

- [54] **MUSICAL INSTRUMENT**
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- [52] U.S. Cl. .... **84/388, 84/452 P**
- [51] Int. Cl. .... **G10d 7/10**
- [58] Field of Search..... **84/387, 388, 392, 452 R,**  
**84/452 P; 29/169.5**

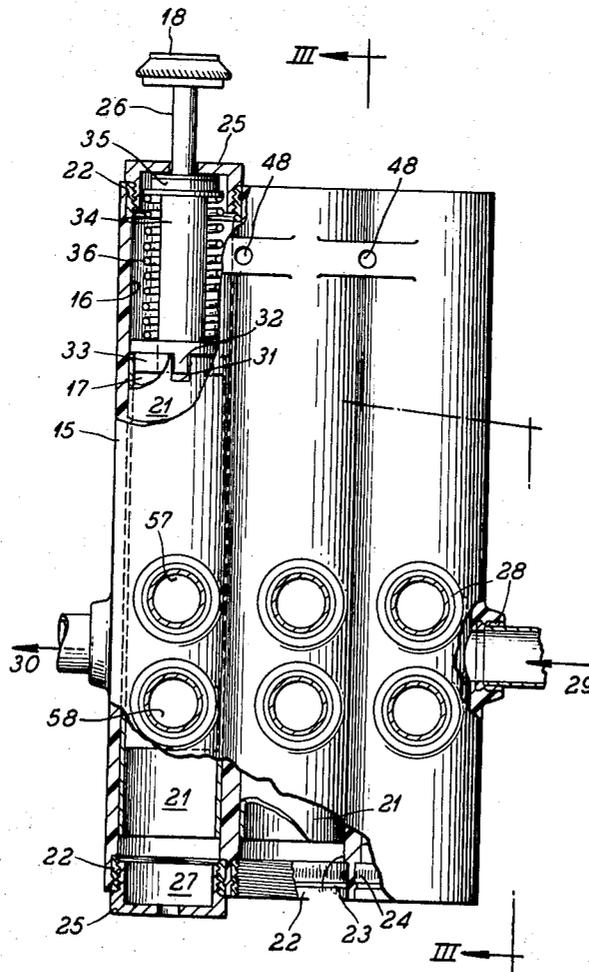
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*Attorney, Agent, or Firm*—Hill, Gross, Simpson, Van Santen, Steadman, Chiara & Simpson

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[57] **ABSTRACT**  
 A musical instrument such as a trumpet has a mouth-piece crook and a bell crook that can be selectively manually detached from a unified valve assembly which employs a unitary molded plastic housing having separate lined bores for the valves.

