W. T. MILLER.

WASHER CUTTING BIT AND DIE.

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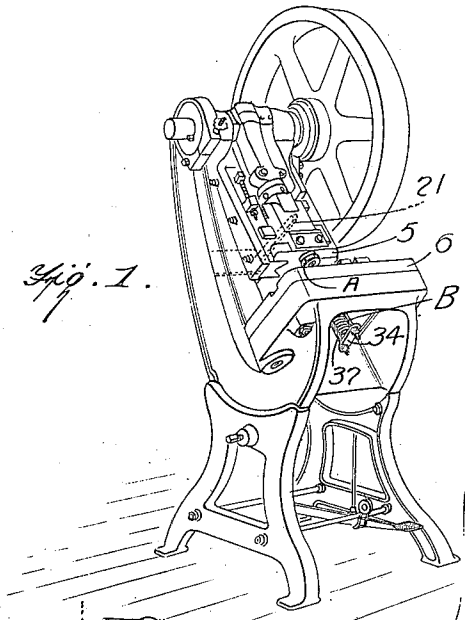


Fig. 1.

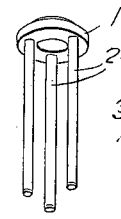


Fig. 5.

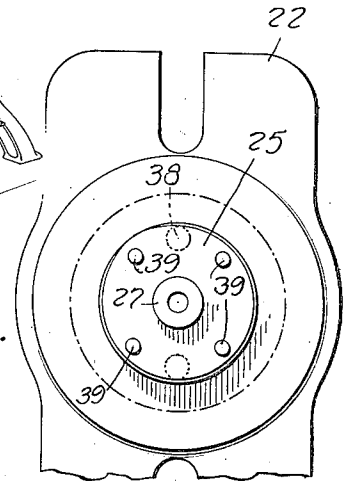


Fig. 4.

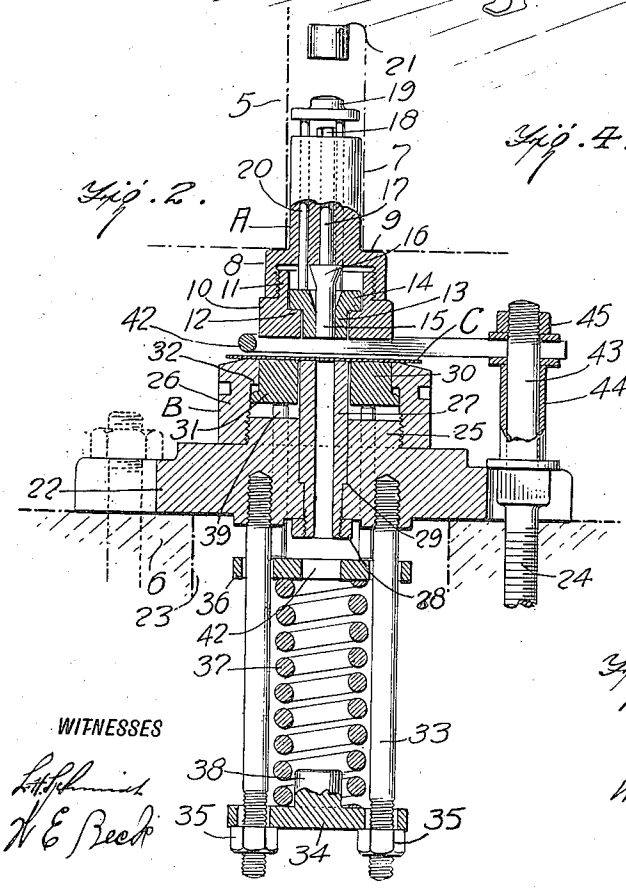


Fig. 2.

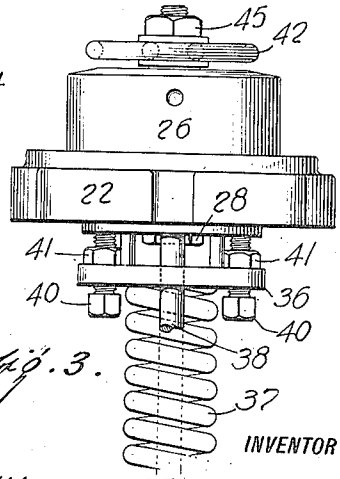


Fig. 3.

