Oct. 28, 1924. 1,513,644

T. A. SINDELAR

METHOD AND APPARATUS FOR FORMING BRAKE DRUMS

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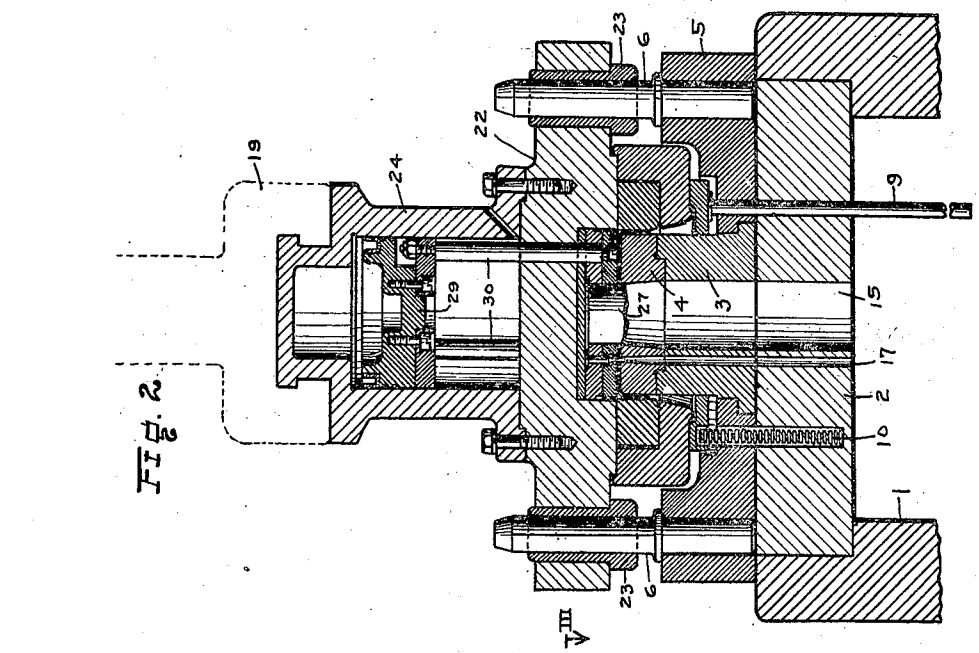


Fig. 2.

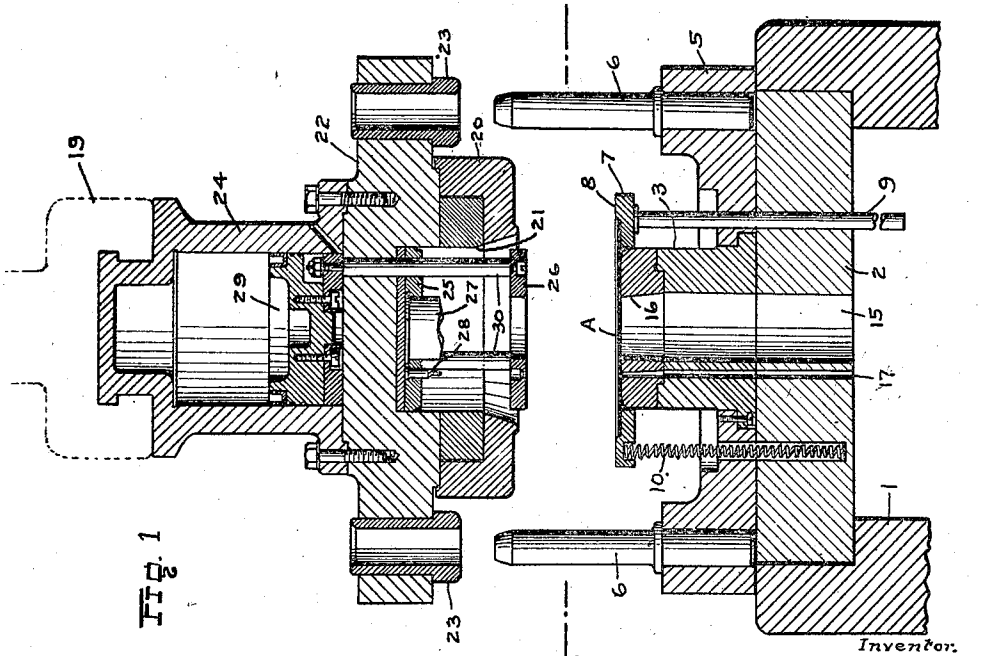


Fig. 1.

