B. F. WINTERHOFF.

APPARATUS FOR SMOOTHING AND CALIBRATING TAPERED AND CURVED HOLLOW METAL BODIES SUCH AS BOWS FOR WIND INSTRUMENTS.

1,253,553. APPLICATION FILED JAN. 21, 1916.

Patented Jan. 15, 1918.

2 SHEETS—SHEET 1.

FIG. 1.

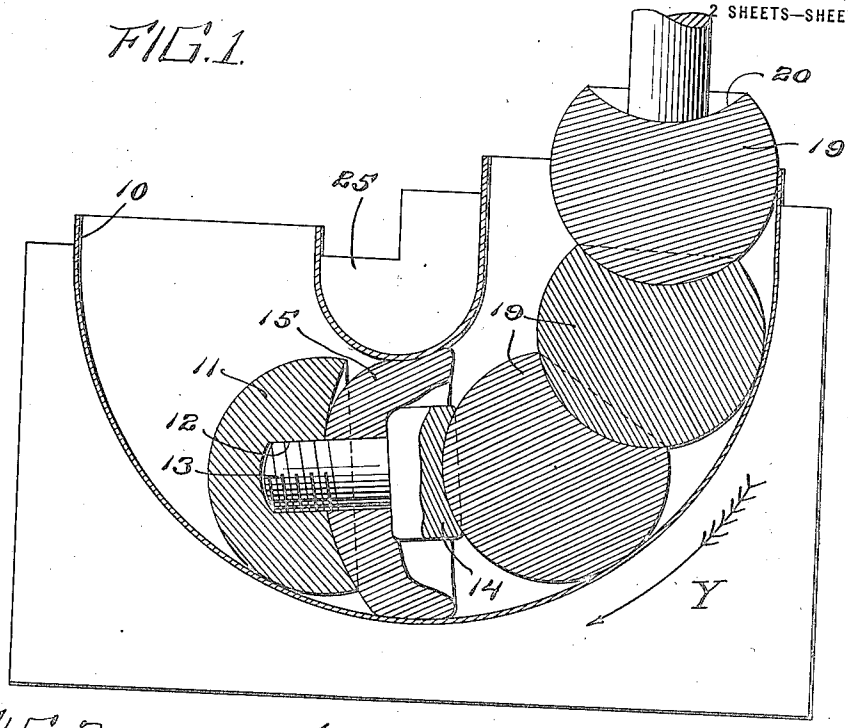


FIG. 2.

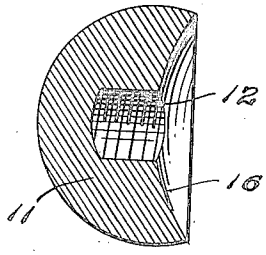


FIG. 3.

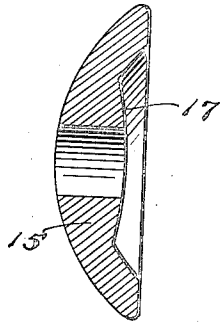


FIG. 4.

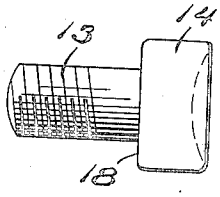
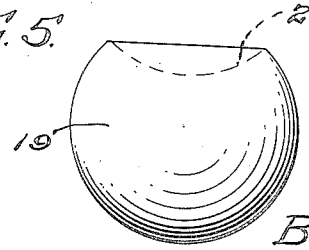


FIG. 5.



WITNESS

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2 SHEETS—SHEET 2.

FIG. 6.

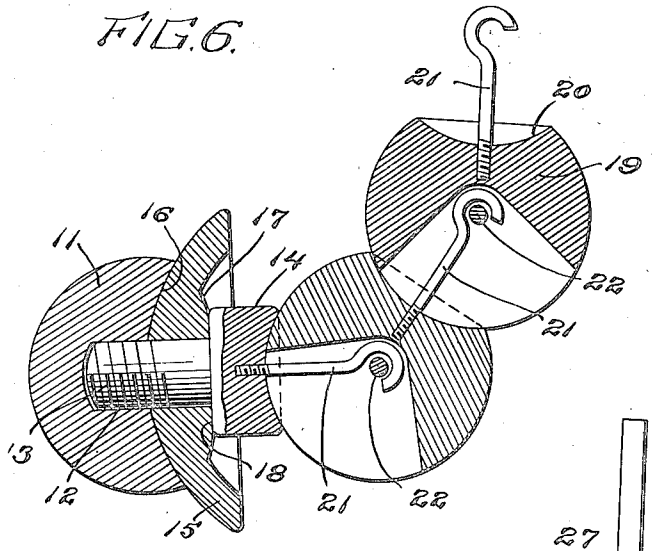


FIG. 7.

