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SECONDARY REGISTER HOLE FOR CLARINETS

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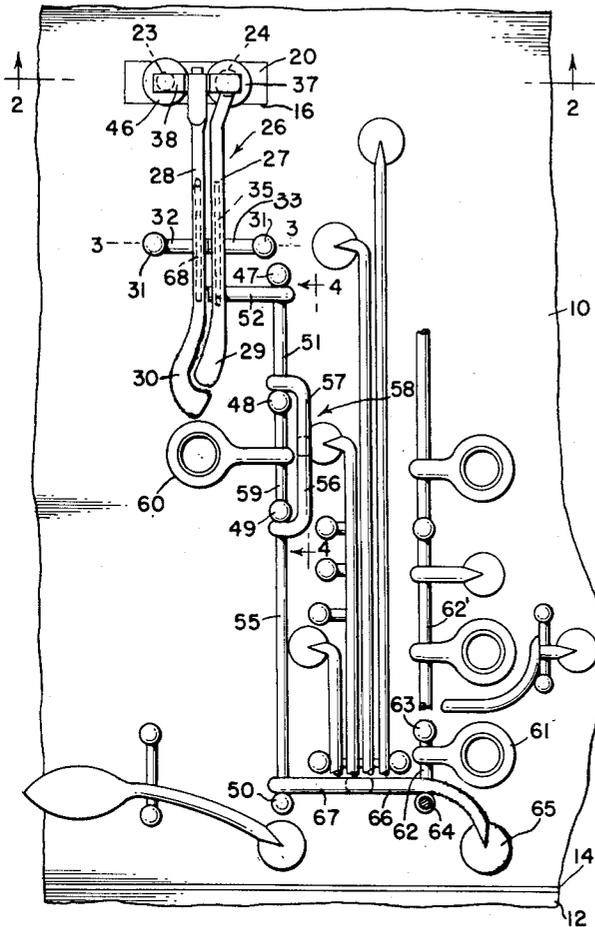


FIG. 1.

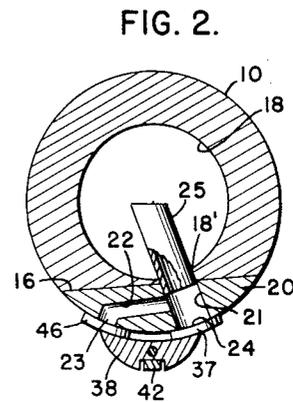


FIG. 2.

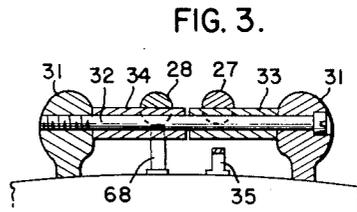


FIG. 3.

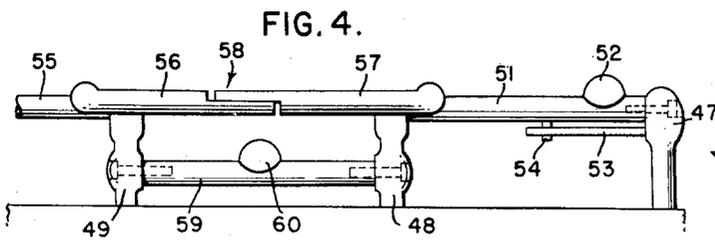


FIG. 4.

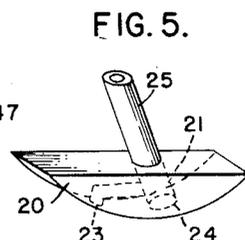


FIG. 5.

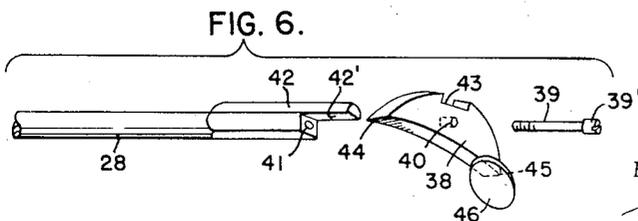


FIG. 6.

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2,951,414

**SECONDARY REGISTER HOLE FOR CLARINETS**

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14 Claims. (Cl. 84—382)

This invention relates to the class of musical instruments and is directed particularly to improvements in clarinets, i.e. specifically Boehm system clarinets.

