E. E. HARVARD.

FINGERING MECHANISM FOR WIND INSTRUMENTS.

APPLICATION FILED OCT. 27, 1917.

1,332,336.

Patented Mar. 2, 1920.

2 SHEETS—SHEET 1.

Fig. 1.

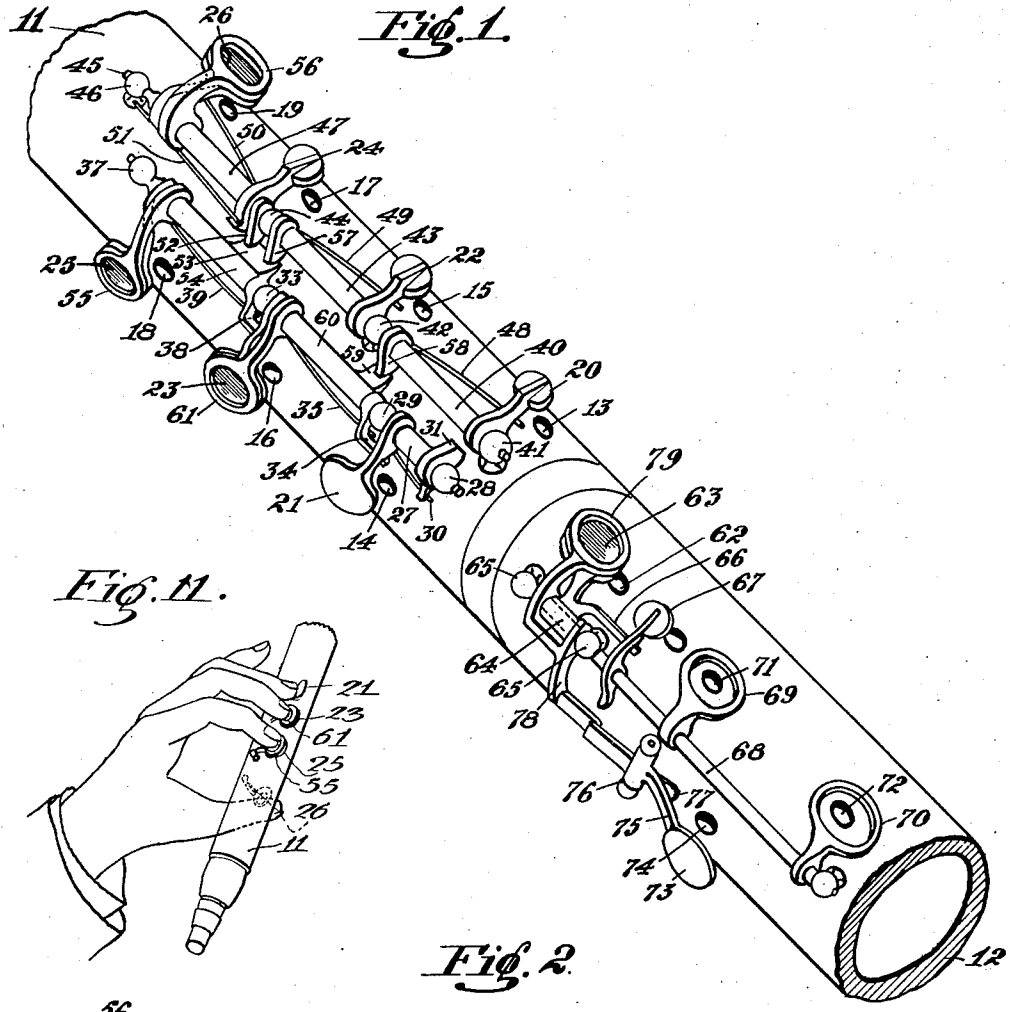
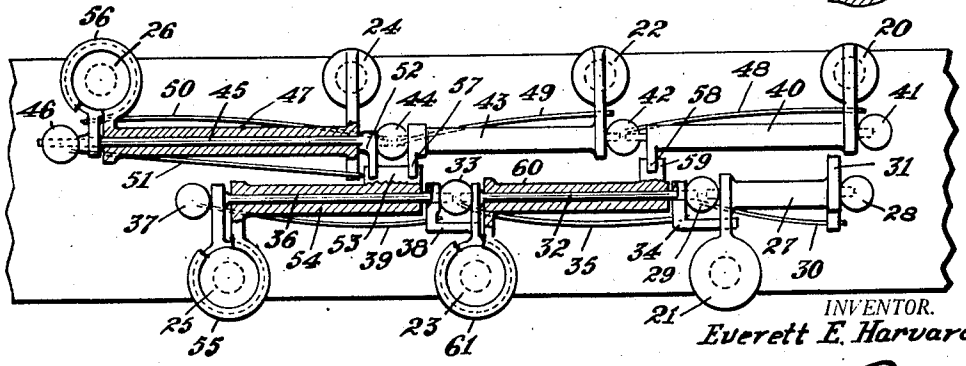