**9 Claims, 3 Drawing Figures**



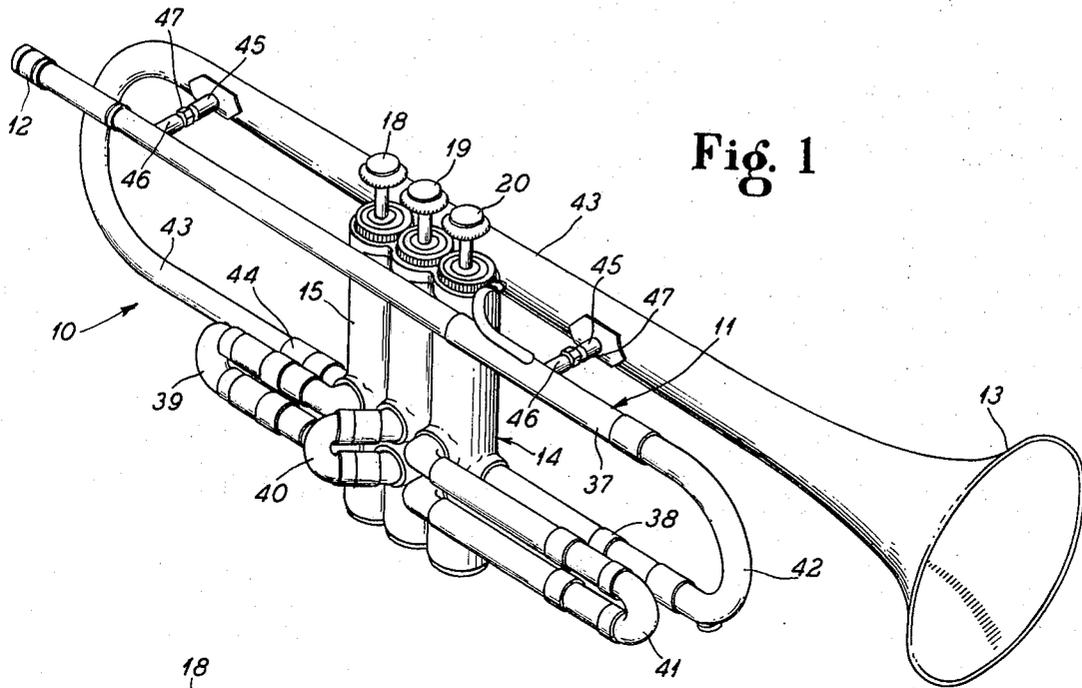


Fig. 1

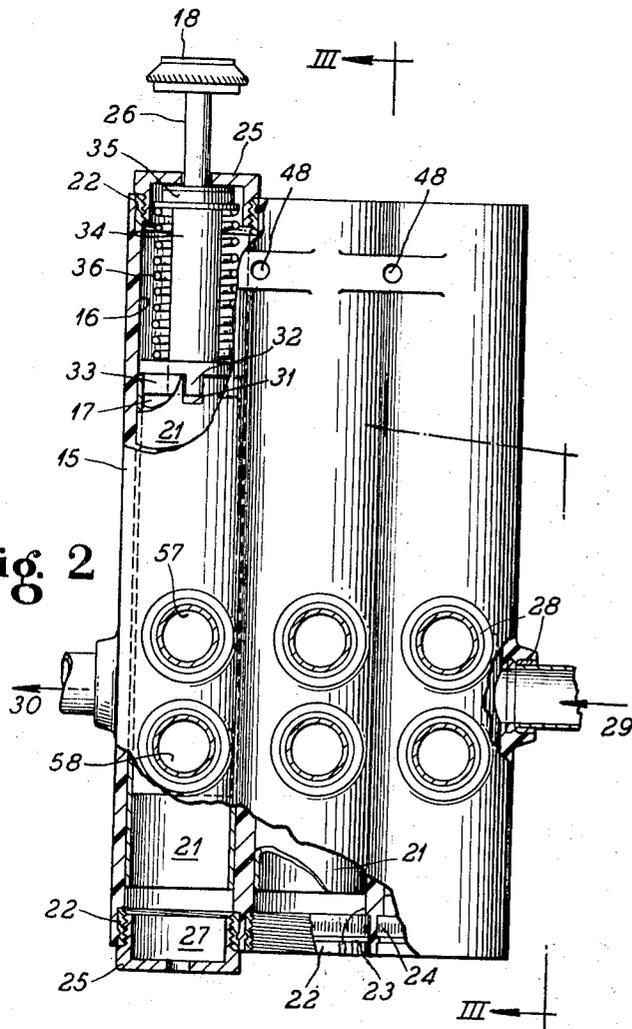


Fig. 2

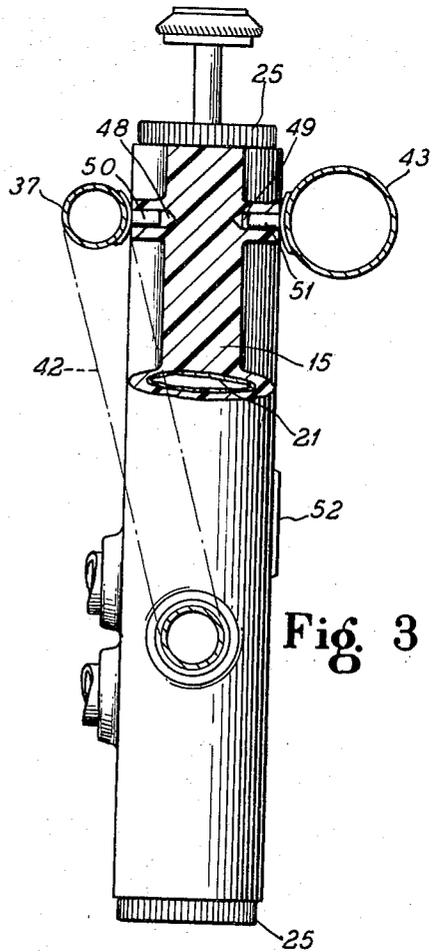


Fig. 3

## MUSICAL INSTRUMENT

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

This invention relates to brass-type of musical instruments of which the trumpet is representative.

## 2. Description of the Prior Art

It has been customary heretofore to provide separate valve bodies of metal joined together by numerous fittings for assembly into various brass instruments in a permanent manner, after which the instrument is provided with its final finish. Damage can and does occur to such instruments at the factory, during shipment, while on sale and/or while in use. The repair of such instrument, to make it as good as new, requires that the instrument be refinished after the damage has been repaired, and where the instrument is not a high priced instrument, the cost of repair can easily be excessive. Further, considerable factory labor is involved in assembling and finishing instruments of the known type. Further, especially in freezing climates, the moisture present in such instruments during outdoor usage not infrequently freezes, thereby causing the valves to stick. Further, in cold climates, because of the thermal conductivity of brass instruments, the instrument readily conducts away heat from the musician's hand, thereby causing the hand to become uncomfortably cold along with stiffening of the fingers.

## SUMMARY OF THE INVENTION

According to this invention, a musical instrument comprises an elongated tube adapted at one end to be fitted with a mouthpiece and the other end thereof flaring into a bell, and a unified valve assembly having three finger-operated valves connected in series with one another, connected to an intermediate portion of said tube, and connected to three tuning slides, said valves being disposed in three separate bores in a unitary molded plastic housing.

According to another feature of this invention, a musical instrument comprises a mouthpiece section of tubing, a bell section of tubing, a keyed valve assembly having tuning slides for each valve and having sliding connections with said tubing sections, and means for manually detachably holding said sections and valve assembly together as a unit.

Accordingly, it is an object of the present invention to provide a musical instrument of the brass type which is cheaper to construct because of the nature of its construction.