In playing a clarinet a particular problem with which the player is concerned, more than any other relating to a structural shortcoming of the instrument, has to do with lip pressure fluctuation for effecting the correct production of certain tones. The playing of the conventional Boehm system clarinet requires considerable lip pressure fluctuation for correctly producing, in correct pitch the tones A, A#, B and C, just above the staff.

It is accordingly a particular object of the present invention to provide a means whereby these tones may be produced by the player while he is using normal lip pressure.

Another object is to provide, in a manner as hereinafter set forth, a novel improved key mechanism associated with the register or 12th key mechanism by which an outlet of a size smaller than the conventional size of the register key opening, may be opened to function exclusively when the said tones A, A#, B and C just above the staff are produced, to sound these tones in correct pitch without the player having to use other than normal lip pressure.

A still further object of the invention is to provide, in a manner as hereinafter set forth, a means of producing under normal lip pressure, correct pitch in the playing of a Boehm system clarinet and in the tones A, A#, B and C just above the staff, by provision of a second register hole of a size smaller than the size of the conventional register hole, with key mechanism operable with, or separately from, the mechanism conventionally employed for opening the regular 12th or register hole, whereby when the smaller hole is opened the stated tones may be correctly produced and when both register holes are open the maximum register outlet is had which is required for playing the 3rd line B flat in correct tune.

Other objects and advantages of the invention will become apparent as the description of the same proceeds and the invention will be best understood from the following detailed description taken in connection with the accompanying drawing forming a part of the present invention with the understanding that minor changes and modifications may be made in the construction so long as the same make no material departure from the salient features of the invention as expressed in the appended claims.

In the drawing:

Figure 1 is a flattened out plan view of a portion of the upper section of a Boehm system clarinet showing

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only that amount of the key mechanism necessary for an understanding by those versed in the art, of the improvement characterizing the present invention.

Figure 2 is a detail section on a slightly enlarged scale taken substantially on the line 2—2 of Figure 1.

Figure 3 is a sectional view taken substantially on the line 3—3 of Figure 1.

Figure 4 is a sectional view taken substantially on the line 4—4 of Figure 1.

Figure 5 is a view in perspective of the insert in the instrument body which carries the large and small outlets and tubes communicating therewith.

Figure 6 is an exploded view of the elements attached to the end of the actuating key lever.

Referring now more particularly to the drawing the numeral 10 generally designates a portion of the upper key carrying section of a sectional clarinet of the Boehm type, while the lower portion of the upper section is designated 12. In this sectional instrument wherein the upper and lower key carrying sections are coupled by a center joint tenon and socket, the joint here designated 14, may be and preferably is, reversed from the conventional arrangement as shown and described in my application Serial Number 420,147, allowed October 4, 1956, now Patent Number 2,791,145.

However, the invention is also applicable to a clarinet not having the separable center joint, and accordingly it is to be understood that the invention is not limited to use on any one type or style of instrument construction.

In accordance with the invention the wall or body of the section 10 has formed thereacross through the area in which is located the conventional single opening for playing those tones requiring an open register or 12th, a recess or slot 16 from the bottom of which leads into the bore 18 of the instrument the opening 18'.

In the recess 16 is fitted a sector shaped insert body 20 which is of proper shape to close the recess and restore the exterior form or configuration to the instrument.

The insert body has a radial passage 21 therethrough with which connects in the insert body one end of a smaller passage 22, the other end of which opens through the arcuate outer surface of the insert body and provides the auxiliary or secondary register outlet for opening 23.

The outer end of the radial larger passage 21 forms the primary register outlet or opening 24.

The inner end of the passage 21 has connected therewith one end of a short tube 25, which is fixed to the insert and, when the insert is fitted and secured in the recess, projects through opening 18' into the bore 18 and terminates therein and communicates therewith at approximately the axial center thereof.

The register key of the present invention for opening and closing the primary and secondary register openings, is a two part or dual key mechanism which is generally designated by the reference number 26.

The mechanism embodies two juxtaposed parallel first and second levers or lever arms 27 and 28, which extend longitudinally of the instrument and carry on their lower ends, that is the ends thereof directed toward the joint 14 or lower end of the instrument, the respective first and second heads 29 and 30, which are interfitted one into the other as shown to facilitate simultaneous finger actuation.

