Feb. 10, 1925. 1,526,013

T. M. ROSEBERRY

BRAKE DRUM BLANKING, FORMING, AND PIERCING APPARATUS

Filed April 5, 1923 5 Sheets-Sheet 1

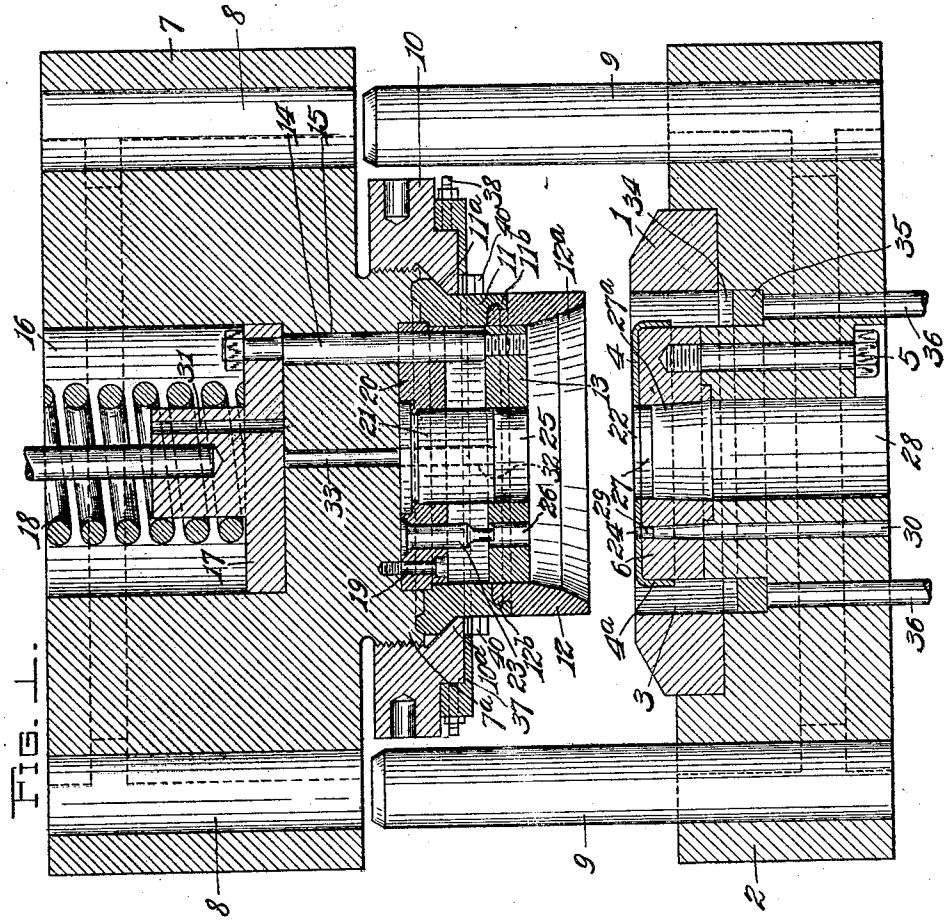


FIG. 1.

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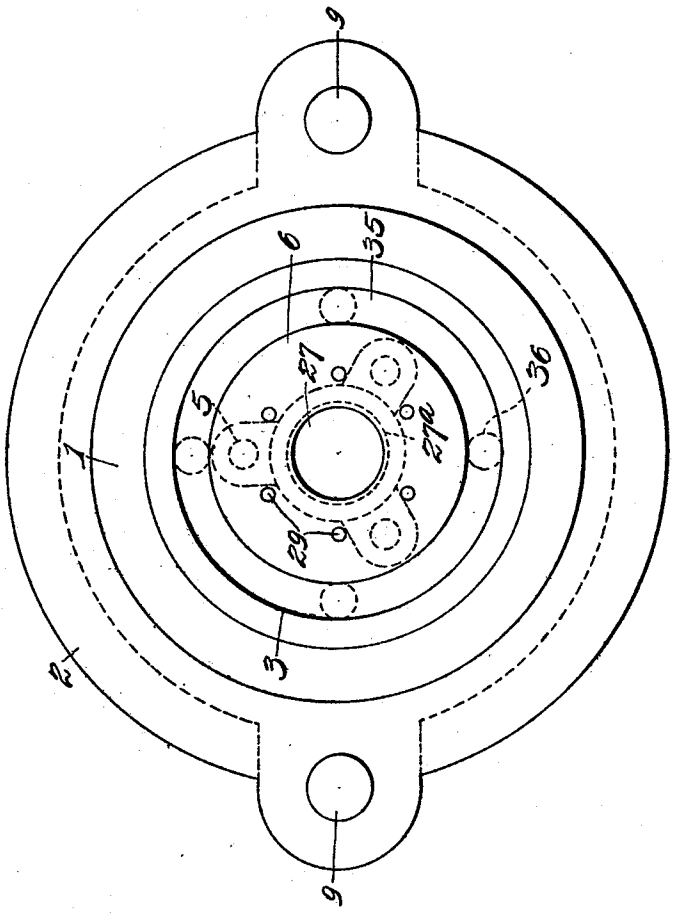
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BRAKE DRUM BLANKING, FORMING, AND PIERCING APPARATUS