WITNESSES

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WASHER-CUTTING BIT AND DIE.

1,236,338. Specification of Letters Patent. Patented Aug. 7, 1917.

Application filed March 1, 1917. Serial No. 151,692.

To all whom it may concern:

Be it known that I, WILLIAM T. MILLER, a citizen of the United States, and a resident of Spruce Pine, in the county of Mitchell and State of North Carolina, have invented a certain new and useful Improvement in Washer-Cutting Bits and Dies, of which the following is a specification.

One of the principal objects of my invention is to provide an improved bit and die designed especially for simultaneously cutting two washers from mica stock, the smaller washer being cut from the center blank formed in punching the larger washer, thus turning the loss accruing to the operation of the ordinary mica washer cutting machine (by reason of the fact that the center blank has heretofore been thrown away) into profit.

Another object of the invention is to provide a washer cutting machine of the type set out, which automatically separates the cut washers from each other and from the stock.

A further object resides in the provision of a bit and die, for the purpose set forth, which cannot get out of alinement.

A still further object is to provide an improved washer cutting machine of the class described, which will be characterized by advantages of simplicity, durability, efficiency in operation, and economy in manufacture and maintenance.

With these and other objects in view which will become apparent as the description proceeds, the invention resides in the construction, combination, and arrangement of parts hereinafter more fully described and claimed, and illustrated in the accompanying drawing, in which like characters of reference indicate like parts throughout the several figures, of which—

Figure 1 represents a view in perspective of a power press having a bit and die mounted thereon constructed according to my invention;

Fig. 2 represents a view in section taken vertically and transversely through the bit and die;

Fig. 3 represents an end elevational view of the die;

Fig. 4 represents a top plan view thereof with the die ring removed;

Fig. 5 is a perspective view of the ejector cap and rods.

Heretofore it has been the common practice, in cutting washers from mica stock, to discard the center blanks formed at the time of cutting the washer. The waste of these blanks has, in view of the fact that but extremely limited use can be found for them, in the course of time, attained considerable proportions. This waste is eliminated by my invention, and in actual practice it has been found that the market value of the smaller washers cut from the blanks is considerably in excess of that of the larger washers in the cutting of which the blanks are formed.

My invention consisting, broadly speaking, of the bit and die, is applicable to many types of power presses, one of which is illustrated in the drawing, and in referring more particularly to the drawing it will be seen that the bit, indicated at A, is mounted in the tool socket provided in the cross head 5 of the press, the die indicated generally at B, being mounted on the bed plate 6 of the machine.

The bit includes the cylindrical shank 7, secured in the tool socket, having an enlarged internally threaded hollow head 8 forming, at its junction with the shank, an annular shoulder 9 fitting against the lower face of the cross head. An annular bit ring 10 is screwed against the head 8 by means of a reduced externally threaded portion 11, forming with the bit ring an internal annular shoulder 12 which limits the outward movement of the ejector ring, indicated at 13, by contact with the enlarged head 14 of the ejector ring.

This ring surrounds the fixed center pin 15 of the bit, and is slidable relatively to the pin and bit ring. The pin has a shoulder 16 bearing against the lower end of shank 7, and is removably secured to the shank by means of an integral rod 17, extending upwardly through a central bore in the shank, and equipped with a nut 18 turned against the upper end of said shank. The lower faces of the bit ring 10 and center pin 15 are coplanar.

An ejector for actuating the ejector ring 13 includes a cap 19 arranged above the shank and in axial alinement therewith, and which carries equally spaced parallel rods 20, which slidably extend through bores provided in the shank, parallel with its axis, and bear at their lower ends against

the head of the ejector ring. A stop arm 21, suitably secured to the frame of the press, and extending forwardly from the rear thereof into alinement with the shank, is engaged by the cap 19, as will be hereinafter described, whereby to move the ejector ring outwardly for ejecting the smaller washer. The cap 19 is provided with a recess in its under surface, into which the nut 18 and upper end of rod 17 will project in case the adjustment of parts is such that, when the cap moves downwardly, it will strike the shank 7. The center pin 15 will, therefore, not be affected by any direct blows against the rod 17.

