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PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improved Keys for Musical Wind Instruments

I, PETER SIMON PROLL, a citizen of the United States of America, of 246 Pomona Avenue, Newark 12, United States of America, do hereby declare the invention for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention has to do with keys for musical wind instruments, especially for toy musical instruments, in the nature of clarinets, saxaphones and numerous other types.

Such keys generally comprise a finger pad portion and a valve portion adapted to open and close an opening or tone port in the body of the instrument when the key is rocked about a central transverse pivot axis, the key being normally held in the port-closing position by a spring.

A conventional way of providing the aforedescribed structure is as follows. The apex portion of a separate V-shaped leaf spring is placed in a recess provided on the underside of the middle of each key. This sub-assembly is pressed against the body of the instrument and a long rod is then threaded through aligned holes in the keys to provide their pivot axis. The rod also passes through lugs on the instrument body and thus holds the keys in place on the instrument. This technique is quite expensive, since the various parts involved must be manufactured separately, and a considerable amount of labour time is needed to perform the assembly operation.

As compared with the conventional technique described above, the present invention allows of a considerable reduction in the number of parts which must be made separately and a significant simplification of the assembly operation.

The invention comprises a key for a musical wind instrument having a finger pad portion, a valve portion for closing a tone port in the instrument, an intermediate body portion connecting the finger pad and valve portions, and a resiliently flexible tongue extending from said intermediate body portion for restoring said key to tone port-closing position after operation thereof, said finger pad portion, valve portion, intermediate body portion and tongue being constituted by a single unitary moulding of a plastics material. Preferably, pivot pins for rockably supporting the key on the body of the instrument also form part of the same unitary moulding.

The invention also comprises an assembly unit comprising a plurality of such keys formed as a single unitary moulding and a musical instrument embodying at least one such key.

Particular embodiments of the invention are described below with reference to the accompanying drawing, in which:

Figure 1 is a top plan view of an instrument, namely, a toy clarinet, embodying the invention;

Figure 2 is a side elevational view thereof;

Figure 3 is an enlarged fragmentary section taken on line III—III of Figure 2;

Figure 4 is an enlarged fragmentary detail view taken on line IV—IV of Figure 2;

Figure 5 is a fragmentary front elevational detail of the key;

Fig. 6 is a side elevational detail view of a portion of the key-mounting structure, taken on line VI—VI of Figure 4;

Figure 7 is a fragmentary, detail front elevational view of a second form of key having two spring tongues;

Figure 8 is a bottom plan view of the key of Figure 7;

Figure 9 is a view similar to Figure 3 showing the key of Figures 7 and 8 mounted on the instrument; and

Figure 10 is a view showing an integral singleshot moulding of a number of keys, which can be used in assembling the keys to the body of the instrument.

The drawing shows the invention applied to a toy clarinet, but the invention can be applied to any desired musical wind instrument.

[*Price 4s. 6d.*]

Price 25p

The body 2 of the instrument is substantially a thin-walled cyclinder moulded as two separate arcuate shells 3, 4 secured together as by glueing. It will be understood that the internal structural details of the instrument body 2 are not necessary for an understanding of the present invention.

A left and right series of ports or openings 5 are provided respectively in portions 3 and 4 of the instrument body 2. Keys 6 are manipulated to control the opening and closing of ports 5 to produce different notes when the instrument is played.

Each key 6 comprises a central body portion 7 from which extend two downwardly sloping diverging arms 8, 9 respectively terminating in a valve member 11 adapted to seal off a port 5, and a recessed finger pad portion 12 adapted to be engaged by the finger of the player to operate the key. Oppositely directed pivot pins 13, 14 integral with the key extend transversely from central portion 7. A thin, resiliently flexible tongue 15 depends integrally from the underside of central portion 7. The entire aforedescribed integral key structure can readily be formed at low cost in one operation by conventional plastic moulding methods from any suitable synthetic material, for example, polyethylene, polystyrene, polypropylene, and so forth.