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METHOD AND APPARATUS FOR FORMING BRAKE DRUMS

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Fig. 3

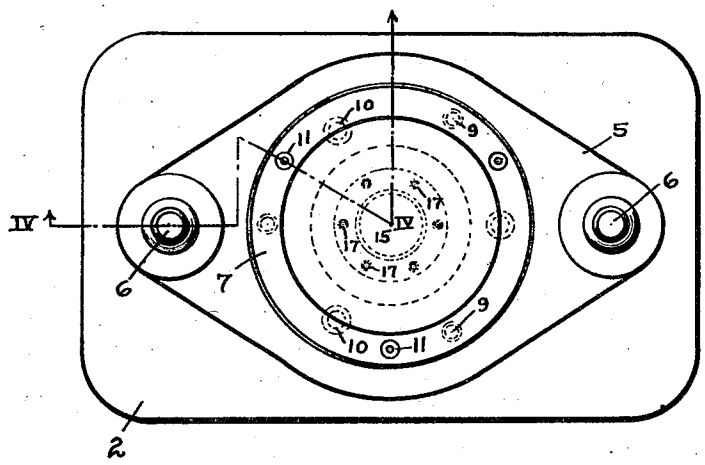
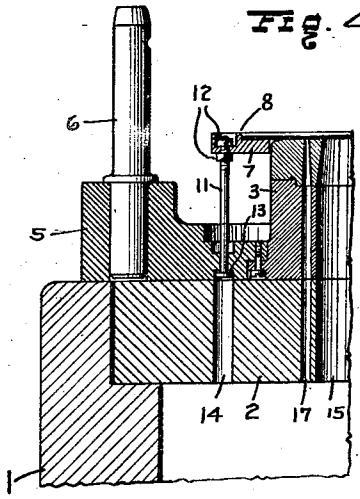


Fig. 4



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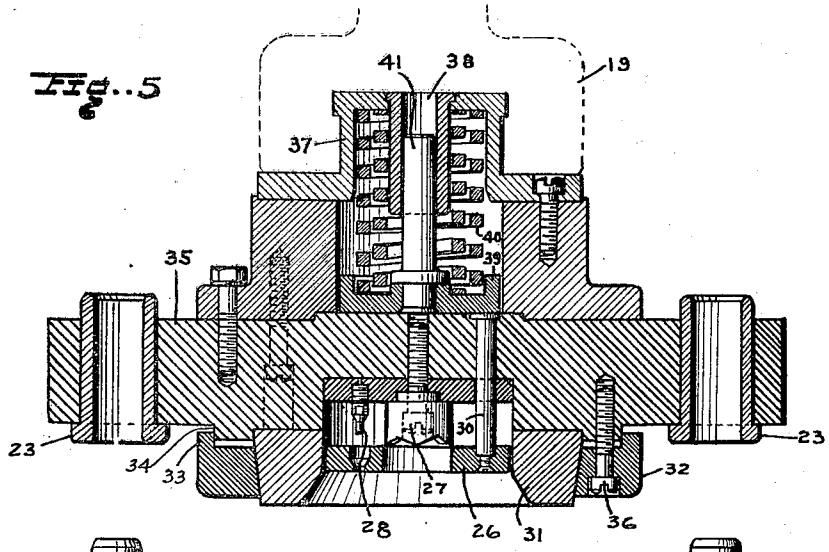
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Fig. 5