The die includes a die holder plate 22 arranged over the opening 23 in the bed plate 6, and secured in place on the bed plate by means of bolts, one of which shown at 24 has an extended portion for supporting the stripper to be presently described. The plate 22 has a central externally threaded boss 25, on which the die ring 26 is threaded, by means of internally formed threads, the lower ends of the die ring being brought against the face of the plate 22. A hollow central die pin 27 is arranged axially of the die ring and is of an external diameter coinciding to the internal diameter of the bit ring. The external diameter of the bit ring is equal to the internal diameter of the die ring, so that the bit ring, on a downward stroke, thus passes into the die ring around the central die pin with a tight fit against both elements to cut the larger washer from the stock, indicated generally at C. The central bit pin which is of a diameter equal to the bore of the die pin, enters the bore of the die pin on the down stroke to punch the center from the smaller washer, which washer is formed by the die pin entering the bit ring around the bit pin.

The said die pin 27 extends down through an opening in the die holder plate, and is removably secured in fixed position by means of a nut 28 turned against the lower face of this plate, the pin and plate being provided with interengaging shoulders 29, as shown. A die ejector ring 30 slidably surrounds the die pin 27 within the die ring, and is formed at its lower end with a head or flange 31 coacting with an internal shoulder 32 formed in the die ring, in preventing loss of the ejector ring from the die.

Below the die supporting plate 22 is arranged a frame including the spaced parallel bolts 33 threaded at their upper ends into sockets provided in the lower surface of the die supporting plate. The bolts are connected by means of a bearing plate 34 which is adjustable longitudinally of the bolt by means of nuts 35 against which the plate rests. A cross head 36 is slidable on the bolt 33, and interposed between this cross head and the bearing plate is a coiled spring 37 whose tendency is to force the cross head 36 upwardly toward the die supporting plate. The spring 37 is centered at its lower end on a lug 38 formed on the plate 34. The cross head 36 carries a plurality of equally spaced rods 39 which slidably extend upwardly through bores provided in the die supporting plate 22. These rods 39 at their upper ends engage against the ejector ring 30.

The throw of the ejector ring 30 is controlled by means of the set screws 40 carried by the cross head 36, and engaging at their upper ends against the die supporting plate 22. These set screws are equipped with locking nuts 41 whereby they may be held in adjusted position. The cross head 36 is provided with an opening 42 alining with the bore provided in the die pin 27, and the central blank punched from the smaller washers by action of the bit pin 15 pass downwardly through the bore in the die pin and drop through the opening 42 in the cross head and find their way through the coils of the spring 37 into a suitable receptacle.

The strip of stock being in the position indicated in Fig. 2, on a down stroke of the bit, the bit ring 10 cuts the larger washer from the stock by entering between the die ring 26 and the die pin 27. The washer thus punched or cut from the strip of stock enters the annular space around the die pin 27, and forces the ejector ring 30 downwardly against the tension of the spring 37. As the bit moves upwardly out of engagement with the die, the recoil of the spring 37 serves to force the ejector ring 30 upwardly whereby to eject the larger washer from the die. Simultaneously with the formation of the larger washer, the die pin 27 cuts the smaller washer and forces the same into the annular recess around the bit pin 15, thus raising the ejector ring 13. As the bit reaches the upper end of its stroke the cap 19, which will have been raised by the movement of the smaller washer as it is cut into the bit, will engage the stop arm 21, whereby to force the ejector ring 13 downwardly for ejecting the smaller washer. It will thus be seen by this operation, that the two washers are cut simultaneously, and that the larger washer is ejected as soon as the bit leaves the die, while the smaller washer is not ejected until a subsequent time, that is, when the bit reaches the upper terminal of its stroke.