Fig. 11.

Fig. 2.



INVENTOR.

Everett E. Harvard;

BY R. L. Berry

ATTORNEY.

E. E. HARVARD.

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2 SHEETS—SHEET 2.

Fig. 3.

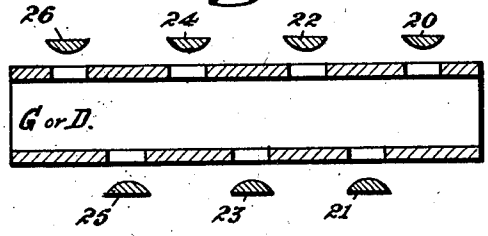


Fig. 4.

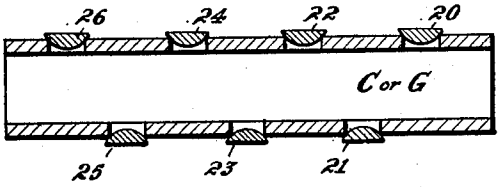


Fig. 5.

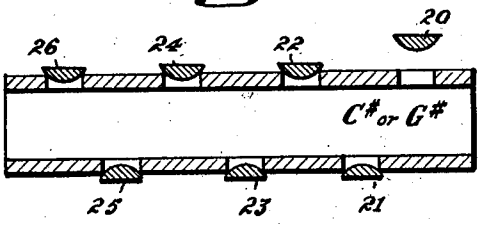


Fig. 6.

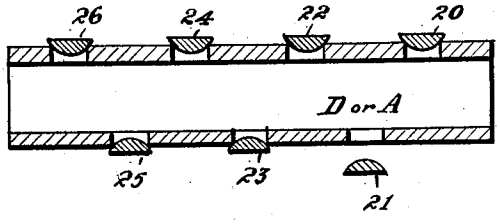


Fig. 7.

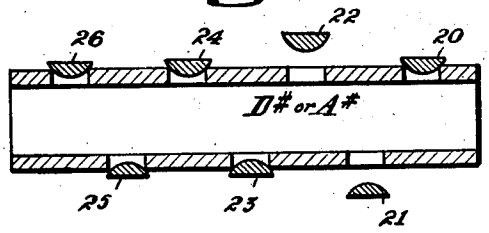


Fig. 8.

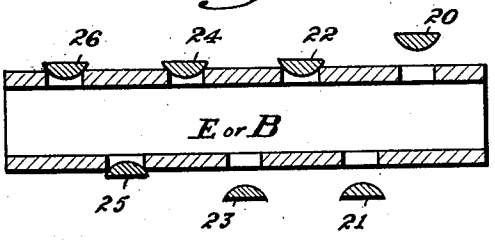


Fig. 9.

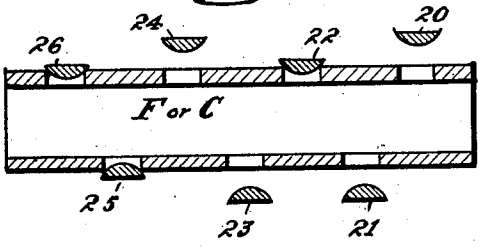
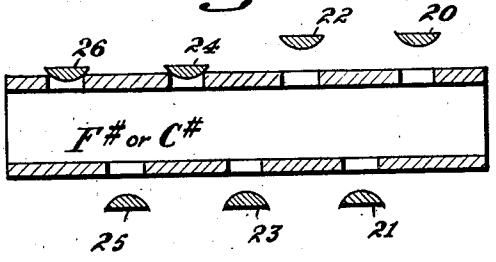


Fig. 10.