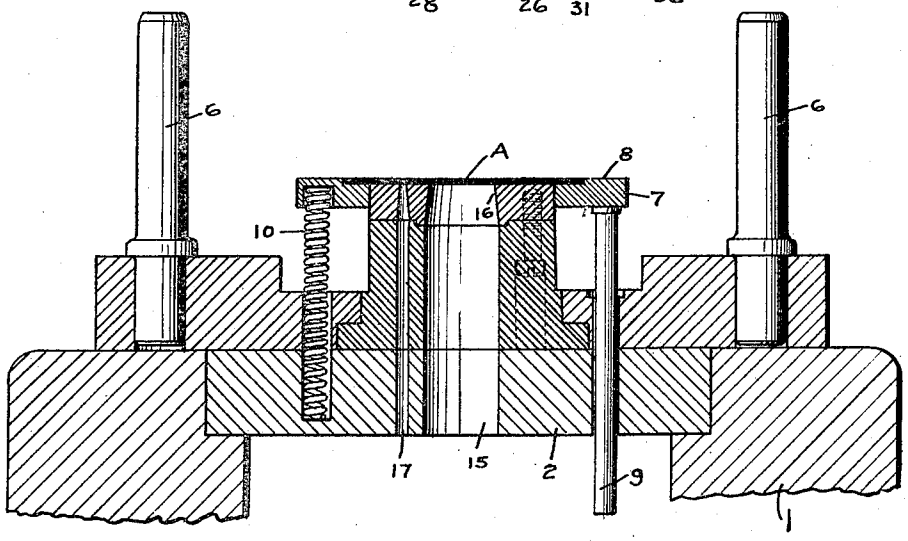
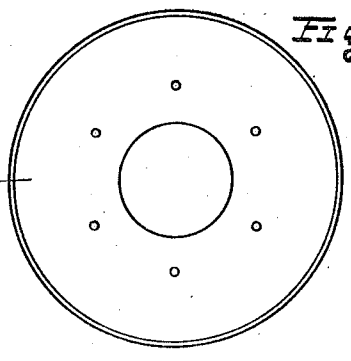


Fig. 6



Fig. 7



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UNITED STATES PATENT OFFICE.

THOMAS A. SINDELAR, OF CLEVELAND, OHIO, ASSIGNOR TO THE HYDRAULIC STEEL COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

METHOD AND APPARATUS FOR FORMING BRAKE DRUMS.

Application filed July 25, 1921. Serial No. 487,567.

To all whom it may concern:

Be it known that I, THOMAS A. SINDELAR, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Methods and Apparatus for Forming Brake Drums, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to apparatus for forming brake drums and it is the object of the invention to provide an apparatus adapted to turn up a true cylindrical flange from a circular sheet metal blank, and to perforate and straighten the back of the drum without distorting said cylindrical flange.

In the drawing forming a part of this specification,

Figure 1 is a central vertical section through the forming dies showing the movable die in raised position and a blank in position to be acted upon.

Fig. 2 is a sectional view similar to Fig. 1 but showing the dies in interengaging position with a fully formed and perforated drum therein.

Fig. 3 is a view taken on line 3—3 of Fig. 1 looking in the direction indicated by the arrows.

Fig. 4 is a detail sectional view taken on line 4—4 of Fig. 3 looking in the direction indicated by the arrows.

Fig. 5 is a sectional view similar to Fig. 1 of a modified form.

Figs. 6 and 7 are sectional and plan views respectively of a finished brake drum.

In the manufacture of automobile brake drums, considerable difficulty has been experienced, due to the distortion of the cylindrical flange in the back straightening and punching operations. The present invention contemplates the performance of the forming, punching and straightening operations in one stroke of the press, the cylindrical flange being firmly held to shape in the dies while the back is punched and straightened, whereby distortion thereof is positively prevented. No distorting stresses are set up in the metal, and a drum produced in which the flange is perfectly round, the back flat and the perforations perfectly centered.

The drawing press consists of a stationary supporting structure 1 upon which is mounted a supporting bed 2 upon the central portion of which is fixed a stationary plunger die 3 having a detachable face plate 4. Mounted in a casting 5 surrounding the die 3 is a pair of vertical guide pins 6. Surrounding and slidably mounted upon the die 3 is an annular blank supporting and stripping plate 7, which closely fits the cylindrical surface of the die and has peripheral blank positioning rib 8 upon its upper face. In stripping a finished drum from the die 4 the stripper plate is forced up by knock-out pins 9 which fit in vertical bores in the bed plate and are actuated by any suitable means (not shown) as is common in the art. The stripper plate 7 is supported by three equally spaced compression springs 10 which normally hold said plate in its uppermost position. The stripper plate 7 has also three equally spaced limit stop bolts 11 which are adjustably connected to the stripper plate 7 by means of nuts 12 and slidably fit in bores through the casting 5 and have an enlarged head 13 fitting in enlarged bores 14 in the bed 2. Axially of the punch die 3 is a vertical bore or passage 15 extending from the top of the die 3 down through the bed plate 2 and having a restricted punch receiving opening 16 at its upper end in the plate 4. Six equally spaced passages 17 of small diameter but otherwise similar to the central passage 15 surround said central passage. These passages permit slugs of metal removed by the punches to fall through.