Filed April 5, 1923 5 Sheets-Sheet 2

Fig. 2.



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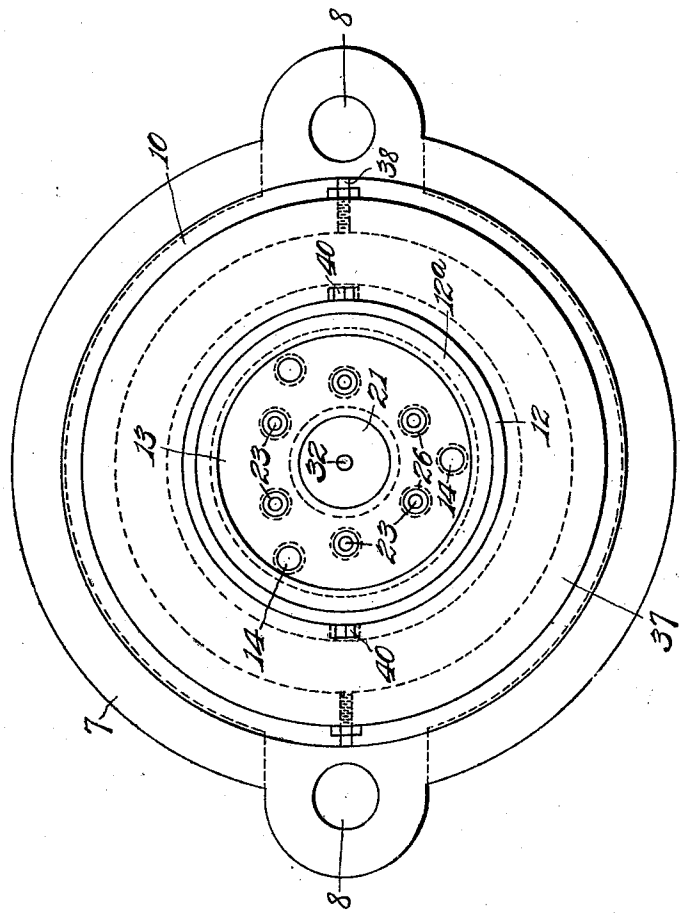
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BRAKE DRUM BLANKING, FORMING, AND PIERCING APPARATUS

Filed April 5, 1923 5 Sheets-Sheet 3

FIG. 7.