A further object of the present invention is to provide a construction for a musical instrument which will make the repair thereof less expensive.

A further object of the present invention is to eliminate many production joints or connections normally used in the manufacture of brass instruments and to eliminate much of the finishing that has been required heretofore.

A still further object of the present invention is to provide a construction of a musical instrument that can be given its complete final external finish before assembly thereof.

Yet another object of the present invention is to provide a musical instrument having a plastic valve housing that can be cast in its final form and finish.

Yet another object of the present invention is to provide a musical instrument that can be manually disassembled so that only a fractional portion of the instrument needs to be repaired or replaced when damage occurs without damage to finish and without need for refinishing of undamaged parts.

A still further object of the present invention is to provide a construction of a musical instrument which will not feel cold to the user in cold climates.

Another object of the present invention is to provide a musical instrument construction employing valving that is freeze-resistant in freezing climates.

Many other advantages, features and additional objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying drawing in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example.

## ON THE DRAWING

FIG. 1 is a perspective view of a trumpet constructed in accordance with the principles of the present invention;

FIG. 2 is an enlarged fragmentary side elevational view of the instrument of FIG. 1 with parts removed or broken away and other parts shown in cross section; and

FIG. 3 is a cross-sectional view of the instrument of FIG. 1, partly in cross section, taken substantially along the line III—III of FIG. 2.

## AS SHOWN ON THE DRAWING

The principles of the present invention are particularly useful when embodied in a musical instrument of the brass horn type such as a trumpet illustrated in FIG. 1 and generally indicated by the numeral 10. Brass instruments of this type comprise an elongated tube or horn generally indicated at 11 adapted at one end 12 to receive a mouthpiece (not shown) and at the other end, the tube 11 flares into a bell 13. An intermediate portion of the tube 11 is connected to a unified keyed valve assembly generally indicated at 14.