Each key 6 is mounted on the instrument body by structure to be described shortly. The normal position of each key is as shown in Figure 3. Tongue 15, whose condition as moulded is shown in Figure 5, is flexed against body 2 so that the tongue is stressed and normally holds the key's valve or port-control member 11 against port 5. When the key is operated by pressing down on finger-pad portion 12, it is rocked on its pivot pins 13, 14 to open the port. This operating rocking movement of the key increases the loading on the resilient tongue 15, causing it to bow downwardly, and the tongue will subsequently restore the key to normal position upon release thereof.

Resilient tongues 15 also aid in mounting the key on the instrument.

The mounting structure will now be described. It includes a series of integral upstanding projections 16 disposed between each adjacent pair of ports 5, on the body portions (3 or 4) containing the ports. As shown in Figures 4 and 6, each projection 16 includes an uppermost inwardly extending horizontal ledge 17, two vertical spaced inwardly extending ribs 18, and a narrow horizontal rib 19 spaced below ledge 17.

Along the upper edge of the other body half (3 or 4, as the case may be), opposite each projection 16 there is provided a confronting integral flat I-shaped lug 21 abutting ledge 17. The spaced abutting, co-operating pairs of projections 16 and I-lugs 21 provide downwardly directed mounting slots 22 (see particularly Figure 4) for receiving the key's pivot pins 13, 14. The ledge 17 forms the upper end of the slot, the opposed vertical faces of projections 16 and lugs 21 are the side walls of the slots and the horizontal outwardly opening notches 23 of each I-lug provide lateral, horizontal access to the mounting slots.

To assemble a key 6 to the instrument body 2, all that need be done is press the key against the body to flex its spring tongue 15, horizontally align its pivot pins 13, 14 with the central facing notches 23 of an adjacent pair of I-lugs 21, and push the pins inwardly through notches 23 until they are in vertical alignment with the vertical mounting slots 22. The key is then moved upwardly, aided by the upward bias of resilient spring tongue 15 to snap the pivot pins past narrow ribs 19 into engagement with the under face of ledge 17. The key is thus now assembled to the instrument body. Any tendency of the pivot pins 13, 14 to drop out of mounted position in slot 22 is resisted by the upward bias of tongue 15. Further, ribs 19 act as stop means to hold and lock the pivot pins in slots 22, the diameters of the pivot pins being slightly greater than the distance between the ribs and the opposed, inner faces of lugs 21, as shown in Figure 4. The pivot pins are rotatably supported in the above described mounting structure of the instrument. Being integral with the key, the pins thus serve as means whereby the key is rockably supported.

As described earlier, when the instrument is played, the resilient tongues 15 will also function to return the keys after they are operated, i.e. rocking them back to home position after they have been operated.

Figures 7, 8 and 9 show a second form of the key in accordance with the invention. Here, in addition to the afore-described resilient tongue 15, the key is provided with a second integral resilient tongue 25 of lesser length. The two depending parallel tongues are spaced from each other on opposite sides of pivot pins 13, 14. The key of Figure 7—9 is mounted on the instrument body in exactly the same way as the key of Figures 1—6. The second tongue 25 functions like, and in addition to, tongue 15, to push the entire key upwardly to hold it mounted on the instrument and also to normalize the key after operation thereof. However, the second tongue 25 is flexed and bowed against the first tongue 15 rather than directly against the instrument body.

Figure 10 shows an arrangement in which a number of the keys, four for example are fabricated, i.e. moulded, integral with a connecting bar or strip 30 which supports the keys. As shown, strips 30 join the lower free ends of the longer tongues 15 of the two tongue form of figures 7—9. The unit of Figure 10 can be used to lessen considerably the assembly time required to mount the keys on the instrument body. The four-key unit of

Figure 10 is placed against the instrument body's mounting structure with the pivot pins 13, 14 of the key properly aligned with the mounting slots 22. The pins are then mounted by being pressed into the slots as described before. Then, the excess portions of strip 30 between adjacent keys are removed. It will be understood that the connecting strip arrangement of Figure 10 can also be with the single tongue key of Figure 5.