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BRAKE DRUM BLANKING, FORMING, AND PIERCING APPARATUS

Filed April 5, 1923 5 Sheets-Sheet 4

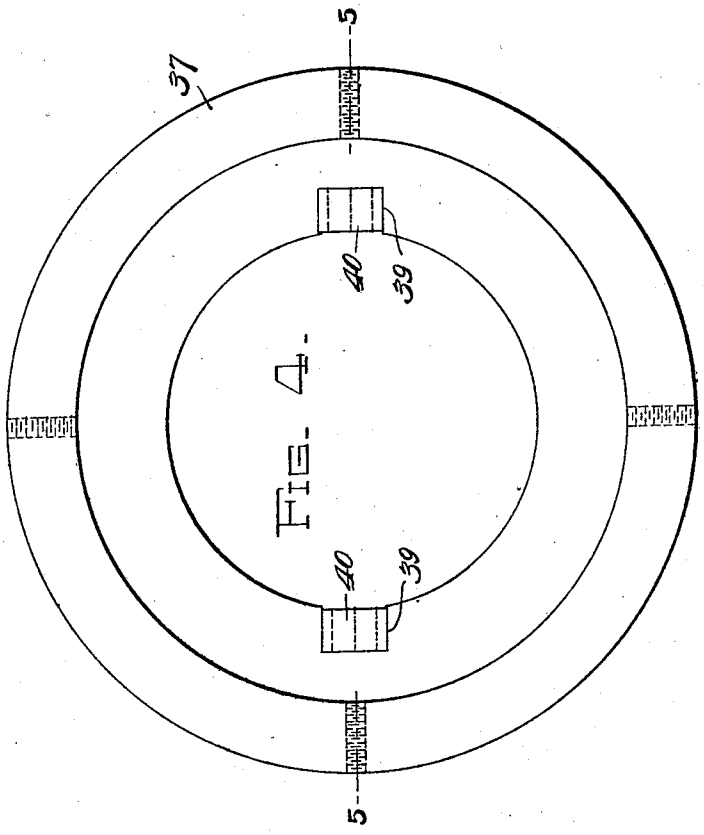


Fig. 4.

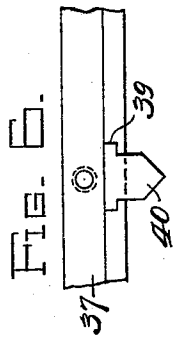


Fig. 6.

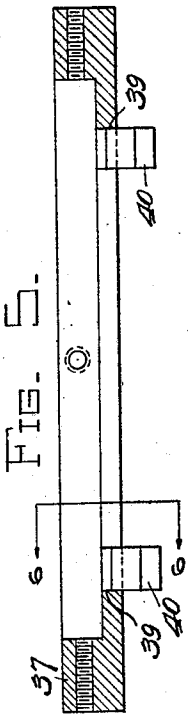


Fig. 5.

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BRAKE DRUM BLANKING, FORMING, AND PIERCING APPARATUS

Filed April 5, 1923 5 Sheets-Sheet 5

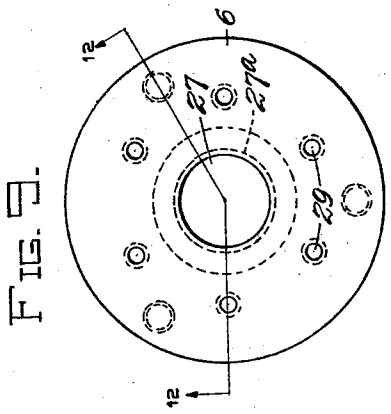


Fig. 9.

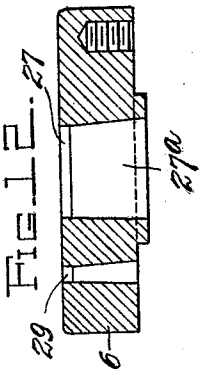


Fig. 12.

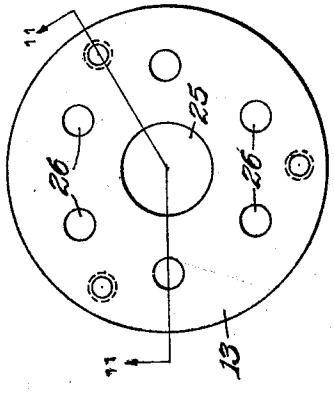


Fig. 8.

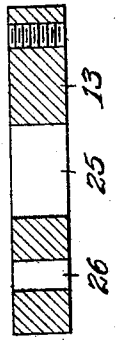


Fig. 11.

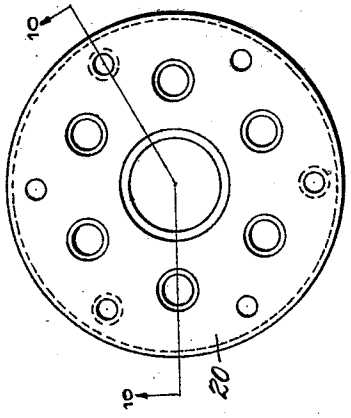


Fig. 7.

