



UNITED STATES PATENT

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June 20, 1967

D. V. TREMAINE

3,326,073

WIND INSTRUMENT

Filed May 25, 1964

2 Sheets-Sheet 1

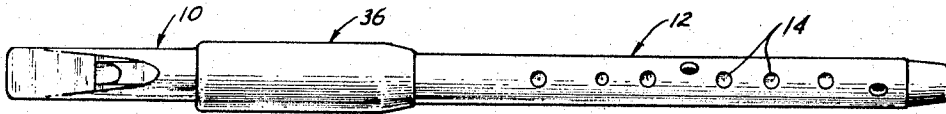


Fig. 1.

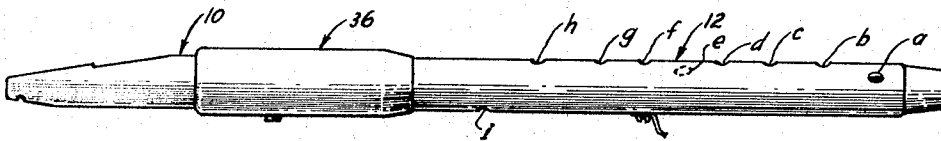


Fig. 2

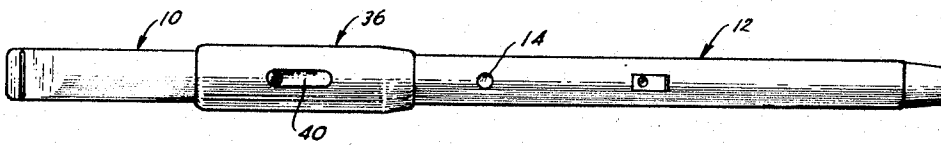


Fig. 3

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WIND INSTRUMENT

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2 Sheets-Sheet 2

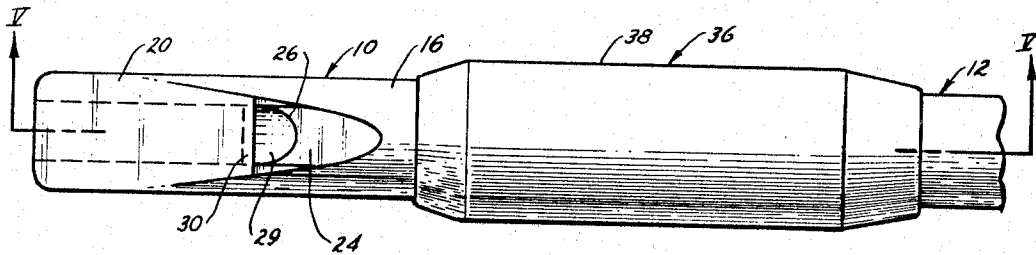


Fig. 4

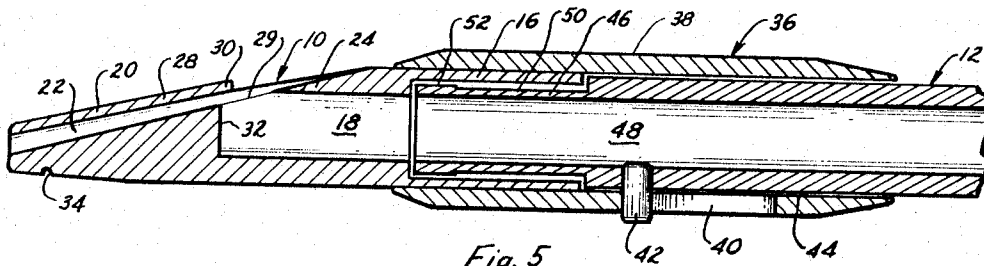


Fig. 5

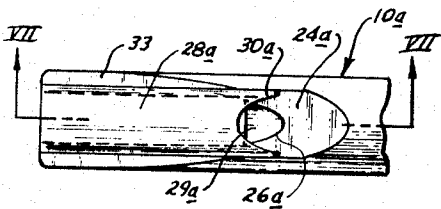


Fig. 6

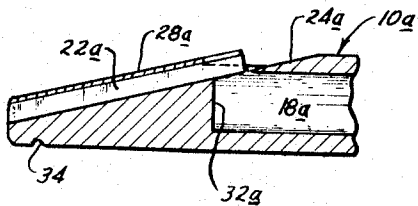


Fig. 7

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1

3,326,073

WIND INSTRUMENT

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10 Claims. (Cl. 84-380)

This invention relates to musical instruments, and more particularly to wind instruments having neither keys nor reeds.

