May 15, 1923. 1,455,440

F. HOFINGER

PROCESS OF MANUFACTURING FLUTES

Filed Feb. 16, 1922

Fig. 1.

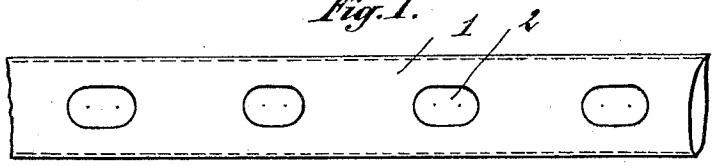


Fig. 2.

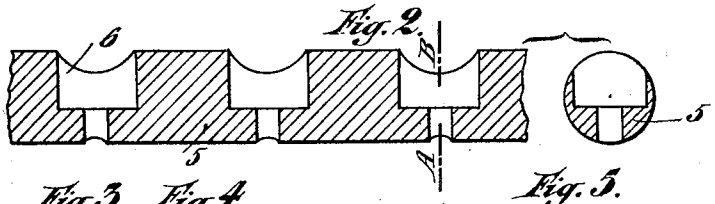


Fig. 3.

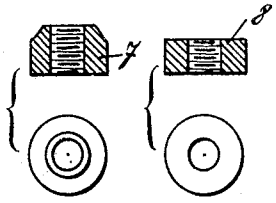


Fig. 4.

Fig. 5.

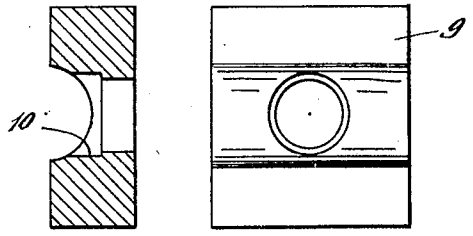


Fig. 6.

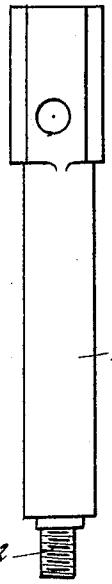


Fig. 7.

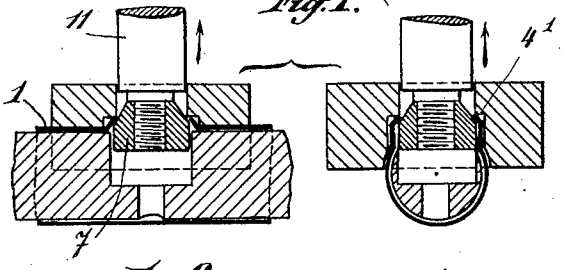


Fig. 8.

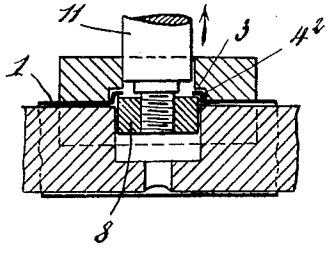
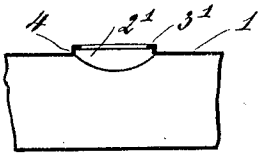


Fig. 9.



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UNITED STATES PATENT OFFICE.

FLORENT HOFINGER, OF BRUSSELS, BELGIUM.

PROCESS OF MANUFACTURING FLUTES.

Application filed February 16, 1922. Serial No. 537,074.

To all whom it may concern:

Be it known that I, FLORENT HOFINGER, a subject of the King of Belgium, residing at No. 244 Rue de l'Intendant, Molenbeek, St. Jean, Brussels, Belgium, have made certain new and useful Improvements in Processes of Manufacturing Flutes, of which the following is a specification.

This invention relates to the art of producing musical instruments and it has more particularly for its object improvements in the manufacture of metal flutes.

Hitherto the various holes in the flute have been surmounted each by a nozzle or neck soldered directly on to the body tube of the flute. A later improvement consisted in forming the said nozzles or necks by pressing-up the metal of the body tube. That method has over the earlier method the advantage of avoiding leakage due to faulty soldering. Both those methods have however two serious drawbacks as regards the proper action of the instrument.

1. The nozzles have a sharp edge which has the effect of damaging the keys after a short period of use.

2. The tuning of the instrument is a difficult matter because the various nozzles have to be milled to the correct height.