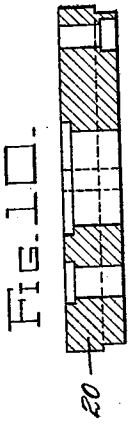


Fig. 10.



Fig. 13.

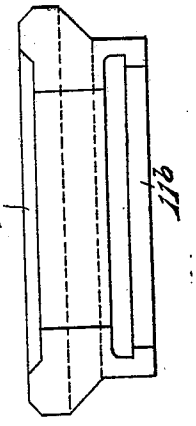


Fig. 14.

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Patented Feb. 10, 1925. 1,526,013

UNITED STATES PATENT OFFICE.

THAYER MELVIN ROSEBERRY, OF WHEELING, WEST VIRGINIA, ASSIGNOR OF ONE-HALF TO HAROLD J. DINGER, OF WHEELING, WEST VIRGINIA.

BRAKE-DRUM BLANKING, FORMING, AND PIERCING APPARATUS.

Application filed April 5, 1923. Serial No. 630,100.

To all whom it may concern:

Be it known that I, THAYER MELVIN ROSEBERRY, a citizen of the United States of America, and resident of Wheeling, county of Ohio, and State of West Virginia, have invented certain new and useful Improvements in Brake-Drum Blanking, Forming, and Piercing Apparatus, of which the following is a specification.

This invention relates broadly to apparatus for the manufacture of brake drums and similar sheet metal articles, and more specifically to a blank cutting and shaping die mechanism.

The primary object of the invention is to provide apparatus adapted to be carried by a power press whereby a complete brake drum of the character employed on motor vehicles is produced in a single stroke of the press.

A further object is to provide an apparatus of the character mentioned, which at each complete reciprocation of the press head or slide stamps a blank from a sheet of metal, presses said blank into shape, punches therein the required holes, and strips the completed drum from the form-die or dies.

With these and other important objects in view, the invention resides in the features of construction, arrangement of parts and combinations of elements which will hereinafter be fully described, reference being had to the accompanying drawings, in which—

Figure 1 is a central vertical section of the invention;

Figure 2 is a top plan view of the lower die mechanism;

Figure 3 is a bottom plan view of the upper die mechanism;

Figure 4 is a bottom plan view of the waste metal, or scrap, cutter;

Figure 5 is a section on line 5—5, Fig. 4;

Figure 6 is a fragmentary detail viewed as indicated on line 6—6, Fig. 5;

Figure 7 is a top plan view of the punch holding plate, detached;

Figure 8 is a similar view of the punch stripping plate;

Figure 9 is a similar view of the die block;

Figures 10, 11 and 12 are sections taken on lines 10—10, 11—11 and 12—12 of Figs. 7, 8 and 9, respectively;

Figure 13 is a top plan of a segment of the draw ring; and—

Figure 14 is an inner face view of the same.

Referring to said drawings, 1 indicates a circular die stationarily mounted upon a heavy plate or holder 2 which is adapted to be clamped, as ordinarily, upon the bed of the press. Said die has therein a large central bore 3 of the diameter of the blank of which the brake drum 4 is formed. Rigidly attached to the die holder 2, as by means of upwardly directed stud bolts 5, is a die block 6 which has a diameter corresponding to the internal diameter of the drum 4 to be formed and which is located concentrically with repect to the die 1 and at a distance from the latter corresponding to the width of the peripheral flange 4^a of said drum.

A punch holding block 7 is designed for attachment to the cross-head of the press in the usual manner and has therein a plurality of bores 8 adapted to receive guide pins 9 carried by the die holder 2 whereby, in reciprocation of the press, said block 7 is accurately guided. Said block has a lower exteriorly threaded neck portion 7^a upon which is screwed a ring nut 10 whereby a segmental or sectional draw ring 11 is clamped in underlying seated relation to said punch holder 7, said nut having its lower portion shaped to form an internal annular lip 10^a with a downwardly and inwardly inclined or beveled upper face upon which rides a correspondingly inclined external shoulder 11^a formed on said draw ring.