The unified keyed valve assembly 14 includes a unitary molded housing 15 preferably of plastic, and which has three bores 16 which respectively receive three finger-operated valves 17 respectively connected to a first key 18, a second key 19 and a third key 20. This construction enables the elimination of conventional fittings used to join valve housings together, and therefore, enables the valves 17 to be disposed closer together than heretofore, an advantage to young or small musicians.

The plastic housing 15 is molded from material that has the physical properties of plastic material such as those sold under the proprietary names of "VALOX" and "LEXAN" available from the Plastics Department of General Electric Company. These properties are that the material has good strength, has good impact strength, has reasonable cost, and that it absorbs less lubricant than certain other plastic materials. Within each of the bores 16 there is provided a metal liner 21 which preferably is cast into the housing 15 during the molding thereof. The valve housing 15 is provided with numerous apertures, for example each of the bores 16 extends therethrough, thus defining six apertures and within each of these apertures there is disposed an in-

ternally threaded metal insert 22 shown in cross section in FIG. 2 in association with the first valve and shown in elevation in association with the second and third bores. Each of the internally threaded metal inserts 22 has a groove 23 which encircles it and a series of axially directed grooves 24 disposed on the outer surface thereof. The insert 22 fits into counterbored ends of the bores 16 and a sonic weld is applied thereto so that plastic material flows into the grooves 23 to hold the insert 22 axially and into the grooves 24 to hold the insert 22 against rotation. Each of the internally threaded metal inserts 22 receives an externally threaded cap 25 which is apertured. The apertures provide venting, the upper apertures provide an opening for a valve stem 26 to pass therethrough, and the lower apertures provide a drainage opening at the bottom of a pocket 27 disposed beneath the lower end of the liner 21.

The housing 15 has eight further apertures leading to the bores 16 through bosses which are counterbored to receive a corresponding number of metal ring inserts 28. The metal ring inserts 28 like the inserts 22 are externally grooved circumferentially as explained and also permanently joined to the plastic housing 15 by a sonic weld by which the grooves are made full of plastic material.

The unified valve assembly 14 has an inlet 29 and an outlet 30 which communicate in a straight through fashion through all of the bores 16 and all of the valves 17 when they are in their raised or "open" position. Each of the valves 17 is movable within the liner 21 and all such valve movement is within the axial limits or extent of the liner 21. Thus in this embodiment, where the valve 17 is axially reciprocable, the upper and lower ends of the valve 17 do not pass either end of the liner 21.

The upper end of each of the liners 21 has a notch 31 into which is received an ear 32 carried on the outer surface of a guide bushing 33 which has a bore of keyed or other non-circular configuration (not shown) and which receives a keyed cylindrical element 34 which is rigidly secured to the valve 17 and to a collar 35 and the stem 26, the bushing 33 being urged against the upper end of the liner 21 by a spring 36 which acts on the collar 35 urging it against the inner face of the valve cap 25.

Depression of the valve 17 by a finger acting on the key 18 causes the collar 35 to compress the spring 36 and the valve 17 to move downwardly so as to align other passages in the valve (not shown) with a pair of ports 57,58 which lead to an adjustable tuning slide 39. Each of the valves is constructed identically to the first valve 17 except that a shorter tuning slide 40 is associated with the second valve and a longer tuning slide 41 is associated with the third valve. Sections of tubing which receive the tuning slides 39-41 are received within the metal ring inserts 28 and are normally permanently joined thereto by means of a cement-type of bond, e.g. of the epoxy type, and portions of the tube 11 are received into the ring inserts 28 in the inlet 29 and the ring insert in the outlet 30. Such a cement-type of bond is also used in lieu of any bond heretofore utilizing molten metal, whereby components may be pre-finished, i.e., before assembly, without any heat damage to the finish.

The end 12 of the tube 11 forms part of a mouthpiece section 37 thereof which has a sliding connection and thus is slidably detachable from the valve assembly 14,

for example in a fitting 38. The mouthpiece section 37 further includes a main tuning slide or crook 42.