It will be understood that numerous changes in form, proportion, size, and other details can be made to the specific embodiments of the invention herein disclosed, within the scope of the following claims.

WHAT WE CLAIM IS:—

1. A key for a musical wind instrument having a finger pad portion, a valve portion for closing a tone port in the instrument, an intermediate body portion connecting the finger pad and valve portions, and a resilinetly flexible tongue extending from said intermediate body portion for restoring said key to tone port-closing position after operation thereof, said finger pad portion, valve portion, intermediate body portion and tongue being constituted by a single unitary moulding of a plastics material.

2. A key according to claim 1, wherein the unitary moulding comprises also means for mounting the key on the musical instrument.

3. A key according to claim 2, wherein the means for mounting the key on the musical instrument comprises a pair of pivot pins forming part of the unitary mounting moulding and projecting laterally from, and normal to, opposite sides of said intermediate body portion.

4. A key according to any of claims 1 to 3 wherein the unitary moulding comprises also a second resiliently flexible tongue, the tongues being bendable so that one overlies and bears upon the other.

5. A key according to claim 4 wherein the two tongues are of unequal lengths.

6. An assembly unit formed as a single unitary moulding of plastics material comprising a plurality of keys according to any of claims 1 to 5 and means interconnecting said keys.

7. An assembly unit according to claim 6 read as appended to claim 5, wherein the interconnecting means joins the ends of the longer of the two resilient tongues of each key remote from the intermediate portion thereof.

8. A musical wind instrument comprising a hollow body having at least one tone port therein, and a key according to any one of claims 1 to 5 mounted on the body for rocking movement relative thereto with the resilient tongue of the key held flexed and tensioned by contact with the body, so that the key is biased into a position in which its valve portion closes the tone port, but can be moved by pressure on its finger portion to open the port.

9. An instrument according to claim 8, in which the key is held mounted on the body by mounting means on the body which limit movement of the key away from the body and by the action of the resilient tongue which biases the key away from the body and against the mounting means.

10. An instrument according to claim 9, in which the mounting means on the body comprise a pair of members upstanding from the body at positions spaced apart longitudinally thereof and having axially aligned openings therein, the key having pivot pins extending from opposite sides of the intermediate portion of the key, which pins are aligned with and pivotally engaged in the openings.

11. An instrument according to claim 8, wherein the hollow body of the instrument comprises first and second concavo-convex longitudinally elongated shell members, each shell members having an upper edge and a lower edge, said shell members being joined together, upper edge to upper edge, and lower edge to lower edge, with their respective concave surfaces face to face and with the joined edges of said shell members meeting in a plane passing through the longitudinal axis of said hollow body; said first shell member having at least two longitudinally spaced upstanding members disposed along and adjacent to the upper edge of said member and having horizontal notches extending into the opposite upstanding edges thereof, said notches being generally parallel to the axis of said body; the second shell member having at least two longitudinally spaced upstanding members disposed along and adjacent to the upper edge thereof and in register with the upstanding members on said first shell member, said upstanding members on said second shell member having upper ledges projecting therefrom into contact with the adjacent face of an upstanding member on said first shell member, and a second ledge projecting from an intermediate position on each of said upstanding members between the upper ledge and the hollow body to form and partially close a mounting slot between the opposed upstanding members of the two adjacent shell members; and wherein the unitary key structure includes pivot pins extending from opposite sides of the intermediate portion thereof; said key being mounted in operative position with said pivot pins disposed in the mounting slots of mounting means disposed on opposite sides of the intermediate portion thereof; said pivot pins being retained in said mounting slots by the biasing force of said resilient tongue means and restraining force of said upper ledges, whereby the unitary key structure is retained in the mounting means without resort to separate locking means.

12. A musical wind instrument having keys for controlling the opening and closing of tone ports in the instrument which are constructed and arranged to operate substantially as herein described and as shown in the accompanying drawing.

Figure 10 is placed against the instrument body's mounting structure with the pivot pins 13, 14 of the key properly aligned with the mounting slots 22. The pins are then mounted by being pressed into the slots as described before. Then, the excess portions of strip 30 between adjacent keys are removed. It will be understood that the connecting strip arrangement of Figure 10 can also be with the single tongue key of Figure 5.