The draw ring has the lower portion thereof in closely-embracing supporting relation to the upper portion of a cutting and shaping ring 12 which is adapted, first, to cooperate with the die 1 for cutting brake drum blanks from sheets of metal introduced between said die and said ring, and, second, to cooperate with the die block 6 for bending said blanks to form the flanges 4^a of the drums. Said ring 12 is vertically alined with the bore 3 of said die 1 and has an external diameter substantially corresponding to that of said bore. Thus, when the ring descends with the down stroke of the press, the lower outer edge of the ring and the upper inner edge of the

die cooperate in the manner of shears for cutting the blank.

The upper portion of the cutting ring 12 has an internal diameter corresponding to that of the segmental draw ring 11 and has its interior walls coincident with those of the latter for guiding in its reciprocating movements a thereby embraced stripper plate 13 which has a diameter substantially corresponding to that of the die block 6, while the internal diameter of the portion of said cutting ring located below the limit of downward movement of said stripper plate is gradually increased downward to the lower edge of said ring, thereby to provide an internal forming face 12^a which, in the descent of the ring following shearing of the drum blank, acts upon said blank to gradually and positively bend downwardly and inwardly the circular outer edge portion of the latter into closely seated embracing relation to the upper periphery of the die block for forming the drum flange 4^a.

The supporting means for the cutting ring 12 consists of an annularly channeled neck 12^b formed on said ring and an internally channeled collar portion 11^b formed on said draw ring 11, said portions being closely interfitted, as shown in Fig. 1.

The stripper plate 13 is rigidly carried upon the lower ends of a plurality of bolts 14 which are vertically movable in holes 15 provided therefor in the punch holding block 7 and which open at their upper ends into a centrally located socket 16 provided in the upper part of said block. The upper ends of said bolts carry thereon a plate 17 which is vertically movable in said socket and which is normally held depressed in seated relation to the bottom of said socket by means of a spiral compression spring 18 that has its upper end resting against the cross-head (not shown) of the press. Due to the fact that the stripper plate 13 is rigidly connected to the plate 17 through the intermediacy of the bolts 14, as aforesaid, said stripper plate is normally held depressed in the position shown in Fig. 1. In said position, said stripper plate yieldingly seats upon the shaped drum 4 at an intermediate point in the downstroke of the press slide and remains so seated until the same point is reached in the upstroke of said slide, performing a function which will hereinafter be made apparent.

Attached to the under face of the punch block 7, as by means of bolts 19, and partially embraced by the sectional draw ring 11 is a plate 20 having rigidly mounted therein a center punch 21 whereby a large central opening or hole 22 is punched in the drum 4 and also having a plurality of circularly arranged smaller punches 23 whereby bolt holes 24 are punched in said drum, said punches 21 and 23 projecting a suitable distance from the under face of said punch-holding plate 20. Said punches 21 and 23 operate through holes 25 and 26 provided therefor in the stripper plate 13 and act in the final portion of the downstroke of the press to shear out clean-cut holes 22 and 24.

The die block 6 has therein a central vertical bore 27 the annular upper edge wall of which cooperates with the center punch 21 for shearing away the metal in the production of the hole 22. Said bore is gradually increased in diameter, as shown at 27^a, from a point closely adjacent to its upper end to its lower end to provide clearance for the cut-out slugs produced in the formation of the holes 22, and registering with the lower end of the tapered portion 27^a is a bore 28 in the die holder 2, through which the slugs are discharged by gravity.

In like manner, bores 29 are provided in the die block 6 for the smaller slugs removed from the drum blank by the punches 23, said bores also having their lower portions of increased diameter and registering with slug-passages 30 provided in the die holder.

In the return, or upward, stroke of the press, the force exerted by the then compressed spring acts to hold the stripper plate 13 seated upon the drum 4 until the punches 21 and 23 have been wholly withdrawn, thus effecting positive stripping of said drum from said punches and eliminating the possibility of the drum being elevated either with said punches or with the cutting ring 12.

To prevent the trapping of air between the spring pressed plate 17 and the bottom of the socket 16 which would tend to interfere with seating of said plate following elevation of the latter, one or more air vents 31 extending through said plate are provided. Also, to prevent the formation of a vacuum between the punch 21 and slugs sheared from the drum blank which would tend to draw such plugs upward with said punch within the hole 25 in the stripper plate, small registering vents 32 and 33 are provided in said punch and the punch block, the vent 33 opening into the lower end of the socket 16.