The present invention obviates those drawbacks by providing nozzles (or necks) with a flange integral therewith and substantially at right angles to the said nozzles so as to provide a flat annular surface on which the keys can rest.

These desired features are obtained by first pressing-up into a conical nozzle the edge of an oblong hole previously pierced in the body tube, and then converting said conical nozzle into a cylindrical nozzle with an inwardly turned annular flange having a flat face or edge and finally milling the inner edge of the said flange to the desired internal diameter. For carrying out these various operations use is made of various tools whose natures and modes of action are fully described hereinafter with reference to the accompanying drawings in which:—

Figure 1 is a view of a flute body tube showing the holes formed by the first milling.

Figure 2 illustrates in longitudinal section and cross section the mandrel upon which the flute tube is mounted during the performance of the various operations for converting the holes into the desired nozzles or necks.

Figures 3 and 4 are views of the two conical and cylindrical dies respectively for effecting the pressing-up of the metal.

Figure 5 illustrates the pressing-up matrix.

Figure 6 illustrates the actuating bar to be screwed in the aforesaid mandrels.

Figures 7 and 8 illustrate the two stages of the pressing-up operation, and

Figure 9 is a section of a portion of a flute body tube showing a finished hole with its nozzle or neck.

Referring to these drawings:—Oblong holes 2 are milled in the body tube 1 of the flute at the desired points. This body tube is shown on a mandrel 5 having cylindrical recesses 6 arranged to come opposite the holes 2.

Over the hole 2 to be shaped, there is placed the matrix 9 of which the aperture is formed with a shouldered recess 10 corresponding to the cylindrical flange 4 that is to constitute the nozzle (Fig. 9). The inner cavity of this matrix corresponds exactly to the periphery of the body tube 1.

The conical die 7 and the cylindrical die 8 fitting in a removable manner in the recesses 6 of the mandrel 5, are drawn towards the outer ends of these recesses by any suitable tractor member such as the bar 11 whose screw-threaded end 12 can be screwed into the correspondingly tapped holes in the dies 7 and 8.

According as either the conical die 7 or the cylindrical die 8 is drawn outwards by means of the bar 11, the metal at the edge of the body tube 1, will be pressed-up in the form of a conical nozzle 4′. Later, this conical nozzle is pressed-up in the form of a cylindrical nozzle 4^2 terminating in an annular flange 3 substantially at right angles to the said nozzle. The latter is then milled internally to the desired dimension 3′ (Fig. 9) so that the finished nozzle has the appearance of a cylindrical neck 2′ having the height 4, and the same diameter as that of the flange 3′.

Since the pressing-up performed by means of the cylindrical mandrel is effected completely in the matrix 9, the nozzles will all have the same height 4, thereby facilitating the tuning of the instrument. The nozzles (or necks) will not have any

sharp edge whatever, which is a very important feature for the length of the "life" of the padding on the keys.

The improved instrument has a perfectly finished appearance, and entails scarcely any upkeep costs; it can be easily tuned, because the sole milling required for tuning, is the milling of the internal diameter of the holes, that is to say, of the flange 3'.

What I claim is:—

1. A process for the manufacture of flutes formed of metal consisting in first forming oblong holes in the body tube of said flute, then pressing up the metal of the edges of said oblong holes so as to form conical nozzles, and then pressing the said conical nozzles into cylindrical nozzles with inwardly turned flanges integral therewith and substantially at right angles to the said cylindrical nozzles so as to provide a flat annular surface on which the keys can rest.

2. A process for the manufacture of flutes formed of metal consisting in first forming oblong holes in the body tube of the said flute, then pressing up the metal of the edges of said oblong holes so as to form conical nozzles, and then pressing the said conical nozzles into cylindrical nozzles with inwardly turned flanges all at the same height above the said body tube and substantially at right angles to the said cylindrical nozzles.

3. A process for the manufacture of flutes formed of metal consisting in first forming oblong holes in the body tube of the said flute, then pressing up the metal of the edges of said oblong holes by means of dies to form conical nozzles, then pressing the said conical nozzles into cylindrical nozzles with inwardly turned flanges integral therewith all at the same height above the body tube, and then milling the edges of said inwardly turned flanges to obtain the correct diameters for tuning purposes.

In testimony whereof I have signed my name to this specification.

FLORENT HOFINGER.

Witnesses:

FELIX DE COSMAN,

G. G. ZOLRAN.