Sept. 8, 1925. 1,552,416

J. BINGHAM

ARTICLE SHAPING AND BINDING MEANS

Filed Dec. 5, 1924 2 Sheets-Sheet 1

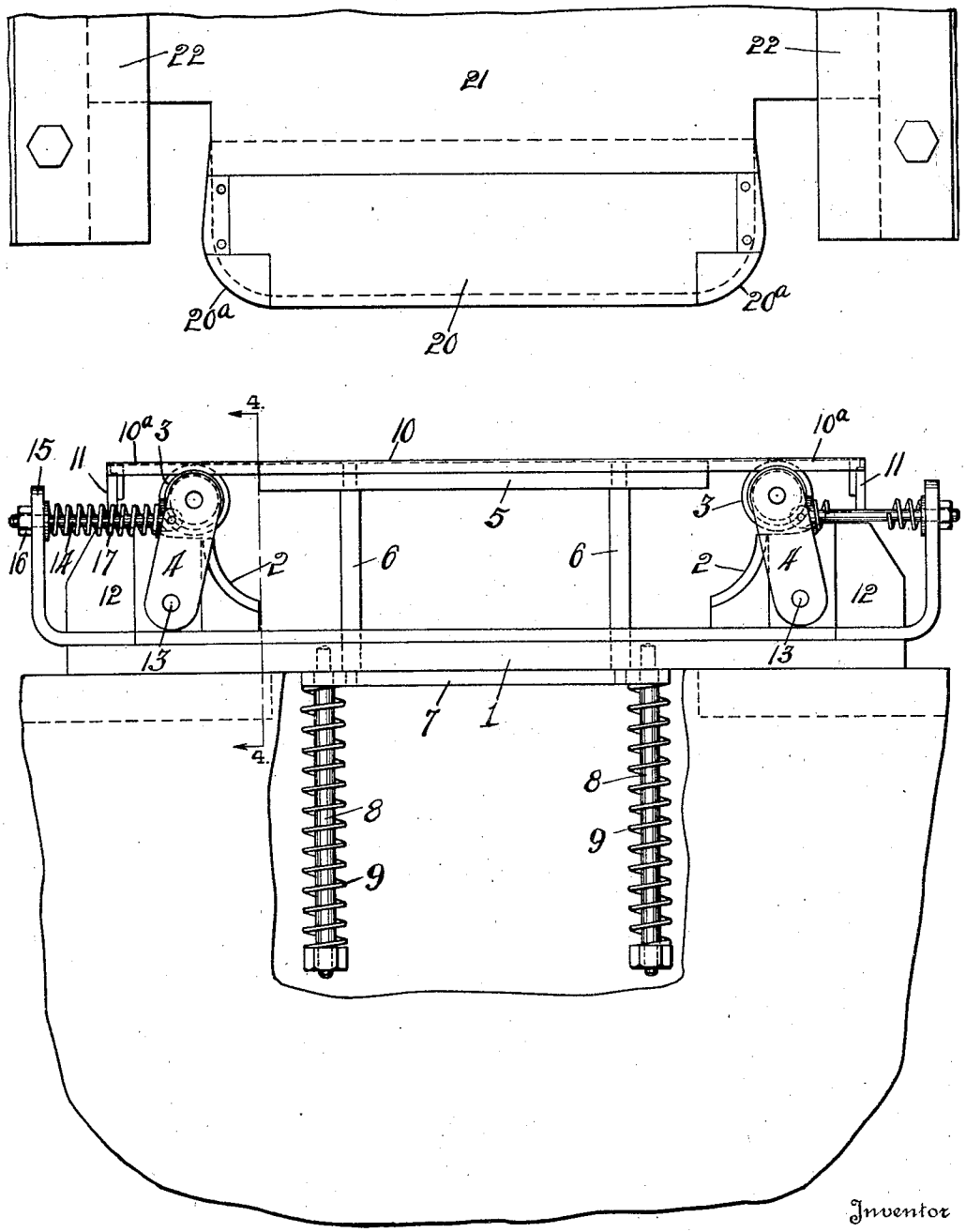


Fig. 1.