The cooperating movable press member is attached to the plunger 19 of a hydraulic ram. The movable member comprises a pair of die rings 20 and 21 removably secured to the under side of a guide plate 22 which carries sleeves 23 registering with and slidable on the guide pins 6 and a hydraulic cylinder 24 to the lower end of which the guide plate 22 is detachably connected and to the upper end of which the plunger 19 is connected. The outer retaining die ring 20 forms the tapered entrance portion while the inner die ring 21 is substantially cylindrical to conform to the outer periphery of the finished drum. The inner ring 21 has an external diameter slightly less than the internal diameter of the ring 20 as shown in Fig. 1 so that the ring 21 can shift slightly to conform to the outer periphery of the drum when there are inequalities in the stock. This prevents the exertion of stresses

in the forming operation tending to shift the punches out of alinement with the apertures in the plunger die. The guide plate 22 has a recess registering with the ring 21 of sufficient depth to accommodate a stationary punch plate 25 and a movable presser plate 26. The punch plate 25 carries a large central punch 27 and six bolt hole punches 28 equally spaced circumferentially about the central punch 27. The punch 27 is alined with the passage 15 and the punches 28 are alined with the passages 17 in the plunger die 4, and the presser plate 26 has apertures registering with each of the punches 27 and 28. Attached at their lower ends to the outer portion of presser plate 26, extending upwardly through the guide plate 22 and attached to a piston 29 in the cylinder 24 are a series of guide rods 30. Any desired pressure will be maintained in the cylinder 24.

In operation the upper die member is raised to the position shown in Fig. 1 and a circular sheet metal blank A which just fits within the peripheral rib 8 of the stripper plate 7 is laid upon the stationary plunger die 3, the stop bolts 11 (Fig. 4) being adjusted to bring the upper face of the plate 7 flush with the upper face of the die. Downward movement of the plunger 19 brings the presser plate 26 into engagement with the blank A and fluid pressure on the piston 29 maintains the presser plate 26 in firm contact with the blank throughout the forming operation. The clamping action of the presser plate 26 prevents any shifting of the blank during the forming operation and maintains the blank A flat against the face of the plunger die 3, positively holding the central portion of the blank against distortion, while the circumferential flange is being formed. As the upper die member approaches the end of its stroke the central punch 27 and the circumferential punches 28 enter the corresponding apertures in the presser plate 26 and are forced through the blank and into the passages 15 and 17 through which the punched out metal falls. In the meantime the passage of the die rings 20 and 21 over the upper end of the plunger die 3 has formed the cylindrical flange as shown in Fig. 2. At the end of the stroke the plate 26 bottoms against the base plate 25 and the full pressure of the ram is exerted upon the brake drum back to positively straighten out any deformation resulting from the flange forming operation.

Upon the return movement of the upper die member the presser plate 26 holds the finished drum upon the plunger die 3 with considerable pressure until after the die rings 20 and 21 are lifted clear, stripping the drum from the ring 20 and at the same time preventing distortion of the back of the drum by pressing it against the flat face of the plunger die 3. As the stripper plate 7 is lifted by the springs 10 it strips the finished drum B from the plunger die 3, whereupon the finished drum may be removed, another blank inserted and the above described operation repeated.

In Fig. 5 is shown a modification suitable for lighter work. In Fig. 4 the stationary die and support is exactly the same as in Figs. 1 and 2 and the same numerals have been applied to the various parts thereof. The movable die member comprises a die ring 31 having a beveled outer surface and a clamping ring 32 having a correspondingly beveled inner surface fitting over the beveled ring 31 and a circumferential upwardly extending aligning flange 33 fitting over a shoulder 34 on the guide plate 35 and held in place by bolts 36. The presser plate and guide rods therefor as well as the bed plate and punches are the same as corresponding parts in Figs. 1 and 2 and have the same reference numerals. The fluid cylinder, however, is replaced with a spring chamber 37 provided with a guide sleeve 38. Interposed between the upper end of the chamber 37 and a plate 39 carried by the upper ends of the guide rods 30 is a compression spring 40. Extending upwardly from the plate 39 is a guide pin 41 engaging the guide sleeve 38.

The operation of the modification shown in Fig. 5 is substantially the same as described in connection with Figs. 1 to 4.

Having described my invention, what I claim is:

A combined forming and punching press comprising a socket die having a fixed bed plate, a central punch and a set of auxiliary punches surrounding the same, carried by said plate, a presser plate slidably mounted in said die and having apertures in alignment with said punches, guide rods secured to said presser plate and extending through said bed plate, and a piston connected to said guide rods.

In testimony whereof, I hereunto affix my signature.

THOMAS A. SINDELAR.