

Sept. 1, 1925.

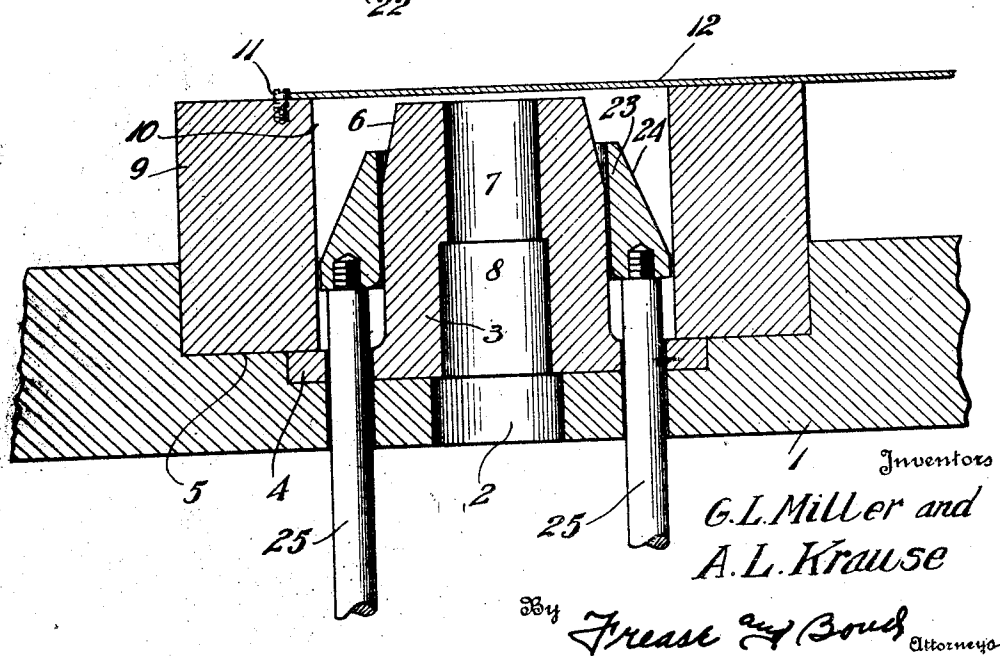
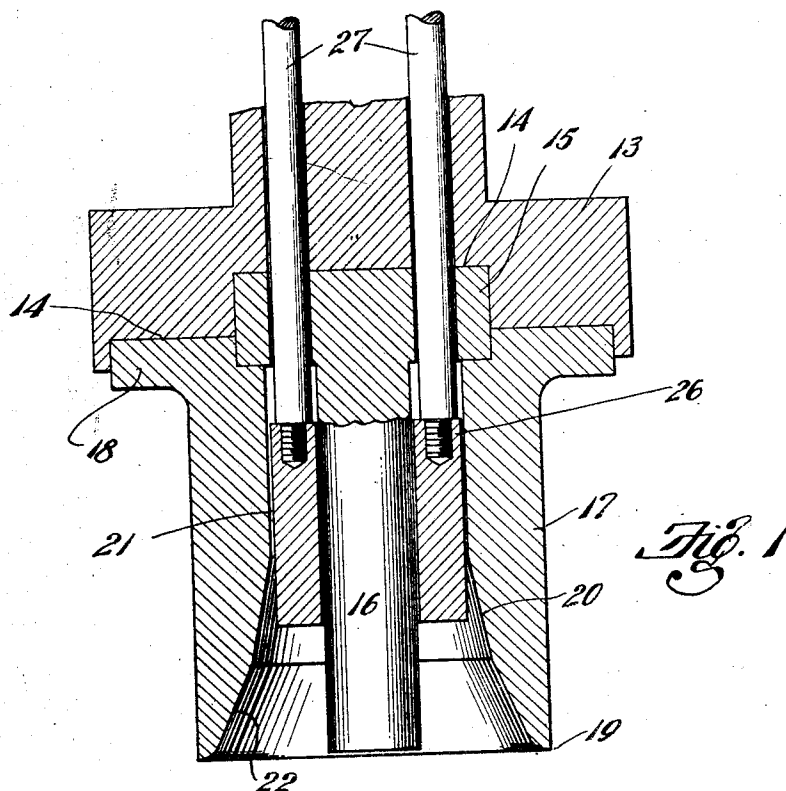
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G. L. MILLER ET AL

DIE

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2 Sheets-Sheet 1



UNITED STATES PATENT OFFICE.

GEORGE LEE MILLER AND ALBERT L. KRAUSE, OF CANTON, OHIO, ASSIGNORS, BY
MESNE ASSIGNMENTS, TO THE TIMKEN ROLLER BEARING COMPANY, OF CANTON,
OHIO, A CORPORATION OF OHIO.

DIE.

Application filed April 18, 1923. Serial No. 632,867.

To all whom it may concern:

Be it known that we, GEORGE LEE MILLER and ALBERT L. KRAUSE, both citizens of the United States, and both residing at Canton, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Dies, of which the following is a specification.

This invention relates to dies and more particularly to a die for shearing, punching and shaping cup shaped blanks from a flat strip or plate in a single operation.