INVENTOR.

Everett E. Harvard

BY

R. S. Bassett

ATTORNEY.

UNITED STATES PATENT OFFICE.

EVERETT E. HARVARD, OF LOS ANGELES, CALIFORNIA.

FINGERING MECHANISM FOR WIND INSTRUMENTS.

1,332,336. Specification of Letters Patent. Patented Mar. 2, 1920.

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To all whom it may concern:

Be it known that I, EVERETT E. HARVARD, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Fingering Mechanism for Wind Instruments, of which the following is a specification.

This invention relates to an instrument key, and particularly pertains to improvements in key construction for musical instruments of the clarinet type.

In the present key system of clarinets, particularly the Albert system, difficulty is encountered in fingering the intermediate keys employed for producing the notes B flat, C sharp, D sharp and F, and the corresponding keys in the harmonic scale, namely: G sharp, A sharp and C, especially in playing fast passages. This is occasioned by an inconvenient arrangement of the key operating levers and the necessity of having to shift the fingers from position in order to depress the intermediate key levers.

It is the object of this invention to provide a construction and arrangement whereby lifting of the fingers will effect operation of the before mentioned intermediate keys, by which the intermediate keys now generally employed may be dispensed with, and by which the necessity of depressing a key lever to play any of the above named notes is obviated.

Another object is to provide a simplified fingering in instruments of the above character which facilitates the execution of fast passages and insures against getting out of position.

Other objects will appear hereinafter.

The invention is illustrated in the accompanying drawings, in which:

Figure 1 is a perspective view illustrating a portion of a clarinet showing the invention as applied.

Fig. 2 is a view in horizontal section and plan with parts broken away showing the manner of mounting and arranging the keys on the upper tube section.

Figs. 3, 4, 5, 6, 7, 8, 9 and 10 are diagrams illustrating the relative positions of the keys on the upper section in playing the various notes.

Fig. 11 is a perspective view illustrating the manner of positioning the fingers of the left hand on the instrument.

More specifically 11 indicates the upper tube section and 12 the lower section connected to the tube 11 by the usual slip joint.

In carrying out my invention, the tube 11 is formed with a double row of note openings arranged with the openings in one row disposed in staggered relation to the openings in the other row. These note openings are designated in the drawings progressively in the order in which they are opened in playing notes chromatically as 13, 14, 15, 16, 17, 18, and 19. The openings are adapted to be manually closed by the thumb and first three fingers of the left hand acting on mechanism controlling normally open covers 20, 21, 22, 23, 24, 25, and 26 which are mounted and arranged to operate in such manner that opening of either of these covers will be effected by lifting the thumb or fingers and not by depression or pressure of the thumb or fingers, the entire set of seven covers being controlled by the thumb and three fingers without change of position. In effecting this result I employ the following construction:

Cover 21 is mounted on a rock-shaft 27 pivoted in bearings 28 and 29 and acted on by a spring 30 to normally maintain the cover in its open position; a stop 31 on the rock shaft limiting the upward movement of the cover. Cover 23 is mounted on a rock-shaft 32 pivoted in the bearing 29 and a bearing 33 which rock-shaft carries a finger 34 rigid thereon and projecting beneath the cover so that on depression of cover 21, cover 23 will also be depressed. A spring 35 normally maintains cover 23 in its uppermost position. Cover 25 is mounted on a rock-shaft 36 pivoted in bearing 33 and a bearing 37 and has a finger 38 rigid thereon extending beneath the cover 23 so that depression of cover 23 or cover 21 will effect depression of cover 25. A spring 39 normally maintains cover 25 in its open position. The covers 21, 23, and 25 are thus normally held open and interconnected in such manner that when the third finger bears on the cover 21 and depresses same, the first and second fingers may be raised from covers 25 and 23 without opening same, yet on releasing covers 21, 23, and 25 successively they will open progressively, and on depressing covers 25, 23, and 21 they will close progressively in the order named.