Disposed within a circular channel 34 provided in the die holder 2 in register with the lower end of the open space between the die 1 and the die block 6 is a metal knock-out ring 35. A plurality of relatively spaced vertical rods 36 have their upper ends in underlying seated relation to said ring, said pins being vertically movable through the die holder 2 and being adapted for actuation in the upstroke of the press slide, for elevating said ring to a point at which it has effected stripping of the formed

brake drum from the die block. It is designed that said rods shall be attached to and carried by any suitable form of frame suspended from and movable with the slide of the press.

In practice, it is usual to feed metal to the press in sheets of considerable length, such sheets being advanced the requisite distance following each cutting and forming operation. To avoid the formation of long unwieldy strips of waste or scrap material as successive blanks are cut from a sheet, means is provided for severing waste material following cutting of each blank and in the same reciprocation of the press slide in which the blank is cut and shaped. Said means comprises a ring 37 suitably attached to the ring nut 10, as by means of a plurality of set screws 38, and having a portion disposed in closely underlying relation to said ring nut and embracing the sectional draw ring 11. Fitted into slot-like seats 39 provided therefor at diametrically opposite points in the inner edge of said ring 37 are blades 40 having downwardly presented beveled cutting edges which at the extreme limit of downward movement of the press slide coact with the top face of the die 1 for shearing off the opposite laterally disposed waste strips of metal remaining following the cutting of the blank.

It will be noted that the stripper plate 13 is held by the pressure of the spring 18 in firmly seated position upon the drum blank during the drawing or shaping operation, thus maintaining the face of the drum perfectly flat.

It will be manifest from the foregoing that the mechanism described provides for the complete formation and the stripping from the press of a brake drum with each complete reciprocation of the press head or slide.

What is claimed is—

1. A brake-drum blanking and forming apparatus comprising a die block having punch receiving holes therein, a lower die encircling said block at a spaced distance therefrom, an upper die embodying a reciprocable carrying block, a cutting and shaping ring adapted to cooperate with said lower die for cutting blanks from a metal sheet and with said die block for forming a peripheral flange on said blank, a segmental draw ring carried by said upper die in supporting relation to said cutting and shaping ring, punches supported by said carrying block, spring pressed punch stripping means through which said punches operate, and knock-out means operable intermediate the lower die and the die block.

2. A brake-drum blanking and forming apparatus comprising a die block having punch receiving holes therein, a lower die encircling said block at a spaced distance therefrom, an upper die embodying a reciprocal carrying block, a cutting and shaping ring adapted to cooperate with said lower die for cutting blanks from a metal sheet and with said die block for forming a peripheral flange on said blank, said ring having the lower part thereof presenting a downwardly and outwardly inclined internal annular face, a segmental draw ring carried by said upper die in supporting relation to said cutting and shaping ring, punches carried stationarily by said carrying block, and movable punch stripping means disposed interiorly of said cutting and shaping ring and having said punches operating therethrough.

3. A brake-drum blanking and forming apparatus comprising a die block having punch receiving holes therein, a lower die encircling said block at a spaced distance therefrom, an upper die embodying a reciprocable carrying block, a cutting and shaping ring adapted to cooperate with said lower die for cutting blanks from a metal sheet and with said die block for forming a peripheral flange on said blank, said ring having the lower part thereof presenting a downwardly and outwardly inclined internal annular face, a segmental draw ring carried by said upper die in supporting relation to said cutting and shaping ring, punches carried stationarily by said carrying block, a spring pressed punch-stripping plate disposed interiorly of said cutting and shaping ring and over which the latter is movable, said plate having said punches operating therethrough.

4. A brake drum blanking and forming apparatus for power presses, comprising a circular die block having punch receiving holes therein, a lower die encircling said block and spaced with respect to the latter to form an intermediate circular passage, a carrying block reciprocable with movements of the head of the press relative to said lower die, a cutting and shaping ring, a segmental draw ring disposed in embracing supporting relation to a portion of said cutting and shaping ring, means clamping said draw ring to said carrying block and for closing said draw ring upon said cutting and shaping ring, punches carried by said carrying block, and means for stripping the punched blank from said punches.