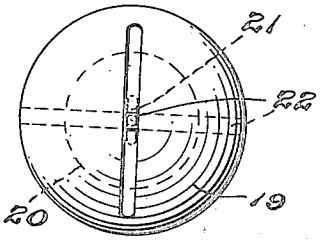


FIG. 9.

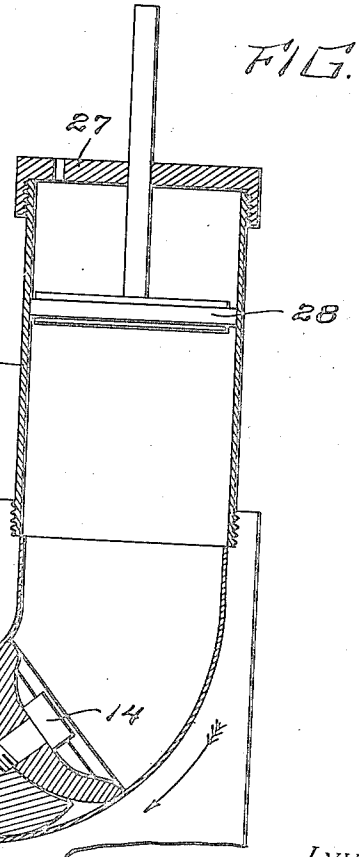
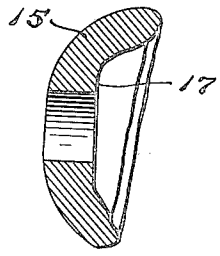


FIG. 8.



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APPARATUS FOR SMOOTHING AND CALIBRATING TAPERED AND CURVED HOLLOW METAL BODIES, SUCH AS BOWS FOR WIND INSTRUMENTS.

1,253,553. Specification of Letters Patent. Patented Jan. 15, 1918.

Application filed January 21, 1916. Serial No. 73,408.

To all whom it may concern:

Be it known that I, BENJAMIN F. WINTERHOFF, a citizen of the United States, and resident of Elkhart, in the county of Elkhart, State of Indiana, have invented certain new and useful Improvements in Apparatus for Smoothing and Calibrating Tapered and Curved Hollow Metal Bodies, such as Bows for Wind Instruments, of which the following is a specification.

The present invention relates to an apparatus for smoothing and calibrating curved hollow metal bodies, and the principal objects of the invention is to provide a device by means of which the bends or bows for wind instruments may be easily and accurately smoothed or ironed out after the two halves of the bend have been brazed together.

Another advantage of the present invention resides therein that the metal in the bend will be made tougher and harder after a treatment, in the same manner as the strength and hardness of a drawn wire has been considerably increased after it has been drawn.

The invention is illustrated in the accompanying drawings wherein—

Figure 1 shows an axial section of a bend or bow with the apparatus in action.

Figs. 2, 3, 4 and 5 are detail views of different parts,

Fig. 6 is a slightly modified form of a train of balls, and

Fig. 7 is an end view of one of the balls.

Fig. 8 is a section of the lead disk after it has been used, and

Fig. 9 illustrates a modified form of the apparatus in axial section.

I will now proceed to describe the device as illustrated in Figs. 1 to 5 both inclusive.

The bend or bow is designated by 10. 11 is a plunger or pilot ball with the diameter smaller than the small end of the bend, and this pilot ball is provided with a threaded portion which is intended to engage with the thread shaft 13 of the stud 14. Between the head of stud 14 and the pilot ball 11, is securely held a mushroom-shaped disk 15 of greater diameter than the pilot ball, and in order to provide a firm seat for the disk 15 on the pilot ball 11, the latter is provided with a recess 16 which conforms in shape to the outer surface of the disk 15. To the rear of the disk 15 is a substantially flat surface 17 which engages with the forward surface 18 of the head of the stud 14.