It is a general object of the present invention to provide a novel musical instrument of wind type, which has novel means to provide sliding variations in pitch, and which provides for chromatic or half-tone steps without partial-covering-of-hole techniques or other relatively slow techniques of fingering, and which provides novel and advantageous mouthpiece construction concepts achieving desired playing and tonal results.

These and other objects, concepts, and advantages will be more fully apparent from the following description of an illustrative embodiment of the invention, considered with the accompanying somewhat diagrammatic drawings, in which:

FIG. 1 is a plan view of an instrument according to one embodiment of the invention;

FIG. 2 is a side elevational view thereof;

FIG. 3 is a bottom view thereof;

FIG. 4 is a fragmental view thereof, in larger scale;

FIG. 5 is an axial cross-sectional view, taken generally along reference line V—V of FIG. 4;

FIG. 6 is a fragmental view illustrating a modified mouthpiece construction; and

FIG. 7 is an axial cross-sectional view, taken generally along reference line VII—VII of FIG. 6.

As illustrated in the drawings, the invention comprises a musical instrument having as general components a mouthpiece 10 and a sound-column or tone-chamber shown as a tube 12 having a plurality of openings or holes 14 coverable by the player's fingers.

According to concepts of the present invention, the holes 14 are of such a spacing and size as to provide chromatic or one-half steps, as the user successively raises his fingers beginning with the lowermost hole 14.

As shown, there are eight holes 14, each one being for a specific one of the user's fingers, plus a thumb-hole underneath for one of the user's thumbs. The fingering of the half-step range is identical for each of the two half-step ranges, and the two half-step ranges are exactly one octave apart.

Thus although no keys need be provided, the quick-action of simple finger-raising or depressing provides the desired one-half steps of pitch for two full ranges, each including eight half-steps, of many of the notes obtainable with the instrument. Throughout such ranges, no cross-fingering is required. And with no note in the entire range obtainable by the instrument, is there any need for a finger to be changed from one hole to another, and no hole need be just-partially closed to obtain the correct pitch.

Thus action can be significantly faster, easier to learn, and more positive and certain and accurate of pitch than with other keyless instruments.

Keys may be provided if desired, but they need be only of the simplest form merely to provide a pad for closing the holes 14 instead of direct covering thereof by the player's fingers.

Recommended fingerings, identifying the holes by letters beginning with the lowest as *a* and the thumb-hole as *i*, and assuming the lowest note to be C, are thus as follows: Successively open holes *a* for C#, *a* and *b* for D, and so on for successive half-steps increments throughout the half-step range including G, the note G being played with all except holes *h* and *i* open.

2

To complete the lower octave, recommended fingering are—

Notes:	Holes closed
G# -----	<i>d, e, f, g, i.</i>
A -----	<i>d, i.</i>
B flat -----	<i>a, b, c (optional), d, f, g, h.</i>
B -----	<i>d.</i>

In the upper octave, and upwards, as follows:

G# -----	<i>d (optional), g, i.</i>
A -----	<i>a, b, c, d, i.</i>
B flat -----	<i>a (optional), b, c, d, h.</i>
B -----	<i>b (optional), c, d.</i>
C -----	<i>a, b, c, d, e, f, g, h, i (optional).</i>
C# -----	<i>b, c, d, e (optional), f, g, h, i.</i>
D -----	<i>c, d, e, h, i.</i>
D# -----	<i>d, e, i.</i>
E -----	<i>a, e, f, i.</i>
F -----	<i>a, e.</i>

A half-tone lower may be achieved by a pitch-varying mechanism yet to be described; and the difference in octaves is obtained by the amount of blowing pressure.

According to other concepts of the invention, a novel mouthpiece 10 is provided (see FIGS. 4 and 5). As shown the mouthpiece 10 at its downstream end 16, is cylindrical and is provided with an axial bore 18.