These levers 27 and 28 lie between two posts 31 which

support between them the hinge screw 32 which in turn has rockably mounted thereon the two independently movable rocker hinge rods 33 and 34 to which are fixed respectively the levers 27 and 28.

There is mounted in the conventional manner on the underside of the lever arm 27, the conventional flat spring 35 which, as is known to those versed in the art, has one end secured to the lever arm while the other end presses against the body 10 of the instrument and this spring is properly located so as to urge the arm 27 and hinge rod 33 to turn in a direction to move the upper end of the arm 27 away from the instrument body.

The upper end of lever arm 27 carries a key pad 37 which overlies and normally closes the primary register opening 24. This pad is normally held in closed position, in the manner, or by the means, hereinafter set forth, even though spring 35 urges the arm in a direction to open the register hole.

The upper end of lever arm 28 has disposed across the flat end face thereof a rocker bar 38 which is held in position thereon for slight rocking movement on an axis extending longitudinally of the arm by a pin 39 which passes through an opening 40 in the bar and has an end threaded in a bore 41 in the end of the arm 28. The head 39' holds the rocker bar from slipping off, but permits it to rock.

Secured to the top of the arm 28 and extending longitudinally and beyond the end thereof is a rocker bar movement limiting finger 42 which has a flat under face 42' lying loosely in a squared seat 43. Enough play or looseness is allowed between the face 42' and the seat to permit slight rocking of the bar 38 on the pin 39.

One end 44 of the rocker bar extends across and engages the top of the lever arm 27 over the pad 37.

The other end 45 of the bar 38 has attached to the underside the auxiliary key pad 46, which is positioned to close the auxiliary register hole 23.

On the side of the mechanism 26, adjacent to the lever arm 27 is a row of spaced posts designated 47, 48, 49 and 50. These are conventional knobbed posts, the upper one 47 being single knobbed and the adjacent central ones 48 and 49 having two knobs as shown in Figure 4.

Between the knob of post 47 and the top knob of post 48 is rockably mounted the pivot rod 51, which carries the laterally extending finger 52, the end of which lies under and engages the lever arm 27 below the hinge rod 33, that is, upon the side of hinge rod 33 away from the key pad 37.

Under the pivot rod 51 and mounted on the post 47 is the conventional type spring 53. The spring 53 engages the side of the pin 54 to urge turning of the pivot rod in a direction to push the outer end of the finger 52 upward against the under side of lever 27. The strength of spring 53 is greater than that of spring 35, which, as above stated, constantly urges the arm 27 to move in a direction to lift the key pad 37 and open register hole 24. The spring 53, therefore, maintains the key pad 37 in closed position over the primary register hole 24 even though the head 30 of the arm 28 may be depressed. However when the pivot rod 51 is rocked by the key mechanism hereinafter described so as to swing the finger 52 away from arm 27, while the arm 28 is rocked by depression of the head 30 to raise the bar 38 and the pad 46, then the spring 35 will be free to rock arm 27 to lift the pad 37 and open the primary register hole 24.

Between the top knob of post 49 and post 50 is mounted in conventional fashion, the pivot rod 55. This pivot rod 55 and the pivot rod 51 are operatively coupled by the sections 56 and 57 of a bridge, generally designated 58. The section 56 is attached to pivot rod 55 and

the free end thereof underlies the free end of section 57 which is attached to pivot rod 51.

The bottom knobs of posts 48 and 49 carry the pivot rod 59 which has attached thereto the ring key 60.

Ring key 61 which is actuated by the third finger of the left hand in playing the instrument, is attached to the short pivot rod 62 which lies below the pivot rod 62' and is mounted between the post 63 and the lower knob of the double knobbed post 64.

Also attached to the short pivot rod 62 is the key pad 65 and the finger 66. This finger 66 is directed transversely of the instrument toward the pivot rod 55, and has its free end located beneath the free end of the oppositely directed finger 67, attached to the pivot rod 55.

The hinge rod 34, and lever arm 28 carried thereby, are influenced, like the hinge rod 33 and lever arm 27, by a spring 68 which urges them to move or turn in one direction. This spring 68 is a conventional flat spring which is secured at one end to the underside of the lever arm 28 and has its other, or free end, bearing against the body of the instrument and this spring 68 is properly located so as to urge the upper end of the lever arm 28, toward the instrument body, that is in a direction to keep the key pad 46 closed over the auxiliary register hole 23.