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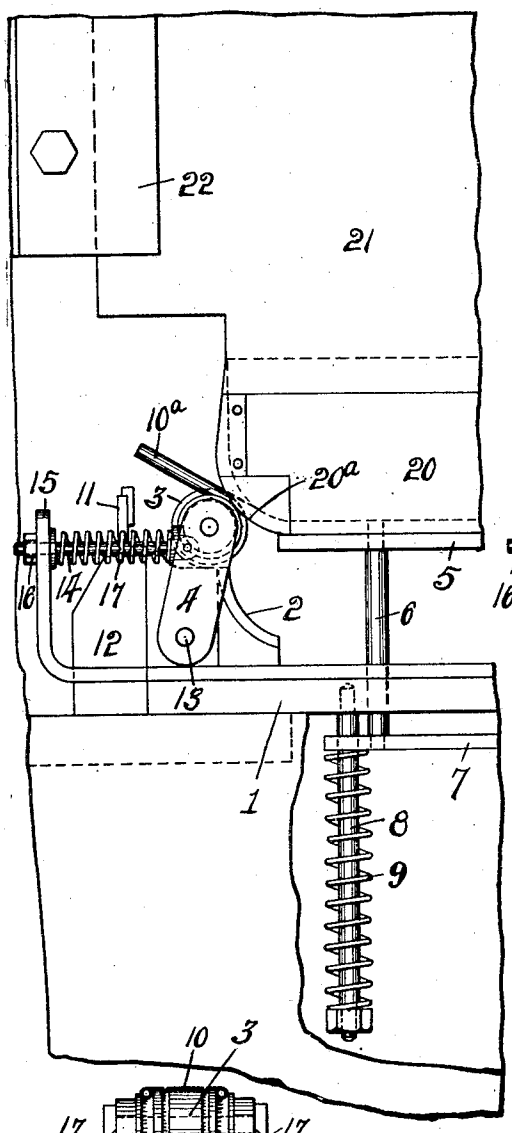


Fig. 2.

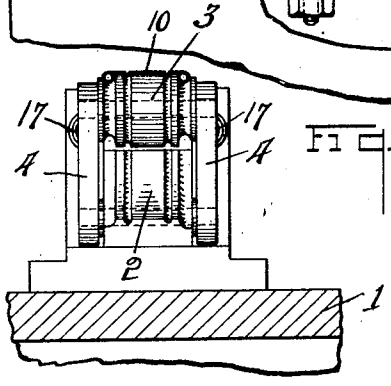


Fig. 4.