The upstream, or mouth-engaging end 20 of mouthpiece 10 is provided with a wind-channel 22 which is formed at an angle to the bore of the instrument, directing air past a lip 24 the upper surface of which is at least substantially co-planar with the lower surface of the wind channel 22.

The upper surface of lip 24 is flat, and its intersection with the cylindrical bore 18 produces a curved edge 26; and the upper wall 28 of the mouth-engaging end 20 of the mouthpiece extends to a portion 30 slightly downstream from the end 32 of the bore 18.

Communication between channel 22 and bore 18 is through the opening 29 bounded by bore-end 32 and lip-edge 26.

A groove 34 is shown provided in the lower wall of the mouthpiece near its extreme end, for locating the mouthpiece on the lower teeth of the player.

The modified mouthpiece 10a of FIGS. 6 and 7 provides advantages of construction, wherein the upper wall 28a of the wind-channel 22a is provided by a separate piece, of an inverted U cross-section suitably secured to the remainder of the mouthpiece, between side-walls 33 of the mouthpiece. The downstream end of wall 28a is cut in a curve, as shown at 30a, the central portion of the curving end 30a slightly upstream from the end 32a of bore 18a and with its sides cutting slightly across the corners formed by the intersection of bore-end 32a and lip-edge 26a of the opening 29a, and extending substantially as far downstream as the central portion of lip-edge 26a.

A mouthpiece according to either of the embodiments 10 or 10a provides sound having a very pleasant, flute-like tonal quality, with reduced tendency to squeal when air pressure is changed to shift from a low register to the higher register or vice versa.

Pitch variation is provided by a pitch device, generally referred to by reference numeral 36, by which the mouthpiece 10 and sound tube 12 are adjustably interconnected, as will now be described.

As shown, the downstream end 16 of the mouthpiece is fitted with a cylindrical barrel 38 having an elongated slot 40; and a pin 42 radially extends from tube 12 into the slot 40. Tube 12 is freely movable in and along the hollow bore 44 of barrel 38, but the movement is restricted by the ends of the slot 40.

The upstream end 46 of tube 12 is of reduced out-

3

side diameter, and telescopingly fits into an enlarged inner diameter of the downstream mouthpiece end 16, confining the air from mouthpiece bore 18 to the bore 48 of sound tube 12. And providing more freedom of telescoping movement, the portion of tube-portion 16 downstream of its upstream end is of reduced outside diameter, as shown at 50, the said upstream end 52 providing an effectively air-tight seal against the bore of the mouthpiece-portion 16.

Accordingly, pitch variation may be of a sliding nature, achieving novelty effects or tuning of the instrument as desired.

A wind instrument according to the present invention provides the several advantages of chromatic or half-step tone or pitch increments without keys or cross-fingering or partial-covering of holes, for extended ranges of the instrument, and it provides a pleasant tonal quality and with reduced tendency to squeal, and provides also advantages and ease and accuracy of playing and pitch, and provides a sliding pitch-variation for effects or tuning as desired.

It will thus be seen that the present invention accomplishes its intended objects including those hereinbefore pointed out and those others that are inherent in the invention.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention. Accordingly, the invention is not to be considered limited to the specific form or arrangement herein described and shown.

What is claimed is:

1. A wind instrument having a sound-column tube with closable openings to vary the effective length thereof for providing the desired pitch;

the openings being of such spacing and size as to provide pitch variations in one-half step increments for a series of successive increments as said openings are successively uncovered by the lifting of successive fingers by the player, permitting the successive one-half step increments to be attained by the player with his having to use a specific finger to cover only one hole without any requirement of partial covering of that hole, and without a necessity of any mechanical device to alter the air-current or length of the sound-column of the instrument.

2. A wind instrument having a sound-column tube with closable openings to vary the effective length thereof for providing the desired pitch;

the openings being of such spacing and size as to provide pitch variations in one-half step increments for a series of seven of such increments as said openings are successively uncovered by the lifting of successive fingers by the player, permitting the successive one-half step increments to be attained by the player with his having to use a specific finger to cover only one hole without any requirement of partial covering of that hole, and without a necessity of any mechanical device to alter the air-current or length of the sound-column of the instrument.