The other end or bell 13 of the tube 11 is part of a bell section 43 of the tube 11 which has a sliding connection with and is thus slidably detachable from the unified valve assembly 14, for example at a coupling indicated at 44.

In order to detachably hold the instrument together, the bell section 43 is provided with a pair of threaded posts 45,45 and the mouthpiece section is provided with a similar pair of threaded posts 46,46 but of opposite hand thread. A coupling member 47 is used to connect the posts 45 to the posts 46. Further, the housing 15 has two pair of guide openings 48,49 which respectively receive guide of pilot pins 50,51 respectively permanently secured to the mouthpiece section 37 and the bell section 43.

In fabrication, the bell section 43 is completely fabricated and given its final finish, and the mouthpiece section 37 is completely fabricated and given its final finish. These sections 37,43 are then slidably coupled with the unified valve assembly 14 (comprising components finished prior to any assembling thereof) and then each section 37, 43 is rocked so as to bring the pilot pins 50,51 into alignment with the recesses 48,49, whereupon the coupling members 47 are manually rotated to draw the sections together to the position illustrated.

It is to be understood that the threads on the elements 45-47 can be reversed.

The end caps 25 are provided with external knurling as shown in FIG. 3.

Not only can the different sections be fabricated separately at the factory in the first instance, but in the event that there is factory damage to one of the sections, it is unnecessary to refinish the entire instrument. That section is merely replaced. The same is also true in the case of a businessman that is operating a musical instrument rental business. If one of his rented instruments becomes damaged, he merely replaces the damaged part and sends that relatively smaller portion to the factory for repair, substituting an equivalent component, thereby making the instrument immediately available for re-rental.

The manually detachable holding means 45-51 thus simplifies repair, service, and initial manufacture.

There is yet another interesting constructional feature in this device. In order to mold the plastic housing 15, the plastic material is forced through a "pipe" which is milled off to provide a flat boss 52 as shown in FIG. 3 the same being narrower in the direction of the paper than its length. The boss 52 thus modified converts an unsightly "pipe" into a neat rectangular pad upon which the manufacturer's serial number can be applied.

Although various minor modifications may be suggested by those versed in the art, it should be understood that I wish to embody within the scope of the patent warranted hereon all such embodiments as reasonably and properly come within the scope of my contribution to the art.

I claim as my invention:

1. A musical instrument comprising:
  - a. a prefinished mouthpiece section of tubing;
  - b. a prefinished bell section of tubing;
  - c. a prefinished 3-keyed valve assembly having a housing;

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- d. a plurality of tuning slides respectively forming a part of one of said sections and said valve assembly and being slidably adjustable thereon; and
- e. a pair of connections respectively joining each of said sections to said housing, at least one of said connections comprising a pair of components respectively forming wind-conducting parts of one of said sections and of said housing, and being permanently bonded together by cement, whereby finish is not thermally affected by the creation of said bond.

2. A musical instrument according to claim 1 in which said housing comprises a unitary molded plastic part having three separate valve bores, said tubing sections being of metal.

3. A musical instrument according to claim 2 in which said housing has apertures for connection with said section and for connection to said tuning slides, said housing having a metal ring insert in each of said apertures respectively receiving ends of said section and of said tuning slides.

4. A musical instrument according to claim 3 in

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which said inserts have grooves in their external surface, and have a sonic weld with said housing by which said grooves are full of the plastic material.

5. A musical instrument according to claim 2 in which said unitary molded housing has a machined pad, which comprised the initial molding pipe, for carrying identification indicia.

6. A musical instrument according to claim 2 including a plurality of tubular metal liners in said bores onto which said housing was molded.

7. A musical instrument according to claim 2 in which said plastic housing has a threaded insert of metal at each end of each of said bores, and an externally threaded cap disposed in each of said inserts.

8. A musical instrument according to claim 7 in which said caps are of identical construction.

9. A musical instrument according to claim 7 in which said inserts have grooves in their external surface, and have a sonic weld with said housing by which said grooves are full of the plastic material.

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