The objects of the improvement are to provide a die of this character including upper and lower shearing, punching and shaping dies arranged to cooperate to simultaneously shear, punch and shape a cup shaped blank for roller bearing cages from a flat strip or plate of metal, in a single operation of the dies, the finished blank being properly punched, shaped and sized for producing a roller bearing cage.

The above and other objects may be attained by constructing the dies in the manner illustrated in the accompanying drawings, in which—

Figure 1 is a vertical, sectional view through the upper and lower dies, showing the same in the open or initial position, a strip of metal being shown in position to be operated upon by the dies;

Fig. 2, a view similar to Fig. 1, showing the dies in the closed or operative position, a finished blank being shown therein, and

Fig. 3, a detail perspective view of the finished blank formed in the dies.

Similar numerals of reference indicate corresponding parts throughout the drawings.

The lower or stationary portion of the die is mounted upon a bed or table 1, provided with a central aperture 2 to form an outlet for the slugs which are punched from the blanks in the operation of the dies.

The lower sizing or shaping die preferably comprises a substantially cylindrical member 3 provided at its lower end with the flange 4 mounted in the recess or pocket 5 in the bed 1.

The upper end of the cylinder 3 is coned as at 6, forming the lower sizing or shaping die and a central, vertical bore 7 is provided through the same, forming the lower punching die, this bore being enlarged near the lower end as at 8 to provide a clearance

for the slugs as they are punched from the blanks.

The lower shearing or blanking die comprises a block 9 located within the recess 5 of the bed and preferably resting upon the flange 4 and provided with a central, cylindrical bore 10 spaced from and concentric with the lower sizing or shaping die. A stop pin 11 may be provided upon the top of the block 9 to engage the end of the metal strip or plate 12 from which the blanks are formed.

It will be noted that the top of the lower shearing or punching die extends upward a slight distance above the top of the lower sizing or shaping die, providing a clearance to permit the blank to be sheared from the strip before the same is brought into engagement with the lower sizing or shaping die.

The upper member of the die is mounted in a vertically reciprocating head 13 provided with the central recess 14 which receives the upper flanged end 15 of the central punch 16, which is aligned with the lower punching die 7.

The hollow cylindrical member 17 is provided with the upper flange 18 received into the recess 14. The lower end of the cylindrical die 17 extends slightly beyond the lower end of the center punch as best shown in Fig. 1, and the outer diameter of the die 17 is of proper size to pass within the lower shearing die 10, as shown in Fig. 2, the lower peripheral edge of the cylinder 17, indicated at 19, forming the upper shearing or blanking die.

The upper sizing or shaping die 20 comprises a conical bore of slightly greater diameter than the lower shaping or sizing die, terminating at its upper end in the cylindrical bore 21 and at its lower end in the outwardly flared, conical surface 22.

A knock-out is provided in the lower die and comprises the ring 23 having the outer conical surface 24 conforming to the flared surface 22, this knock-out being provided with rods 25 arranged to be operated in any usual and well known manner to raise the knock-out as the head of the press starts its upward movement.

A similar knock-out is provided in the upper die and comprises the ring 26 mounted in the bore 21 of the die and provided with the rods 27 arranged to move downward in

any usual manner, as the head starts its upward movement, these knock-outs thus loosening the finished blank from the upper and lower dies.

5 This upper knock-out also forms a flattening die to flatten and smooth the upper face of the blank as shown in Fig. 2; the ring 26 engaging the top of the blank as shown in said figure, while the upper edge
10 of the ring engages the flange 15 of the center punch, thus receiving the full pressure of the head.

In operating the dies, a strip as indicated at 12 is placed over the lower die engaging
15 the stop 11 as shown in Fig. 1. As the head descends, the blanking or shearing dies will first engage the strip, cutting a circular blank from the same and carrying the same down into engagement with the upper end
20 of the lower sizing and punching dies.

The center punch will then pass through the center of the blank, cutting a slug from the same and forming the central aperture 28 therein, while the outer portion of the
25 blank will be first engaged by the inner flared surface 22 and bent downward toward the lower sizing or shaping die, after which the upper sizing or shaping die will engage the same, pressing it in against the
30 lower sizing die, as the head reaches the lower limit of its movement, as shown in

Fig. 2, forming the frusto-conical flange 29 of proper size and shape upon the blank.

As the head is raised, the knock-outs 23 and 26 will be operated as above described,
35 loosening the finished cup shaped blank from the upper and lower dies.

This blank is thus sheared or blanked, punched and sized in a single operation and is ready to be placed in a slotting machine
40 or the like to form the finished roller bearing cage.

We claim:—

A device of the character described arranged to form a punched, cup shaped article
45 in a single operation of a single acting press and including a lower blanking die, a conical lower sizing die concentric with and spaced from the blanking die and having a central punching die formed therein, a conical
50 knock-out ring surrounding the lower sizing die, an upper movable blanking die having a conical bore spaced from its lower end and forming a sizing die, a downwardly and outwardly flared bore beneath the sizing
55 die to receive the knock-out blank, and a center punch fixed upon the upper die and arranged to cooperate with the punching die.

In testimony that we claim the above, we have hereunto subscribed our names.

GEORGE LEE MILLER.
ALBERT L. KRAUSE.