Cover 20 is mounted on a rock-shaft 40 pivoted in bearings 41 and 42; cover 22 is mounted on a rock-shaft 43 pivoted in the

bearing 42 and a bearing 44; cover 26 is mounted on a rock-shaft 45 pivoted in the bearing 44 and a bearing 46; and cover 24 is mounted on a sleeve 47 turnable on the rock-shaft 45. Springs 48, 49, 50 and 51 normally maintain the covers 20, 22, 26 and 24 respectively in their open positions. Mounted on the rock-shaft 45 carrying the cover 26 is an arm 52 which extends over a flange 53 on a sleeve 54 turnable on the rock-shaft 36 carrying the cover 25. The sleeve 54 is fitted with a ring 55 which extends over the cover 25 in such manner that on depression of ring 55 with the forefinger, sleeve 54 will be rocked and will operate through flange 53 and arm 52 to turn the rock shaft 45 and close cover 26, so that opening of cover 26 will be effected when playing by lifting the forefinger. The sleeve 47 carrying cover 24 is provided with a ring 56 arranged above cover 26 in such manner that when ring 56 is depressed by the thumb, cover 24 will be closed and opening of cover 24 will be effected by lifting the thumb from the ring 56 while the cover 26 is held closed by the forefinger. The rock-shaft 43 carrying cover 22 is provided with an arm 57 which extends over the flange 53 so that cover 22 will be held closed when the ring 55 is depressed by the forefinger and will be opened when the forefinger is lifted. Shaft 40 carrying cover 20 is fitted with an arm 58 which extends over a flange 59 on a sleeve 60 turnable on the rock-shaft 32 and which sleeve carries a ring 61 extending over cover 23 so that when cover 23 is depressed by the second finger cover 20 will be held closed and will open on lifting the second finger.

From the foregoing it will be seen that the seven successive note openings will be controlled by the thumb and first three fingers of the left hand and the various notes played by raising the thumb or finger to permit opening the desired cover by spring action.

The operation of the cover system and the manner of producing various notes will be better understood on referring to Figs. 3 to 10 inclusive of the drawings in which Fig. 3 shows the covers in their normal open position which by reason of the highest cover 26 being open would on playing the instrument produce the note G. On disposing the first two fingers on and depressing rings 55 and 61 and their companion covers 25 and 23, depressing cover 21 with the third finger, and depressing ring 56 and cover 26 with the thumb these covers and the remaining covers 20, 22 and 24 will be closed as shown in Fig. 4. Middle C can then be played if the highest opening 62 on the lower tube section is open. As the highest open note opening on the tube governs the note played, successive opening of the covers 20 to 26 inclusive will produce the notes chromatically from C-sharp to G inclusive and in the same order on opening of the harmonic key, not shown, from G to D inclusive. As the operation is the same in both groups it is only necessary to explain the operation of the first group which is as follows:

The covers being closed as shown in Fig. 4, the note C-natural can be played.

To play C-sharp, cover 20 is opened as shown in Fig. 5 by raising the second finger to release ring 61, the cover 23 under ring 61 remaining closed by reason of cover 21 being depressed as before described.

To play the note D, cover 21 is opened by lifting the third finger therefrom while the remaining covers are held closed as shown in Fig. 6.

The note D-sharp is played by lifting the first finger from ring 55 causing cover 22 to open as shown in Fig. 7.

The note E is played by raising the second and third fingers from ring 61 and cover 21 to permit cover 23 to open as shown in Fig. 8.

The note F is played by opening cover 24 as indicated in Fig. 9 which is effected by removing the thumb from ring 56.

The note F-sharp is played by removing the three fingers from cover 21 and rings 61 and 65 to open cover 25 as indicated in Fig. 10.

On releasing all the rings 61, 65 and 56, and cover 21, the covers 20, 21, 22, 23, 24, 25, and 26 will be restored to their normal open position as shown in Fig. 3.

