

P. C. HARDY.

PROCESS OF MAKING KEY SEATS ON WIND MUSICAL INSTRUMENTS.

APPLICATION FILED MAY 8, 1914.

1,153,489.

Patented Sept. 14, 1915.

2 SHEETS—SHEET 1.

Fig. 1.

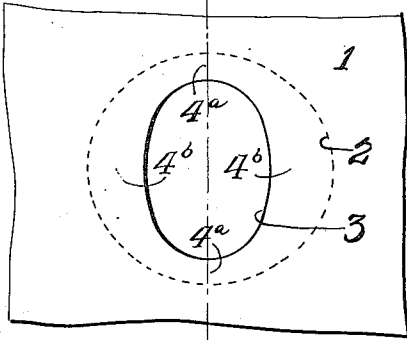


Fig. 2.

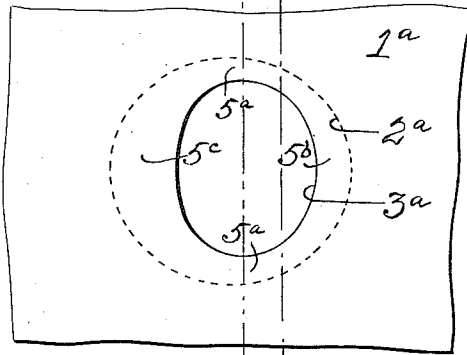


Fig. 3.

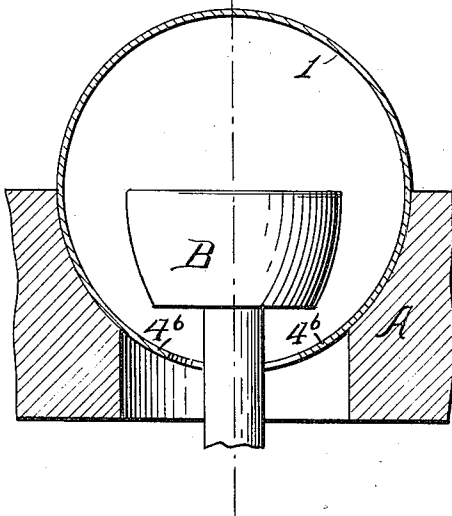
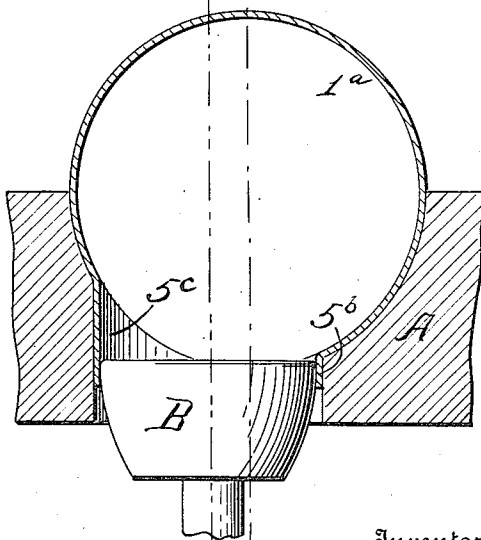


Fig. 4.



Witnesses
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2 SHEETS—SHEET 2.

Fig. 5.

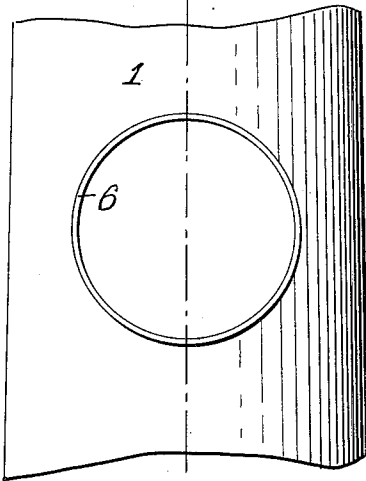


Fig. 7.