3. A wind instrument having a sound-column tube with closable openings to vary the effective length thereof for providing the desired pitch;

the openings being of such spacing and size as to provide pitch variations in one-half step increments for a series including all of such openings up to the opening closable by the first finger of the uppermost hand of the player as said openings are successively uncovered by the lifting of successive fingers by the player, permitting the successive one-half step increments to be attained by the player with his having to use a specific finger to cover only one hole without any requirement of partial covering of that hole, and without a necessity of any mechanical device to alter the air-current or length of the sound-column of the instrument.

4

4. A wind instrument having a sound-column tube with closable openings to vary the effective length thereof for providing the desired pitch;

the openings being of such spacing and size as to provide pitch variations in one-half step increments for a series of successive increments throughout a first half-step range of pitches as said openings are successively uncovered by the lifting of successive fingers by the player, permitting the successive one-half step increments to be attained by the player with his having to use a specific finger to cover only one hole without any requirement of partial covering of that hole, and without a necessity of any mechanical device to alter the air-current or length of the sound-column of the instrument;

the instrument also providing a second half-step range of pitches, respectively spaced one octave from the first half-step range.

5. A mouthpiece for a wind instrument having a sound-column tube with closable openings to vary the effective length thereof for providing the desired pitch;

said mouthpiece provided with a bore communicating with said tube;

the mouthpiece being provided with walls defining a wind-channel formed at an angle to the said bore of the mouthpiece;

the mouthpiece having a body-member which provides the mouthpiece bore, the lower surface of the wind-channel, the opening between the wind-channel and bore, the lip-edge, and the upper surface of the lip, permitting, in a single machine operation, the machining of the two said surfaces, the cutting of said opening, and the machining of said lip-edge; and the mouthpiece also having a second member which is applied to the said body-member after said machine operation has been performed, the second member providing the upper surface of the wind-channel.

6. A mouthpiece for a wind instrument having a sound-column tube with closable openings to vary the effective length thereof for providing the desired pitch;

said mouthpiece provided with a bore communicating with said tube;

the mouthpiece being provided with walls defining a wind-channel formed at an angle to the said bore of the mouthpiece;

the lower wall of said wind-channel abruptly opening to said bore, and the upper wall of the wind-channel extending downstream slightly farther than the location of said abrupt opening.

7. A mouthpiece for a wind instrument having a sound-column tube with closable openings to vary the effective length thereof for providing the desired pitch;

said mouthpiece provided with a bore communicating with said tube;

the mouthpiece being provided with walls defining a wind-channel formed at an angle to the said bore of the mouthpiece;

the upper wall of said wind-channel being of curved configuration opening in the downstream direction.

8. A mouthpiece for a wind instrument having a sound-column tube with closable openings to vary the effective length thereof for providing the desired pitch;

said mouthpiece provided with a bore communicating with said tube;

the mouthpiece being provided with walls defining a wind-channel formed at an angle to the said bore of the mouthpiece;

the upper wall of said wind-channel being of curved configuration opening in the downstream direction and having its central portion slightly upstream of the downstream end of the lower wall but its sides slightly downstream with respect thereto.

9. A wind instrument having a sound-column tube with closable openings to vary the effective length thereof for providing the desired pitch;

75 providing the desired pitch;

5

a mouthpiece;
 the mouthpiece and said tube being relatively movable axially to obtain sliding variation of pitch;
 a cylindrical member secured to said mouthpiece;
 and pin and elongated-slot means provided by said tube and said cylindrical member limiting relative movement of the tube and cylindrical member, the pin providing an abutment lug extending transverse to the axis of the tube and the said cylindrical member.
 10. A wind instrument having a sound-column tube with closable openings to vary the effective length thereof for providing the desired pitch;
 telescoping sections providing variation of effective tube-length;
 the junction of the telescoping sections being covered by a generally cylindrical barrel;
 one end-portion of said barrel fitting one of said telescoping sections;
 the other end-portion of said barrel loosely receiving the other of said telescoping sections;
 the barrel and said other telescoping section having cooperating abutment means limiting said telescoping movement;

6

the telescoping sections being freely movable to obtain the said variation in pitch by selective and relatively-free adjustment of overall instrument length.

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