5. A brake drum blanking and forming apparatus for power presses, comprising a circular die block having punch receiving holes therein, a lower die encircling said block and spaced with respect to the latter to form an intermediate circular passage, a carrying block reciprocable with movements of the head of the press relative to said lower die, a cutting and shaping ring, a segmental draw ring disposed in embracing supporting relation to a portion of said cut-

ting and shaping ring, means clamping said draw ring to said carrying block and for closing said draw ring, punches carried by said carrying block, and a plate disposed within the embrace of said rings and movable relative to said punches whereby the punched blank is stripped from the latter.

6. A brake drum blanking and forming apparatus for power presses, comprising a circular die block having punch receiving holes therein, a lower die encircling said block and spaced with respect to the latter to form an intermediate circular passage, a carrying block reciprocable with movements of the head of the press relative to said lower die, a cutting and shaping ring, a segmental attaching ring for said cutting and shaping ring, said cutting and shaping ring being adapted to cooperate with said lower die for cutting blanks from a metal sheet and with said die block for forming a peripheral flange on said blank, and means operable within said circular passage for stripping a formed blank from said die block.

7. A brake drum blanking and forming apparatus for power presses, comprising a circular die block having punch receiving holes therein, a lower die encircling said block and spaced with respect to the latter to form an intermediate circular passage, a carrying block reciprocable with movements of the head of the press relative to said lower die, a cutting and shaping ring, a segmental draw ring disposed in embracing supporting relation to a portion of said cutting and shaping ring, means clamping said draw ring to said carrying block and for closing said draw ring upon said cutting and shaping ring, punches carried by said carrying block, a plate disposed within the embrace of said rings and having said punches operable therethrough, and resilient means normally holding said plate depressed in position for seating upon the blank at an intermediate point in the downstroke of the press and adapted to actuate said plate to strip formed blanks from said punches as the latter are elevated.

8. A brake drum blanking and forming apparatus for power presses, comprising a circular die block having punch receiving holes therein, a lower die encircling said block and spaced with respect to the latter to form an intermediate circular passage, a carrying block reciprocable with movements of the head of the press relative to said lower die, a cutting and shaping ring, a segmental draw ring disposed in embracing supporting relation to a portion of said cutting and shaping ring, a ring nut for attaching said draw ring to said carrying block and for closing said draw ring upon said cutting and shaping ring, and punches carried by said carrying block.

9. A brake drum blanking and forming apparatus for power presses, comprising a circular die block having punch receiving holes therein, a lower die encircling said block and spaced with respect to the latter to form an intermediate circular passage, a carrying block reciprocable with movements of the head of the press relative to said lower die, a cutting and shaping ring, a segmental draw ring disposed in embracing supporting relation to a portion of said cutting and shaping ring, a ring nut for attaching said draw ring to said carrying block and for closing said draw ring upon said cutting and shaping ring, punches carried by said carrying block, and means for effecting stripping of the punched blank from said punches.

10. A brake drum blanking and forming apparatus for power presses, comprising a circular die block having punch receiving holes therein, a lower die encircling said block and spaced with respect to the latter to form an intermediate circular passage, a carrying block reciprocable with movements of the head of the press relative to said lower die, a cutting and shaping ring, a segmental draw ring disposed in embracing supporting relation to a portion of said cutting and shaping ring, a ring nut for attaching said draw ring to said carrying block and for closing said draw ring upon said cutting and shaping ring, punches carried by said carrying block, and spring pressed means through which said punches operate arranged to strip the punched blank from said punches.

11. A brake drum forming and piercing apparatus for power presses, comprising a die block having punch receiving holes therein, a carrying block reciprocable relative to said die block with movements of the head of the press, a shaping ring, means embodying a segmental ring for removably attaching said shaping ring to said carrying block, said shaping ring being adapted to cooperate with said die block for forming a peripheral flange on an interposed sheet metal blank, punches carried by said carrying block, a spring pressed member movable within the embrace of said shaping ring and having said punches operable therethrough, said member being adapted to seat upon the blank at an intermediate point in the downstroke of the press and also to strip the formed blank from said punches as the latter are elevated.

In testimony whereof I affix my signature in presence of two subscribing witnesses.

THAYER MELVIN ROSEBERRY.

Witnesses:
G. O. SMITH,
H. E. DUNLAP.