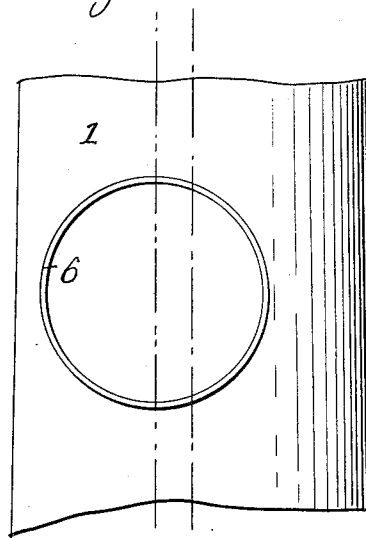


Fig. 6.

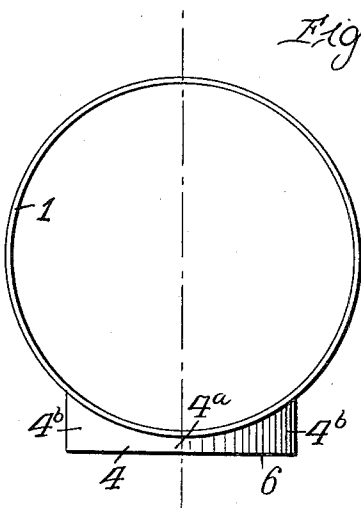
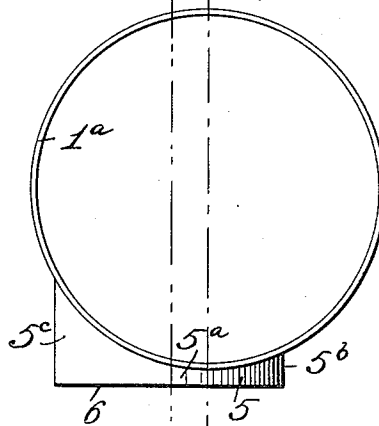


Fig. 8.



Witnesses

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UNITED STATES PATENT OFFICE.

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PROCESS OF MAKING KEY-SEATS ON WIND MUSICAL INSTRUMENTS.

1,153,489.

Specification of Letters Patent.

Patented Sept. 14, 1915.

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To all whom it may concern:

Be it known that I, PAUL C. HARDY, a citizen of the United States, and resident of Elkhart, in the county of Elkhart and State of Indiana, have invented a certain new and useful Process of Making Key-Seats on Wind Musical Instruments, of which the following is a specification.

This invention relates to the production upon the curved metal walls of wind musical instruments or parts thereof, flanges projecting outwardly therefrom around the key openings in order to provide seats for the key valves. Heretofore these key seats have been provided by forming a separate flange of dimensions appropriate to the key opening to be equipped and with its inner end shaped to correspond to the curvature of the instrument part and to solder or braze the flange in position. This method has long been recognized as being objectionable, because of the difficulty in obtaining complete and perfect attachment of the flange to the tubular body and the consequences of imperfect attachment; these consequences being serious not only from a mere mechanical standpoint, but for musical considerations, since imperfect attachment develops leakage and affords opportunity for relative vibration between the body of the metal and the flange, either of which conditions renders the tone of the instrument impure.

My invention obviates these objections by drawing outward from the wall of the tubular instrument part, that portion of the metal defined by the key opening and forming it into a flange which ultimately surrounds the opening and is integral with the body of the musical instrument. But in carrying out the process, it is necessary for musical considerations that there be substantial uniformity in the distribution of the metal forming the flange, notwithstanding the fact that the flange will be higher at some points than at others, by reason of its projection from a cylindrical or approximately cylindrical surface; for which reason, a reduced opening is formed within the area of the ultimate key opening and this reduced opening is of such shape as to leave between the different points on its perimeter and the perimeter of the circular key opening ultimately to be formed, metal substantially corresponding in dimension to the height of the flange which such metal is required to form

at that point. A suitable die is then placed over the metal to be drawn up with an opening corresponding to the external diameter of the flange to be formed, and a specially formed mandrel is then forced outwardly through the reduced opening to draw the metal into the form of the flange. The shape of the die is preferably such that it first acts upon the metal corresponding to the deeper portions of the flange to be formed, and it terminates in a portion with circular section of such diameter as to forcibly iron the metal out against the surrounding die. After the flange is thus formed, its edge may be trimmed as by a rotary cutter, or grinding, to bring it accurately to the plane in which it is desired to have the key valve seat.