In further carrying out my fingering mechanism, I provide means on the lower tube section for playing the note B-flat without depressing the usual lever and by raising the forefinger from the C cover 63. To accomplish this the cover 63 is mounted on a sleeve 64 turnable on a shaft supported by bearings 65 which sleeve is fitted with an arm 66 extending below the usual tuning cover 67 on a rock-shaft 68 carrying rings 69 and 70 encircling note openings 71 and 72. A new cover 73 is provided for closing the B-flat opening 74 which cover 73 is mounted on a lever 75 pivoted at 76 fitted with a spring 77 by which the cover 73 is normally held in an open position. Pivoted between the bearings 65 independent of the sleeve 64 is a lever 78 one end of which extends beneath the outer end of the lever 75 the opposite end of which is fitted with a ring 79 extending over the cover 63. The operation of the covers just described is as follows:

On depressing either of the rings 69 and 70 the cover 63 will be depressed whereupon the ring 79 may be depressed by the first finger to close the cover 73. It follows that when it is desired to play B-flat the note

controlled by the cover 73, the forefinger is lifted from the ring 79. The cover 63 may be operated independent of the covers 67, 69 and 70.

As the fingers are normally disposed opposite the covers, the proper position is readily maintained and the execution of rapid passages is facilitated.

While I have shown and described a specific embodiment of my invention, it is manifest that various changes may be made in the details of construction without departing from the spirit of the invention as set forth in the appended claims.

I claim—

1. In a fingering mechanism for wind instruments of the clarinet type having C-sharp, D, D-sharp, E, F, F-sharp and G openings, normally open covers over said openings, and means whereby all of said covers may be held closed by pressure of the thumb and first three fingers and whereby each and all of said covers may be opened selectively by releasing pressure of the thumb and fingers without shifting the hand.

2. In a fingering mechanism for wind instruments of the clarinet type, a series of seven normally open covers, and means whereby said covers may be closed and controlled selectively by the thumb and first three fingers of one hand without shifting the hand.

3. In a fingering mechanism for wind instruments of the clarinet type having a series of openings, normally open covers for said openings, means whereby direct depression and closing of one of said covers will effect closing of another, and means extending over the last named cover and operable independently thereof when said cover is closed for closing another normally open cover.

4. In a fingering mechanism for wind instruments having a series of openings; normally open covers 20, 21, and 23; means whereby direct closing of cover 21 will close cover 23; and means extending over cover 23 operable independently of said cover when the latter is closed to close cover 20.

5. A fingering mechanism for wind instruments comprising a row of normally open covers 21, 23, and 25; separate rock-shafts 27, 32, and 36 on which said covers are mounted; fingers on the rock-shafts 32 and 36 extending beneath the covers 21 and 23 whereby depression of either cover 21 or 23 will close cover 25 and depression of cover 21 will close both covers 23 and 25; a second row of normally open covers 20, 22, 24, and 26; rock-shafts 40, 43, and 45 on which said covers 20, 22, and 26 are mounted; a sleeve 47 on rock-shaft 45 on which cover 24 is mounted; a projection on said sleeve extending over cover 26 adapted to be depressed by the thumb to close cover 24; a projection 61 extending over cover 23; means whereby depression of projection 61 will close cover 20; a projection 55 extending over cover 25; and means whereby depression of projection 55 will effect closing of covers 22 and 26.

6. In a fingering mechanism for wind instruments of the clarinet type, a series of normally open covers 23, 25 and 26; a row of normally open covers 20, 22, and 24; means extending over cover 23 for controlling cover 20; means extending over cover 25 for controlling cover 22; and means extending over cover 26 for controlling cover 24.

7. In a fingering mechanism for wind instruments of the clarinet type having E, F-sharp, and G openings; and C-sharp, D-sharp, and F openings; normally open covers over said E, F-sharp and G openings closable by the thumb and first two fingers; normally open covers over said C-sharp, D-sharp and F openings; and means extending over the covers for said E, F-sharp and G openings for controlling said C-sharp, D-sharp and F openings.

8. In a fingering mechanism for wind instruments, a normally open cover, a second normally open cover, a finger piece extending over said first named cover for closing said second cover either in conjunction with the first named cover in closing same or independently of said cover when it is closed, and means operable by a finger of the same hand adjacent to the finger controlling said finger piece for holding said first named cover closed.

9. In a fingering mechanism for wind instruments, a normally open cover, a second normally open cover, a finger piece extending over said first named cover for closing said second named cover either when closing said first named cover or operable independently of the latter when it is closed, and separate means arranged adjacent to said finger piece for holding said first named cover closed.

EVERETT E. HARVARD.