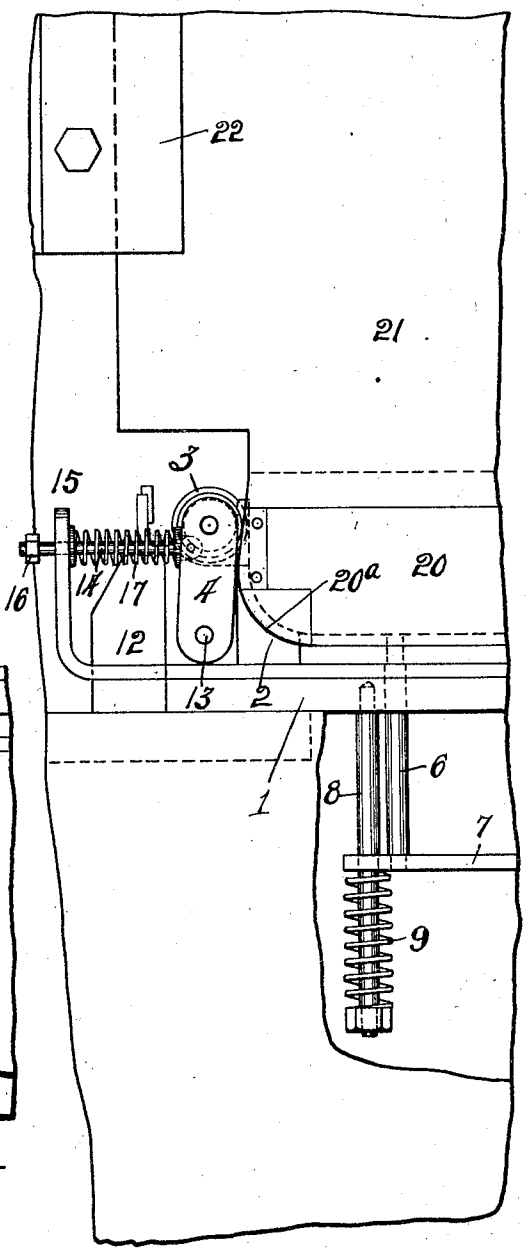


Fig. 3.

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# UNITED STATES PATENT OFFICE.

JEREMIAH BINGHAM, OF TOLEDO, OHIO, ASSIGNOR TO THE AMERICAN-NATIONAL COMPANY, OF TOLEDO, OHIO, A CORPORATION OF OHIO.

## ARTICLE SHAPING AND BINDING MEANS.

Application filed December 5, 1924. Serial No. 754,054.

*To all whom it may concern:*

Be it known that I, JEREMIAH BINGHAM, a citizen of the United States, and a resident of Toledo, in the county of Lucas and State of Ohio, have invented a new and useful Article Shaping and Binding Means, which invention is fully set forth in the following specification.

This invention relates to the manufacture of sheet metal articles, and particularly to means for bending or shaping sheet metal strips having rolls or beads therein extending lengthwise of the bend.

In the bending of sheet metal having rolls or beads therein extending across the point of bend lengthwise thereof, considerable difficulty is experienced in accomplishing such bend without flattening the roll or bead, breaking the metal thereof by reason of the stretching action, or causing a buckling of the metal at the inner side of the roll or bead, except where the roll or bead is of quite small diameter.

The object of the invention is the provision of a mechanical means to accomplish the bending of such metal in an easy, efficient and rapid manner without injury to a roll or bead thereof.

The invention is fully described in the following specification, and while in its broader aspect it is capable of embodiment in numerous forms, a preferred embodiment thereof is illustrated in the accompanying drawings, in which,—

Figure 1 is a fragmentary elevation of a press embodying the invention with a work-piece in position therein for bending. Fig. 2 is a similar view of a portion of the shaping parts shown in Fig. 1, with such parts at an intermediate stage in the bending action. Fig. 3 is a similar view with the parts in final work-shaping position, and Fig. 4 is a cross-section on the line 4, 4 in Fig. 1.

Referring to the drawings, 1 designates the bed-plate of a press on which, in the present instance, are mounted the two spaced stationary corner-shaping dies 2, 2 with each of which is associated a movable die including a roll 3 and rocker supports 4. A blank-holder 5 is mounted for vertical movements above the bed-plate 1 and between the dies 2, 2, and the movable die rolls 3, 3 are supported, in the present instance, by pins 6, which extend down thru the bed-plate and attach to a cross-piece 7 that is guided for vertical movements by bolts 8 and yieldingly supported by springs 9 on said bolts.

The work 10 before being bent is supported by the blank-holder 5 with the end portions thereof to be bent projecting beyond the ends of the blank-holder and over the respective die-rolls 3. The ends of the work may be supported beyond the die-rolls 3 by standards 11, which may also serve as centering means for the work.

Each roll 3 engages the underside of the respective portion of a work-piece 10 and has its periphery shaped to conform to the cross-sectional contour of the engaging portion of the work. The rockers 4 are two in number for each roll 3, the roll being disposed therebetween and journalled at its ends in the upper end portions of the rocker. The rockers extend down, in the present instance, at opposite sides of a bed block 12 and are pivoted thereto at 13 for rocking movements lengthwise of the work-piece 10. The blocks 12 at their inner sides form, brace or support the respective stationary dies 2. Each rocker 4 has a rod 14 pivotally projecting outwardly from its upper end portion in the plane of rocking movement of the rocker, and freely projects at its outer end through an arm 15 projecting upwardly from the adjacent end of the bed-plate 1. The rod 14 is provided with a nut or stop member 16 for engagement with the outer side of the arm 15 to limit the inward movements of the rockers 4, and a coiled compression spring 17 is mounted on each rod 14 intermediate its rocker 4 and arm 15 to yieldingly resist outward movement of the rockers. The rockers 4, when in normal position, are preferably inclined slightly inward from a vertical, as shown in Fig. 1.

