 and its larger diameter, as compared to the tone tube 7, affords a comfortable resting surface for the lips and provides the musician a greater flexibility producing better quality notes when the side embouchure is used in playing the flute.

The opposite end of the tone tube 7 is slightly enlarged internally and threaded as seen at 19 to receive the externally threaded end 20 of a short sleeve member 21 which forms a piston stop and piston rod guide. A tubular piston rod 22 extends reciprocally through the bore 23 of the stop 21 and the inner end of said piston rod 22 is preferably ribbed or serrated as seen at 24 to receive a sleeve member 25 forming the piston of the flute 6. The piston 25 may be formed of any suitable compressible and resilient material such as leather, felt or cork to provide a seal between the piston rod 22 and the inner wall surface 9 of the tube 7. The bore of the piston 25 is made slightly smaller than the exterior diameter of the piston rod 22 so that it will be stretched into a tight fitting engagement thereon and said piston is preferably cemented or otherwise bonded to the serrated portion 24 to provide an air tight connection with the piston rod. Likewise, the outside diameter of the piston 25 is sized to snugly fit the inner wall surface 9 and is of sufficient length to prevent escape of air past the piston. The piston 25 functions to shorten or lengthen the air column of the tone tube 7 for producing high or low notes. The inner or forward end of the piston rod 22 is closed and sealed by a plug 26 of a compressible material. The piston rod 22 has a sufficiently close fitting engagement with the bore of the piston stop 21 for guiding the piston and rod in their reciprocating movement relatively to the tone tube 7 but a slight clearance of sufficient size exists between said piston rod and piston stop to allow air to enter into or escape from the tone tube 7 between the piston 25 and the piston stop 21 to prevent a vacuum or pressure occurring in said portion of the tone tube and which would hamper movement of the piston 25.

A group of longitudinally spaced colored bands 27 may be etched or otherwise suitably inscribed on the exterior surface of the piston rod 22 and correctly located to indicate the proper location of the piston for the playing of certain notes on the instrument and are used only or primarily for visual setting of the instrument for the playing of initial notes as thereafter movement of the piston is accomplished by aid of the ear determining the correct note and pitch position.

The opposite, outer end of the piston rod 22 is externally threaded as seen at 28 to receive a housing member 29 which has a bore extending

longitudinally therethrough including a threaded portion 30 for engaging said threaded end 28 and an enlarged inner end portion 31 to receive the outer end of the piston stop 21 when the piston is in a fully retracted position, as illustrated in Figure 1. The housing 29 is provided at its inner end with an annular flange or enlargement 33 and adjacent thereto is provided with an externally threaded portion 34. Beyond the threaded portion 34 and to the outer end thereof, the housing 29 is preferably tapered externally as seen at 35. A cap 36, similar to a fountain pen cap, is adapted to receive the outer end of the housing 29 and is provided with an internally threaded end 37 to detachably engage the threaded portion 34 and an internally threaded opposite end 38 to receive a threaded plug or nut 39 having a restricted neck portion 40 which is disposed beyond the sleeve portion of the cap and which is engaged by the ring portion 41 of a pocket clip 42. It will thus be seen that when the flute 6 is in a fully retracted position, as illustrated in Figure 1, it may be placed in the pocket and attached thereto similar to a fountain pen or mechanical pencil by the pocket clip 42 and is of a convenient length to fit a normal garment pocket.

The staff 43 of a cleaning swab may be detachably housed in the bore of the piston rod 22 and with the cleaning swab head 44 contained within the cap 36, as illustrated in Figure 1 so that the cleaning swab will be at all times conveniently available for use in cleaning the interior of the tone tube 7.

In playing the instrument 6, when the end embouchure 11 is employed the tube 7 is held in substantially a vertical position with the left hand, the left forefinger of the musician blocking the side embouchure 12, 18. With the bottom lip resting against any one of the surfaces 14, 15 or 16 of the lip rest 13, as previously described, the musician directs a stream of air from the lips against the far edge portion of the embouchure band 11 while pronouncing the syllables "too," "tu-ke" and "tu-ke-tu" for single, double and triple tongued notes. If a tremolo effect is desired, the left forefinger is vibrated rapidly on the side embouchure 22, 18. The slide flute 6 may also be played chromatically while thus held. By selecting different surfaces of the lip rest 13, lip tension and fatigue may be alleviated in employing the end embouchure to play the flute.

In employing the side embouchure 12, 18 to play the flute, the tone tube 7 is held in a horizontal position so as to rest between the index and middle finger of the left hand with the left thumb blocking the end embouchure 11 and with the bottom lip resting against a portion of the side embouchure ring 17. The technique of tone production is the same when employing the side embouchure as when employing the end embouchure; however, in the use of the side embouchure in conjunction with movement of the thumb rapidly into and out of engagement with the end embouchure, full rounded trills, shakes, turns, appoggiaturas as well as a wide variety of bird calls may be produced.