All of the balls 19 are of the same diameter as the pilot ball 11. One side of each of these balls is recessed to form a seat, as at 20, for the next ball of the train. That means that the curvature 20 is of the same radius as the ball itself.

In Fig. 6 has been illustrated a link connection between the balls so that the apparatus may be extricated as a whole after the work is completed. This link connection preferably consists of bent hooks 21 which are secured by means of threading into the stud 14 and into each of the following balls. This hook is intended to engage with a central pin 22 provided in each of the balls which permits turning to form a loose connection between the balls and the attachment of one ball to the next.

The use of this apparatus is very simple. After the rough bend has been secured in a mold 25 of the desired form and clamped on a punch press, drop hammer, or arbor press, the apparatus is introduced into the bend with the pilot ball in advance, as illustrated in Fig. 1. Pressure is now applied on the rearmost ball, and after one stroke of the machine, the disk 15 will have been advanced slightly in the direction of the arrow Y. A slight compression of the lead or soft metal of which the disk consists, will now take place and any uneven portions in the bend will be smoothed out.

If the stroke of the machine used for applying the power is equal to the diameter of the ball 19, a metal ball is added in the rear of the train, and a new stroke made by the machine. The disk 15 will then be still further advanced in direction of arrow Y and still further compressed, while it simultaneously smooths out any unevenness in the metal of the bend. Ultimately, the disk will reach the smaller opening of the bend and will by that time have been distorted to a shape similar to that illustrated in Fig. 8.

If the bend by this time is not found to be perfect, another mushroom disk 15 is attached to the balls and the procedure repeated.

In the modified form of the apparatus illustrated in Fig. 9, I use hydraulic pressure instead of the train of balls as described above. For this purpose a pipe 26 is

attached in suitable manner to the mold 25 so as to make a water tight joint and the bend or bow 10 is placed as before in this mold with its larger end near the pipe 26. After the lead disk 15 with the pilot ball 11 as before is inserted in the bend, the balls 19 in this case being dispensed with, a piston 28 is inserted in the pipe 26 and the end of the pipe closed with the cap 27 guiding the piston and the apparatus is now ready to be used. Pressure is now applied to the free end of the piston rod as for instance by a blow from a drop hammer or by the plunger in a hydraulic press. This pressure is then communicated to the disk 15 from the piston 28 by water or other liquid filled into the space between them and the procedure and the effect are otherwise identical with what has already been described.

I claim:

1. Apparatus for smoothing and calibrating curved hollow metal bodies, comprising flexible guiding means, said guiding means consisting of a plurality of spherical members interengaging with each other for the purpose of transmitting pressure in axial direction of the hollow body, said spherical members being of the same diameter, a mushroom shaped disk rigidly secured between said spherical members, said mushroom shaped disk being of a greater diameter than said spherical members.

2. Apparatus for smoothing and calibrating tapered bows for wind instruments, comprising a train of balls of uniform diameter, which is less than the smallest diameter of said bow, a mushroom shaped lead disk of a greater diameter than the balls, the pilot ball in said train of balls being concaved for receiving the spherical convex side of the said disk, a stud for rigidly securing said disk to said pilot ball, said stud and the remaining balls of the train of balls being concaved to the diameter of each ball.

3. Apparatus for smoothing and calibrating tapered bows for wind instruments, comprising a train of balls of uniform diameter, which is less than the smallest diameter of said bow, a mushroom shaped lead disk of a greater diameter than the balls, the pilot ball in said train of balls being concaved for receiving the spherical convex side of the said mushroom disk, a stud for rigidly securing said disk to said pilot ball, said stud and the remaining balls of the train of balls being concaved to the diameter of each ball, link connection for securing the train of balls together and permitting limited movement between said balls.

4. A device for smoothing and calibrating curved, hollow metal bodies, comprising a rigid pilot member, a concavo-convex yielding member connected to the pilot member and having its periphery bendable toward the axis of said pilot member, and means for imparting movement to said device.

5. A device for smoothing and calibrating curved, hollow metal bodies, comprising a convex pilot member having a concave recess, a yielding concave or convex member having an edge extending beyond the periphery of the pilot member and the convex portion of said yielding member fitting in the concave portion of the pilot member, and means connecting said members together.

The foregoing specification signed at Elkhart, Indiana, this 5th day of June, 1915.

BENJAMIN F. WINTERHOFF.