Sept. 15, 1931. R. H. BOWEN 1,823,557

DIE

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FIG. I.

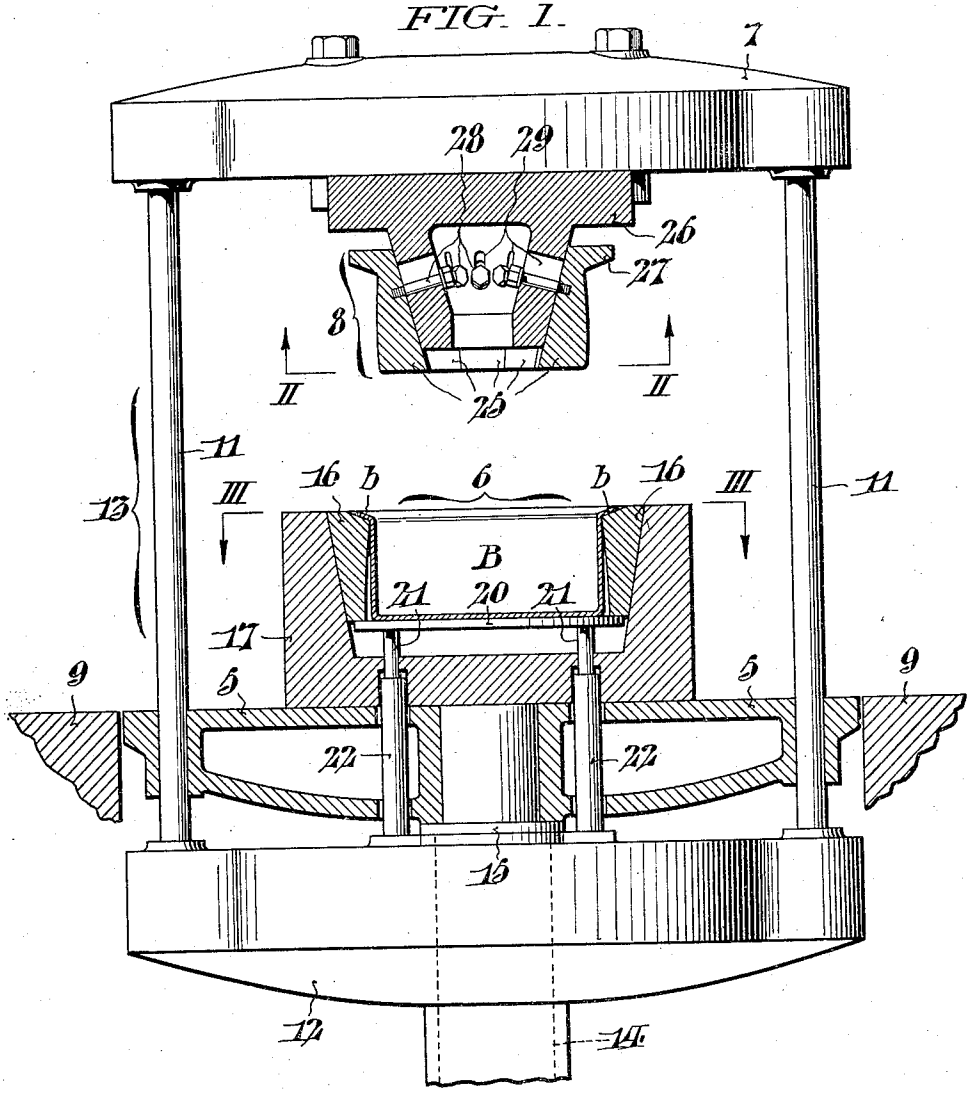
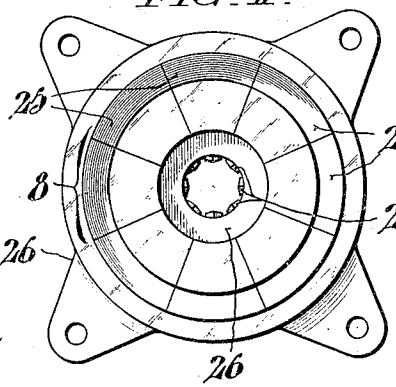


FIG. II.



WITNESSES

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FIG. IV.