The invention will be fully understood upon reference to the accompanying drawings, in which—

Figures 1 and 2 represent portions of the curved walls of a wind musical instrument, made of thin metal and having two different forms of initial reduced openings formed therein. Figs. 3 and 4 are sectional views illustrating the application of the die and mandrel to the opening in the circular wall; Fig. 3 showing parts before the commencement of the drawing action, and Fig. 4 showing the drawing action substantially complete. These figures, however, show the work-piece prepared for openings in two different ultimate relations to the instrument body. Figs. 5 and 6 are, respectively, a plan view and an end elevation of an instrument part having the key opening flange produced by the application of the invention illustrated in Figs. 1 and 3. Figs. 7 and 8 are similar views of an instrument part having a flange produced according to Figs. 2 and 4.

1 represents the sheet metal body of the instrument, the dotted circle 2 indicates the perimeter of the key opening ultimately to be formed, and 3 represents the perimeter of the preliminary reduced opening, where the flange is to be located with its axis substantially in line with a radius of the instrument body (see Fig. 1); while 1^a, 2^a and 3^a represent similar features in a construction where the flange is to be formed with its axis to one side of the radius of the instrument body. According to Fig. 1, the preliminary reduced opening is cut so as to

leave the reduced portions 4^a corresponding to the portions of the flange that are to project from the crest of the cylindrical surface and two equal but relatively wider portions 5 4^b corresponding to the portions of the flange which are to project from points on opposite sides of and equally below the crest. A blank thus prepared is introduced into the die in the relation shown in Fig. 3, and 10 the flange produced thereby is represented at 4 in Figs. 5 and 6.

According to Fig. 2, the preliminary reduced opening is cut so as to leave between its perimeter and that of the ultimate key 15 opening, narrow portions of metal 5^a at the crest of the cylindrical surface nearest the plane of the ultimate flange, and with a narrow portion 5^b on one side which is also near said crest, but with a much wider portion 5^c 20 corresponding in position to a deep portion of the flange that must be formed to reach from a relatively low point up to the outer plane of the ultimate flange. A work-piece prepared as in Fig. 2 is introduced into the 25 die in the relation shown in Fig. 4, and the flange produced is represented at 5 in Figs. 7 and 8.

By making other suitable changes in the form of the initial reduced opening or by 30 placing it in suitable relation to the perimeter of the key opening ultimately to be formed, a flange can be produced with the plane of the key seat 6 provided by its outer end in various relations, as will be readily 35 seen.

I claim:—

1. The process of forming key seats on cylindrical metal parts of wind musical instruments, and in a plane raised above the 40 cylindrical surface thereof, which consists in forming through the cylindrical wall, a preliminary opening of reduced diameter with its perimeter spaced within and, at different points, varying in distance from

the perimeter of the ultimate key opening 45 to be formed, and drawing the marginal portion of the tube about the preliminary opening, into a projecting flange, while restraining the same to correspond to the dimensions of the desired seat. 50

2. The process of forming key openings and raised key seats surrounding the same in the curved surfaces of metallic wind instrument parts, which consists in forming 55 within the area of the ultimate key opening, a reduced preliminary opening having a perimeter formed to leave between it and the perimeter of the ultimate opening, a depth of metal varying at different points 60 proportionally to the height of different portions of the seat to be formed; and drawing the marginal portion of the tube surrounding said preliminary opening into a projecting flange while restraining the same 65 to correspond to the dimensions of the desired seat.

3. The process of forming a key seat on a cylindrical metal part of a wind musical instrument, in a plane raised above the cylindrical surface and with its axis parallel with 70 but to one side of the diametric plane of the cylindrical wall, which consists in forming a preliminary opening of reduced dimensions, with its perimeter spaced within, and, on the side away from said diametric 75 plane, increasing in distance from the perimeter of the ultimate key opening to be formed, and drawing the marginal portion of the tube which surrounds the preliminary opening into a projecting flange while re- 80 straining the same to correspond to the dimensions and position of the desired seat.

The foregoing specification signed at Elkhart, Indiana, this 17th day of April, 1914.

PAUL C. HARDY.

In presence of—

W. W. WHITE,
FRANK DODGE.