This spring 68 is of sufficient strength to overpower spring 35 and thus, even though finger 52 may be lowered or moved away from lever arm 27, if key 30 is not depressed to lift auxiliary pad to uncover auxiliary register hole 23, spring 35 cannot move the lever arm 27 and cause the primary register hole to be uncovered.

By depressing key head 30 the rocker bar carrying auxiliary key pad 46 will be raised, thus opening or uncovering the auxiliary register hole 23. By opening of this smaller auxiliary hole the notes or tones A, A#, B and C, just above the staff, can be played in proper pitch. This outlet or hole functions exclusively for playing these tones in correct pitch.

The larger register hole 24 is opened for playing all other tones that require an open register or 12th. By depressing ring key 61 with the third finger of the left hand while key 30 is depressed, the finger 66 raises finger 67 to turn shaft 55. This operates through the bridge 58 to release the pressure of finger 52 from the lever arm 27. As lever arm 28 is already moved so that the spring 68 is not effective to hold the rocker bar down on the key pad carrying end of arm 27, spring 35 is now free to oscillate hinge rod 33 and raise key pad 37 from primary register hole 24.

In addition to making possible the improving of the four tones above mentioned, the use of the auxiliary register hole also brings into correct tune the high "D" as produced when trilling "C, D" and "C#" as when trilling "B" and "C#."

As previously stated the bar 38 has slight rocking movement on the pin 39. This is to assure ample pressure simultaneously by the pads 37 and 46 against the outlets 23 and 24.

The bridge 58 is used in preference to the employment of a straight pivot rod extending from post 47 to post 50, to avoid interfering with, or avoid interference from, the thumb which covers hole and ring 60.

In producing 3rd line B flat it is necessary that the heads 29 and 30 be depressed simultaneously.

The primary hole opening 24, inside bore, is of correct size for producing tone B flat, 3rd line in tune and this is the same as conventional. When this B flat is produced a small amount of sound may pass out through the smaller secondary outlet 23. However, this will not matter. In other words the large, or primary, hole 24 is of conventional size throughout. The fact that the secondary outlet 23 is also open when playing B flat,

3rd line, is of no consequence as the hole, or outlet, 24 can carry the necessary tonal outlet by itself.

While there has been illustrated and described the sector shaped insert piece 20, having the primary and auxiliary register holes therein and having the tube 25 forming a communicating passage between the same and the bore of the instrument, it is to be understood that the invention is not necessarily limited to this construction as any other suitable means which may be employed to accomplish the objects of the invention comes within the purview of the same as claimed.

I claim:

1. In a "Boehm" system clarinet, a primary and secondary register hole, the secondary hole being of smaller size than the primary hole, said holes being located in a common plane normal to the axis of the body of the instrument and when open together providing the maximum register outlet required for playing the 3rd line B flat in correct tone and the smaller size secondary register hole being of such size that when open alone it provides a means of producing under normal lip pressure and in correct pitch the tones A, A#, B and C, just above the staff and key mechanism for selectively opening said holes.

2. A "Boehm" system clarinet having a conventional register or 12th hole and key and a secondary register hole of materially smaller size than the said conventional hole and key therefor, the said register holes being located in a common plane normal to the axis of the body of the instrument, said secondary hole key being operable to open the secondary register hole only for effecting the production under normal lip pressure and in correct pitch the tones, A, A#, B and C just above the staff.

3. The improved means whereby the tones A, A#, B and C just above the staff, may be produced in correct pitch under normal lip pressure in playing of a "Boehm" system clarinet, said means comprising providing the clarinet with a second register hole of smaller size than and adjacent to the conventional register hole, said second register hole and conventional hole lying in a plane normal to the axis of the instrument, a key pad for closing the same, and a key for effecting the opening of the second hole.

4. The invention according to claim 3, with means connecting the said key pad for the second hole with the conventional key pad for the conventional register hole and holding the conventional register hole pad in closed position, spring means connected with the conventional register hole pad and biased to urge opening of the register hole pad, and spring means of greater strength than the first spring means connected with the second hole key pad and holding both key pads closed and finger actuated means operatively coupled with the conventional key which is provided for the opening of the conventional register hole whereby the said conventional key is held against movement by the first mentioned spring when the key for the second hole is depressed for effecting the opening of the second hole.