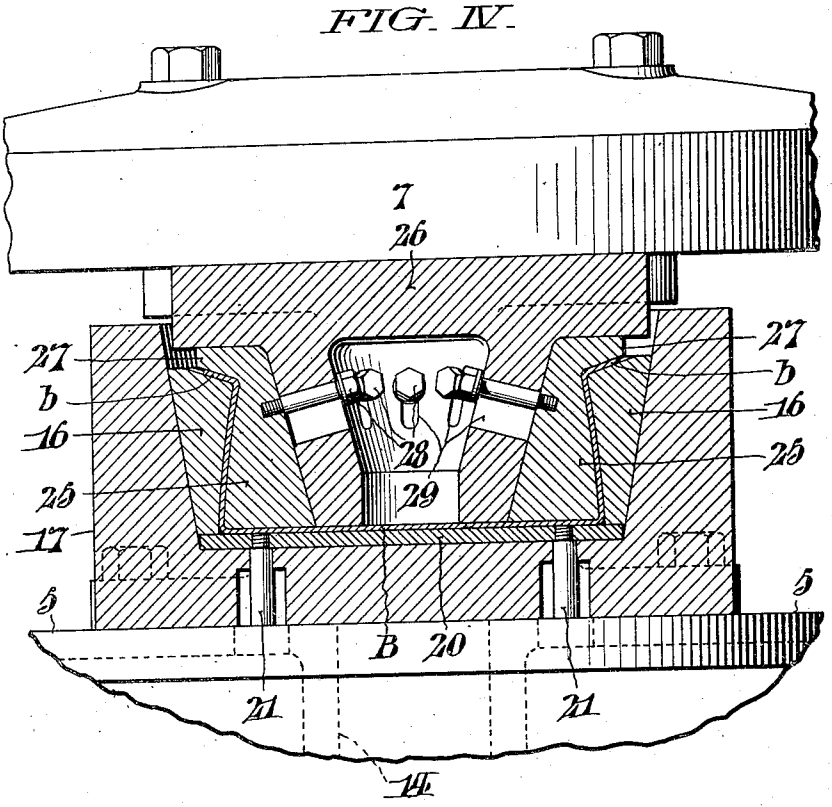
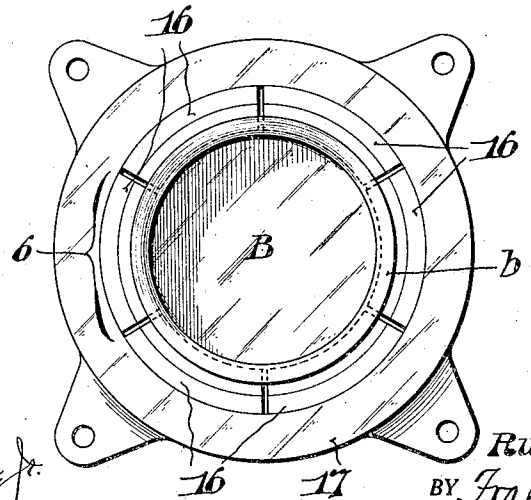


FIG. III.



WITNESSES

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Patented Sept. 15, 1931 1,823,557

UNITED STATES PATENT OFFICE

RUSSELL H. BOWEN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE AMERICAN PULLEY COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

DIE

Application filed May 2, 1928. Serial No. 274,394.

My invention relates to dies for the production of hollow articles involving a "tumble-home", and is particularly adapted and advantageous for the manufacture of crowned sheet metal pulleys. Such pulleys may be made of similar halves each resembling the outer vessel of a double boiler (such as used for cooking cereals), with their flat bottoms riveted together to form a central web for the pulley. My invention affords a convenient means for imparting the crown or tumble-home to the pulley halves.

In the drawings, Fig. I shows a side elevation of a die press with dies conveniently embodying my invention in vertical mid-section, and also a blank for the production of a crowned pulley piece.

Fig. II is an inverted plan view of the upper die shown in Fig. I, taken as indicated by the line and arrows II—II in Fig. I.

Fig. III is a plan view of the lower die, taken as indicated by the line and arrows III—III in Fig. I; and

Fig. IV shows a vertical mid-section through the dies when closed upon a pulley piece.

The die press of Fig. I comprises a bed or platen structure 5 which supports the lower die 6, and an upper plate 7 which carries the upper die 8. The platen 5 is movable up and down in an opening in the surrounding floor 9. The upper plate 7 is connected by standards 11 to a lower plate 12 beneath the movable platen 5, through openings in which platen the standards 11 extend. In the ordinary operation of the machine illustrated, the structure 13 composed of the parts 7, 11, remains stationary, though it may for convenience be adjusted up and down to avoid the necessity for excessive movement of the platen 5. The platen 5 may be raised and lowered by any suitable mechanism, such as a hydraulic device (not shown) whose movable plunger 14 extends up through the lower plate 12, and is reduced and shouldered at 15 to engage in the central bore of the platen 5 and support it. By downward and upward movement of the platen 5, the lower die 6 may be raised around the upper die 8 or returned to the position shown in Fig. I.

As shown in Fig. I, the lower die 6 is the external one, adapted to receive within it a sheet metal blank B in the form of a cylindrical "pan" with bevelled top "rim" or flange *b*, while the upper die 8 is the internal one, adapted to enter the blank B and co-operate with the die 6 in imparting to said blank the crown or "tumble-home" illustrated in Fig. IV. When the dies 6, 8 come together, the external die 6 contracts around the blank B so as to squeeze in its sides toward its open upper end, while the internal die 8 expands within the blank B, so as to sustain its sides adjacent the flat bottom of the blank, and even expand them there somewhat.

