

An arm 76 is secured to this sleeve and is extended lengthwise of the body tube at one side of the sleeve, and into a position where it passes under the bowed rod 71 when the parts of the instrument are assembled. A spring 77 is mounted in the post 74 and engages a hook 78 on the sleeve 73, (Fig. 2), tending constantly to raise the arm 76. The finger 43 also extends in the same direction as arm 76, but on a different side of the instrument and projects between the instrument body and the semi-ring 66.

There is secured to the sleeve 73 an arm 79 carrying a bar which underlies an adjustable abutment on a bar 80 carried by an arm 81, to which is secured the cover of the C-sharp tone hole, (designated by the character C#.) This arm and cover turn freely about the same axis as sleeve 73. The C-natural tone hole cover, designated by the letter C in the drawing, carries a finger 82 which overlies the C-sharp cover, and is directly connected with the finger key marked 1L by an arm 83, a sleeve 84 and an arm 85.

The C-sharp cover is also overlaid by one arm of a lever 86, pivoted on the same axis as the sleeves 13, 18 and 84, and the other arm of said lever 86 is connected by a bridge rod 87 with a lever 88 carrying the finger key 2L. Either key 1L or 2L may be depressed to close the C-sharp key, and when this is done, the arm 76 is depressed.

In the operation of this mechanism, if the key 31 alone is depressed, the floating lever carrier 32, 33, 34 is raised, raising the pivot 35 of the floating lever 36 and turning said lever about the pin 39 as a fulcrum, because the lever 36 and arm 12 are held down by the spring 23, and the spring of cover A, either of which is strong enough for the purpose. This causes the finger 43 of the floating lever to be raised, (that is, moved away from the body within the meaning of the definition hereinbefore given, said finger being located at the under side of the body.) This action, being transmitted through the semi-ring 66 to the arms 60 and 61, depresses the fulcrum 59 and the left-hand arm of the floating lever 54, turning the latter about its pivot connection 56 with the lever 50, which is prevented from being moved owing to the resistance opposed by the finger 76. Thus the octave hole cover 8 is opened. But if either of the keys 1L or 2L is pressed upon before depression of key 31, the arm 76 is depressed, its support of the righthand arm of the floating lever is removed, and the depression of the floating lever pivot 59 then causes said lever to swing about the connection 55 as a fulcrum and depress the righthand arm of lever 50, raising the stopper 7. Or if either key 1L or 2L is pressed upon while key 31 is held depressed, the previously open octave hole

cover 8 is closed, and the previously closed cover 7 is opened. This order of opening the octave hole stoppers is due to the fact that the spring 68 exerts a stronger upward force on the lefthand arm of the floating lever 54 than on the righthand arm thereof, which in turn is due to the position of the spring and of the pivot 59 and abutment pin 70. Considering only the relation of the floating lever to the carrier, the spring tends to turn the lever about its carrier fulcrum 59 in right hand rotation.

If the finger key 3L is pressed upon before or while key 31 is depressed, the resistance to rise of the lower octave hole cover 6 is removed, while movement of the finger 43 of floating lever 36 is resisted by spring 68. Hence the floating lever arm 38 is raised, raising the octave hole cover 6 without opening either of the upper octave holes. But if key 3L is released while key 31 remains depressed, then the lower octave hole is closed and one or the other of the other octave holes is opened, according as either key 1L or 2L is depressed or not at that time.

It may be observed here that in Fig. 2 an inevitable inaccuracy exists in the relation between the finger 43 and the semi-ring 66. This inaccuracy occurs from the very nature of the case, because these members are on the under or rear side of the instrument and their rising movements are opposite, or substantially so, to the absolute direction of rising movement of the other parts. While, in this diagram, the arm 42 and finger 43 have been developed into a horizontal plane so as to indicate correctly their movements or rise and depression, the semi-ring 66 cannot be drawn in the same plane in correct relation to the other parts and therefore has been omitted from this figure.

The movements of the octave keys above described do not take place unless the thumb key 31 is depressed, and are not used in playing notes in the lower register. But when playing in the second (the middle) register, the key 31 is depressed, and if the notes played are below A, the key 3L is depressed also, causing the lower octave hole to be opened, and in passing from G-sharp to A, or any higher note, the key 3L is released and the lower octave hole is thereby closed. If such higher note is below C-sharp, then either the key 1L or 2L will be depressed and the octave hole cover 7 only will be opened; while if the higher note is C-sharp or above, the octave hole cover 8 only will be opened. These movements of the octave keys take place automatically by virtue of the manipulation of the keys which control the various tone holes.

It will have been noted that the means which supports the free arm of lever 50, and so causes the octave hole 8 to be opened when key 31 alone is depressed is a spring,