5. In a "Boehm" system clarinet, a first 12th or register hole of conventional size leading through the body of the instrument into the bore thereof, a second hole of smaller size communicating in the body of the instrument with the first hole, a pair of juxtaposed lever arms supported for independent rocking movement, said lever arms having heads formed and positioned so that they may be separately or simultaneously engaged by a player's finger to effect simultaneous or independent rocking movement of said arms, a pad carried by a first arm of the pair for closing the first hole, a member carried by the second arm and removably engaging the first arm, a pad carried by said member for closing the second hole, spring means connected with the first arm and biased to urge rocking of the latter in a direction to move the first named pad from the first hole, and spring means connected with the

second arm and biased to urge rocking of the second arm in a direction to maintain the second named pad in closed position over the second hole, the second spring being stronger than the first spring and through said member holding the first pad closed against the action of the first spring.

6. The invention according to claim 5, wherein said member comprises a short bar mounted midway of its ends on the second lever arm for limited turning movement on an axis extending longitudinally of the arm, one end of the bar extending across the first arm for the said removable engagement therewith, the second named pad being attached to the other end of the bar.

7. The invention according to claim 5, wherein said first and second holes are in an insert in the body of the instrument.

8. The invention according to claim 5, wherein the body of the instrument through a portion thereof in which the first and second holes are formed, is in the form of a separate inserted member.

9. The invention according to claim 5, wherein the body of the instrument through a portion thereof in which the first and second holes are formed, is in the form of a separate inserted member, and a tube secured at one end in the inner end of the first hole and terminating at its other end approximately at the axial center of the instrument bore.

10. The invention according to claim 5, with a pivot rod at one side of and parallel with the first arm, a finger carried by the pivot rod and having an end engaged against the underside of the first lever arm on the side of the pivot thereof remote from the first pad, spring means connected with the pivot rod and biased to urge the turning of the pivot rod in a direction to urge said finger end against the underside of the first lever arm, the last named spring means being stronger than the spring means connected with the first arm whereby to maintain the first pad closed over the first register hole when the second arm is actuated to open the second hole, and means operatively coupling said pivot rod with that key ring which is actuated by the third finger of the left hand for effecting turning of the pivot rod in a direction to disengage the finger end from the first lever arm when the key ring is pressed whereby to permit the first spring to move the first arm and open the first register hole when the second register hole is open.

11. In a wood-wind instrument of the class described wherein there is a register hole together with a covering pad and a register hole key for actuating the pad, spring means connected with said key and biased to urge movement of the key in a direction to open the register hole, a secondary register hole adjacent to the first hole and located in a common plane therewith normal to the axis of the instrument, a key and key pad attached thereto for closing the secondary hole, spring means urging movement of the secondary hole key to hole closing position, an element separably coupling the secondary hole key with the register hole key, the spring means for the secondary hole key being stronger than the first spring means and through said coupling element holding the register hole key in hole closed position, said secondary hole key when depressed to open the secondary hole disengaging said coupling element from the register hole key, and finger operated means for releasably holding the register hole key against opening movement by the first mentioned spring when the secondary hole key is depressed.

12. In a wind instrument of the type having an octave key, a single air conduit opening into the bore of the instrument and means forming two air passageways having outer ends opening upon the outside of the instrument and both joining said single air conduit for communication therethrough with the bore, one of said two air passageways being of smaller size than the other, key

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pads for closing the air passageways, and two key members operatively coupled with and adapted for selectively moving said pads for opening said air passageways.

13. The invention according to claim 12, wherein said single air conduit comprises in part a tube having one end located at approximately the axial center of the instrument bore.

14. The invention according to claim 12, wherein said operative coupling of the key means with the pads comprises a short bar member extending between and overlying said outer ends of the air passageways, the key pad closing the outer end of the smaller passageway being attached to said bar member, one of said key members being attached to said bar member at a location between

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the said outer ends of the passageways and adapted to raise the bar member and only the pad attached thereto, and the other key pad lying beneath said bar member and having the other key member attached thereto.

References Cited in the file of this patent

UNITED STATES PATENTS

706,557	Heckel -----	Aug. 12, 1902
2,133,625	Loomis -----	Oct. 8, 1938

FOREIGN PATENTS

765,070	France -----	Mar. 19, 1934
505,835	Great Britain -----	May 12, 1939