In either position of playing as previously described, the right hand grasps either the cap 36 or the housing 29 for operating the piston 25 which is employed to shorten or lengthen the air column of the tone tube 7 for the production of higher or lower notes, respectively. The length of the tone tube 7 is in direct relationship to the number of octaves desired or the particular

fundamental or lowest note required. The instrument 6, capable of being carried in the pocket as previously described, may be provided with a tone tube of sufficient length to produce approximately two octaves commencing with the fundamental note of high C which is one octave higher than the fundamental note of the concert piccolo and two octaves higher than the concert flute. The instruments 6 having larger tone tubes may produce a fundamental note a major-fourth lower than a piccolo. The tone tube 7 conforms to the fundamental laws governing acoustics of the closed tube in that the lower notes can be over-blown by a trained lip to sound 12 degrees higher. As the piston 25 is propelled toward the embouchure end of the tone tube the air column is shortened increasing the vibration and thus producing higher sounding notes and, conversely, as the piston is moved in the opposite direction or toward the piston stop 21 the air column becomes longer resulting in lower sounding notes.

Various modifications and changes are contemplated and may obviously be resorted to, without departing from the spirit or scope of the invention as hereinafter defined by the appended claims.

I claim as my invention:

1. A pocket size slide flute comprising a tone tube, a relatively short sleeve member of circular cross section secured in and extending from one end of the tone tube and forming a restricted end embouchure, a sleeve member detachably connected to the opposite end of the tone tube and providing a piston stop and piston rod guide, a piston rod extending reciprocally through the guide and stop member, a piston fixed to said piston rod within the tone tube and forming a seal between the ends of the tone tube, said piston being formed of a resilient, compressible material.

2. A slide flute comprising a tone tube, a relatively short sleeve member secured in and extending from one end of the tone tube and forming a restricted end embouchure, a sleeve member detachably connected to the opposite end of the tone tube and providing a piston stop and piston rod guide, a piston rod extending reciprocally through the guide and stop member, a piston fixed to said piston rod within the tone tube and forming a seal between the ends of the tone tube, and a housing member detachably connected to the opposite end of the piston rod and externally disposed with respect to the tone tube to form a hand grip for reciprocating the piston within the tone tube, said housing having a recessed inner end, and said stop and guide member having a protruding end receivable in said recess when the piston is moved from a fully extended position toward said end embouchure.

3. A slide flute comprising a tone tube, a relatively short sleeve member secured in and extending from one end of the tone tube and forming a restricted end embouchure, a sleeve member detachably connected to the opposite end of the tone tube and providing a piston stop and piston rod guide, a piston rod extending reciprocally through the guide and stop member, a piston fixed to said piston rod within the tone tube and forming a seal between the ends of the tone tube, and a housing member detachably connected to the opposite end of the piston rod and externally disposed with respect to the tone tube to form a hand grip for reciprocating the piston within the tone tube, said housing having a recessed inner

end, and said stop and guide member having a protruding end receivable in said recess when the piston is moved from a fully extended position toward said end embouchure, and a cap provided with a pocket clip detachably connected to said housing and projecting therefrom, said cap and housing combining to define a swab head receiving chamber and said housing and piston rod having communicating bores defining a swab staff receiving chamber.

4. A slide flute comprising a tone tube, a relatively short sleeve member secured in and extending from one end of the tone tube and forming a restricted end embouchure, a sleeve member detachably connected to the opposite end of the tone tube and providing a piston stop and piston rod guide, a piston rod extending reciprocally through the guide and stop member, a piston fixed to said piston rod within the tone tube and forming a seal between the ends of the tone tube, said end embouchure sleeve member extending a short distance into the first mentioned end of the tone tube and a short distance beyond said end, and a lip rest secured around said tone tube adjacent said first mentioned end and having an outer end disposed substantially flush with said first mentioned tone tube end.

5. A slide flute comprising a tone tube, a relatively short sleeve member secured in and extending from one end of the tone tube and forming a restricted end embouchure, a sleeve member detachably connected to the opposite end of the tone tube and providing a piston stop and piston rod guide, a piston rod extending reciprocally through the guide and stop member, a piston fixed to said piston rod within the tone tube and forming a seal between the ends of the tone tube, said end embouchure sleeve member extending a short distance into the first mentioned end of the tone tube and a short distance beyond said end, and a lip rest secured around said tone tube adjacent said first mentioned end and having an outer end disposed substantially flush with said first mentioned tone tube end, said lip rest having a plurality of peripheral surfaces of different shapes forming lip rest surfaces.

6. A slide flute comprising a tone tube, a relatively short sleeve member secured in and extending from one end of the tone tube and forming a restricted end embouchure, a sleeve member detachably connected to the opposite end of the tone tube and providing a piston stop and piston rod guide, a piston rod extending reciprocally through the guide and stop member, a piston fixed to said piston rod within the tone tube and forming a seal between the ends of the tone tube, said tone tube having an opening near the first mentioned end thereof of a diameter corresponding to the bore of said end embouchure sleeve member, a side embouchure band disposed around and secured to a portion of the tone tube and having an opening therein registering with said last mentioned opening and combining therewith to form a side embouchure.

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

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