As shown in Figs. I and III, the external die 6 comprises a number of segments 16 (in the present instance six segments) in the conical-walled recess of a structure 17 secured to the platen 5. Externally, the segments 16 are also conical, with a slope corresponding to that of the surrounding wall 17; internally, they are curved according to the crown to be given the pulley. The upper ends of the segments 16 are bevelled in correspondence with the slope of the rim *b* of the blank B. The die segments 16 are normally supported in about the position shown in Fig. I, with their upper ends substantially flush with the top of the structure 17, by a "false" bottom plate 20 in its cavity. This plate 20 has feet 21 that extend down through holes in the bottom of the structure 17 and rest on the upper ends of uprights 22 carried by the lower plate 12 and extending up through holes in the platen 5. The internal die 8 comprises a number of pieces or segments 25 (in the present instance eight segments) mounted around a hollow conical head 26 that is bolted to the upper plate 7. Internally, the segments 25 are conical, with a slope corresponding to the external slope of the head 26. Externally, they are curved according to the crown to be given the pulley, and shouldered at 27 for cooperation with the external die 6. The segments 25 are movably mounted and secured on the head 26 by means of bolts 28 that lie in vertical and substantially radial slots 29 in the wall of said head. Normally, the weight of the segments 25 keeps them in their lowermost

contracted position, shown in Fig. I, with the bolts 28 at the lower ends of the slots 29.

In practice, a blank B, of the pan-like form shown in Fig. I, is placed in the lower die 6 while the platen 5 is in the lower position shown. This blank B may itself be shaped by die pressing, or in any other suitable manner. Under these conditions, the bottom of the blank B rests on the bottom plate 20 and its rim *b* rests on the beveled upper ends of the die segments 16. When the plunger 14 is operated to raise the platen 5 and the structure 17, the plate 20 sinks to the bottom of the cavity in said structure 17, leaving the blank B suspended in the midst of the die segments 16 by its rim *b*. At the same time, the segments 16 may descend slightly in the conical cavity of the structure 17 (by gravity), crowding in on the blank B. As the platen 5 continues to rise, the inner die 8 eventually enters freely into the blank B, with the die segments 25 still in their contracted lower position shown in Fig. I, until the lower ends of the segments 25 strike the bottom of the blank B and their shoulders 27 strike the blank rim *b*. After this, further upward movement of the platen 5 (and the part 17) expands the die segments 25 within the blank B, and at the same time forces the die segments 16 downward in the structure 17 and contracts them upon the blank B. At the final squeeze, the die segments 16, 25 and the head 26 practically "bottom" in the external die 6, against the bottom of the blank B and the plate 20; which, as already mentioned, rests flat on the bottom of the cavity in the structure 17. Thus the blank B is brought to the crowned form shown in Fig. IV.

When the application of power is reversed and the platen 5 descends, the parts 25 descend (until the bolts 28 reach the lower ends of the slots 29) and the upper die 8 contracts sufficiently to allow it to be withdrawn through the contracted "mouth" of the blank B, without lifting the blank B or the segments 16 more than momentarily, at any rate. Eventually, the members 22 on the lower plate 12 strike the feet 21, on the support 20, and lift the segments 16 and the blank B to the position shown in Fig. I again, where said blank is loose and can readily be removed

If desired, the blank B may be turned somewhat in the die 6 after the above described operation, so as to bring its portions which were opposite the divisions of the die segments 16 into slightly different positions, and the dies 6, 8 again brought together on the blank B, thus assuring that it shall be perfectly formed. Thereafter, the blank B may be removed from the dies, ready for the operations necessary to join it bottom to bottom with a similar blank and complete the pulley.

Having thus described my invention, I claim:

1. In a device for making pulley halves from cylindrical pans with a top flange, the combination of an external die comprising a series of movable segments supported in a conically-walled structure, said segments having their inner surfaces curved in accordance with the crown to be given the pulley, means normally supporting said segments flush with the top of the recess in said structure with capacity for limited descent, and an internal die embodying a greater series of segments supported around and axially movable relative to a conical member, said latter segments having their outer surfaces complementarily curved and being externally shouldered for co-operation with the external die to contract and expand said external and internal dies, respectively, when the latter is forced into the former.

2. In a device for making complemental sheet metal pulley halves from preformed cylindrical pans having a beveled top flange, the combination of an external die comprising a number of movable segments slidably fitting in a conically-walled structure, said segments having their inner surfaces curved in accordance with the crown to be given the pulley, a false bottom normally sustaining said die segments in expanded position and elevated relative to the bottom of said structure, an internal die embodying a numerically greater number of external shouldered segments with their outer surfaces complementarily curved, said segments being disposed around a radially-slotted hollow conical head, and headed securing members for the latter die segments movable vertically in the slots of the conical head to permit expansion of said segments by co-operation of their shoulders with the external die.

In testimony whereof, I have hereunto signed my name at Philadelphia, Pennsylvania, this twenty-sixth day of April, 1928.

RUSSELL H. BOWEN.