It will be understood that numerous changes in form, proportion, size, and other details can be made to the specific embodiments of the invention herein disclosed, within the scope of the following claims.

WHAT WE CLAIM IS:—

1. A key for a musical wind instrument having a finger pad portion, a valve portion for closing a tone port in the instrument, an intermediate body portion connecting the finger pad and valve portions, and a resilinetly flexible tongue extending from said intermediate body portion for restoring said key to tone port-closing position after operation thereof, said finger pad portion, valve portion, intermediate body portion and tongue being constituted by a single unitary moulding of a plastics material.

2. A key according to claim 1, wherein the unitary moulding comprises also means for mounting the key on the musical instrument.

3. A key according to claim 2, wherein the means for mounting the key on the musical instrument comprises a pair of pivot pins forming part of the unitary mounting moulding and projecting laterally from, and normal to, opposite sides of said intermediate body portion.

4. A key according to any of claims 1 to 3 wherein the unitary moulding comprises also a second resiliently flexible tongue, the tongues being bendable so that one overlies and bears upon the other.

5. A key according to claim 4 wherein the two tongues are of unequal lengths.

6. An assembly unit formed as a single unitary moulding of plastics material comprising a plurality of keys according to any of claims 1 to 5 and means interconnecting said keys.

7. An assembly unit according to claim 6 read as appended to claim 5, wherein the interconnecting means joins the ends of the longer of the two resilient tongues of each key remote from the intermediate portion thereof.

8. A musical wind instrument comprising a hollow body having at least one tone port therein, and a key according to any one of claims 1 to 5 mounted on the body for rocking movement relative thereto with the resilient tongue of the key held flexed and tensioned by contact with the body, so that the key is biased into a position in which its valve portion closes the tone port, but can be moved by pressure on its finger portion to open the port.

9. An instrument according to claim 8, in which the key is held mounted on the body by mounting means on the body which limit movement of the key away from the body and by the action of the resilient tongue which biases the key away from the body and against the mounting means.

10. An instrument according to claim 9, in which the mounting means on the body comprise a pair of members upstanding from the body at positions spaced apart longitudinally thereof and having axially aligned openings therein, the key having pivot pins extending from opposite sides of the intermediate portion of the key, which pins are aligned with and pivotally engaged in the openings.

11. An instrument according to claim 8, wherein the hollow body of the instrument comprises first and second concavo-convex longitudinally elongated shell members, each shell members having an upper edge and a lower edge, said shell members being joined together, upper edge to upper edge, and lower edge to lower edge, with their respective concave surfaces face to face and with the joined edges of said shell members meeting in a plane passing through the longitudinal axis of said hollow body; said first shell member having at least two longitudinally spaced upstanding members disposed along and adjacent to the upper edge of said member and having horizontal notches extending into the opposite upstanding edges thereof, said notches being generally parallel to the axis of said body; the second shell member having at least two longitudinally spaced upstanding members disposed along and adjacent to the upper edge thereof and in register with the upstanding members on said first shell member, said upstanding members on said second shell member having upper ledges projecting therefrom into contact with the adjacent face of an upstanding member on said first shell member, and a second ledge projecting from an intermediate position on each of said upstanding members between the upper ledge and the hollow body to form and partially close a mounting slot between the opposed upstanding members of the two adjacent shell members; and wherein the unitary key structure includes pivot pins extending from opposite sides of the intermediate portion thereof; said key being mounted in operative position with said pivot pins disposed in the mounting slots of mounting means disposed on opposite sides of the intermediate portion thereof; said pivot pins being retained in said mounting slots by the biasing force of said resilient tongue means and restraining force of said upper ledges, whereby the unitary key structure is retained in the mounting means without resort to separate locking means.

12. A musical wind instrument having keys for controlling the opening and closing of tone ports in the instrument which are constructed and arranged to operate substantially as herein described and as shown in the accompanying drawing.

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