The upper die 20 of the press is mounted above the blank-holder 5 and carried for vertical reciprocatory movements by a plunger 21 operating in guides 22, as well understood in the art. The die 20 constitutes the male die of the set and when lowered engages the work 10 in opposition to the blank-holder 5, forcing the central portion of the work and the blank-holder down and cooperating at its ends with the dies 2 and 3 to form the end bends in the work-piece, as illustrated in Figs. 2 and 3. The rounded ends or corner-shaping portions $20^a$ of the die 20 project beyond the ends of the blank-holder 5 and partially over the

respective rolls 3, so that upon a lowering of the die 20 it will act to partially lower or press down the portion of the work intermediate the rolls before coacting with the rolls to effect an outward swinging of the rolls as they follow the end contours of the die and bend or roll the end portions of the work around the ends of the male die as it completes its forming stock. The relationship of the rolls 3 and rounded corner portions $20^a$ of the die 20 is such that the rolls first engage the die substantially midway of the respective rounded corner portions $20^a$, and during the remainder of the downstroke of the die 20 the rolls follow the end contours of the die, being permitted to have yielding swinging movements for such purpose under the action of the springs 17. After the die 20 completes its forming stroke, the rounded corner portions $20^a$ thereof cooperate with the stationary dies 2 to give a finish and permanent set to the rounded corner portions of the work.

It is found in practice that the mounting of the rolls 3 for swinging movements about the axes of the respective centers 13 is important in the proper forming of the work, and that results are accomplished which cannot be accomplished by end dies mounted merely for rectilinear reciprocatory movements. It is also found that the best results are obtained by inclining the rockers 4 carrying the rolls 3 to such an extent inwardly from a vertical that the axes of the rolls will not pass the vertical plane of the rocking axes 13 of the rockers during their outward work-shaping movements. It is evident that the initial forming movement of the work which brings it to the shape shown in Fig. 2 takes place before the die 20 has moved into shaping coaction with the rolls 3 and before the rolls have any outward swinging movements. The rolls during this initial portion of the shaping operation merely serve as fulcrum supports for the end portions of the work, as the central portion thereof is forced down between the rolls, the end portions of the work assuming an inclined position during such action, as shown in Fig. 2. One advantage of having the rockers 4 inwardly inclined is to cause the pressure of the work on the rolls during the initial forming operation to be directed lengthwise of the rockers and toward the rocking axes thereof instead of exerting an outward lateral pressure on the rolls tending to effect an outward swinging thereof away from the die ends.

It is found in practice that with the arrangement of work-shaping parts, as shown, the end portions of the sheet metal workpieces 10 with the longitudinally extending rolled portions $10^a$ thereof are essentially given a right angle bend with respect to the cross or connecting portion of the work without effecting a flattening, breaking or buckling of the roll portions of the metal.

I wish it understood that my invention is not limited to any specific construction, arrangement or form of the parts, as it is capable of embodiment in numerous forms without departing from the spirit of the claim.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

In a machine for rolling the edges of sheet metal blanks, the combination of a male die having rounded corners, a vertically movable platform for supporting a sheet metal blank with the edges thereof extending a short distance therebeyond, means for yieldingly resisting downward movement of said platform, stationary female corner dies at the opposite edges of said platform, said dies being rounded to conform to the corners of the male die and positioned below the normal position of said platform, arms pivoted to said corner dies at their lower ends, rolls on the outer ends of said arms, and yielding means for holding the outer ends of said arms inwardly inclined with respect to said platform.

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

JEREMIAH BINGHAM.