The power press is arranged so that the die will be on a slant, as indicated in Fig. 1, so that the washers will automatically slide off of the press as they are ejected.

It will be seen that, by reason of the fact that the larger and smaller washers are ejected at different times, the washers may be assorted as soon as they are cut.

The rings and pin of the die are rigidly fixed, in so far as any lateral movement of one relatively to the other is concerned, and the same is true of the ring and pin of the bit, hence it will follow that there will be no possibility of the cutting elements of the tool getting out of alinement, so long as the press runs true.

The stripper device, before mentioned, is indicated at 42, and includes a length of stout wire formed into a loop at its central portion, which loop is of an internal diameter slightly greater than the internal diameter of the die ring 26. The loop is positioned slightly above the die ring, being spaced therefrom a sufficient distance to admit of the stock C being slipped over the die ring. The loop will strip the stock from the bit as the latter starts upwardly, and the loop also serves as a guard to prevent the fingers of the operator getting into a position between the bit and die where they would be in danger of being cut off. The outer ends of the length of wire of which the stripper is formed, are brought together to engage on opposite sides of the extension 43 of the bolt 24, previously mentioned, and rest against the upper end of a sleeve 44 mounted on the bolt. A nut 45 screwed down against a washer arranged above the ends of the stripper, serves to secure the latter in position on the press.

It will be seen by the construction set forth that all of the various parts of the cutting elements are readily removable for replacement or repair. The construction is such that the die and bit are comparatively inexpensive to manufacture and maintain. It has been found in actual practice that the device is extremely efficient in operation, and that the work done by the invention is of the highest quality.

Although I have described the preferred embodiment of my invention, I may desire to make such changes in the construction, combination, and arrangement of parts thereof, as do not depart from the spirit of the invention and the scope of the appended claims.

I claim:

1. The combination with a press including a stationary bed plate and a reciprocating cross head, of a die plate secured to the bed plate, an annular fixed die ring secured to the die plate, a hollow central die pin fixed to the die plate at the center of the die ring, a shank secured to the cross head, a bit ring secured to the shank in axial alinement with the die ring, and having an external and internal diameter corresponding respectively with the internal diameter of the die ring and the external diameter of the hollow central die pin, a solid center pin fixed to the shank at the center of the bit ring in axial alinement with the hollow central die pin, and being of a diameter corresponding with the internal diameter of the hollow central die pin, an ejector ring arranged within the die ring and surrounding the hollow central die pin, and having external and internal diameters corresponding respectively with the external and internal diameters of the said ring, an ejector ring arranged within the bit ring and surrounding the solid pin and having external and internal diameters corresponding respectively with the external and internal diameters of the hollow central die pin, and means for operating the ejector rings.

2. The combination of a fixed die ring, a hollow central die pin fixed relatively to the die ring at the center of the die ring, a movable bit ring arranged in axial alinement with the die ring and having an external and internal diameter corresponding respectively with the internal diameter of the die ring, and the external diameter of the hollow central die pin, a solid center pin movable with the bit ring and fixed at the center of the latter in axial alinement with the hollow central die pin, and being of a diameter corresponding with the internal diameter of the hollow central die pin, an ejector ring arranged within the die ring and surrounding the hollow central die pin, an ejector ring arranged within the bit ring and surrounding the solid pin, and means for operating the ejector rings.

3. The combination of a fixed die ring, a hollow central die pin fixed at the center of the die ring, a movable bit ring arranged in axial alinement with the die ring, and having an external diameter corresponding with the internal diameter of the die ring, and having an internal diameter corresponding with the external diameter of the hollow central die pin, a solid center pin fixed at the center of the bit ring, and being movable with the bit ring, said solid center pin being in axial alinement with the hollow central die pin, and being of a diameter corresponding with the internal diameter of the hollow central die pin, ejector means arranged within the die ring, and ejector means arranged within the bit ring.

4. The combination with a press including a stationary bed plate and a reciprocating cross head, of a die plate secured to the bed plate, an annular fixed die ring secured to the die plate, a hollow central die pin fixed to the die plate at the center of the die ring, a shank secured to the cross head, a bit ring secured to the shank in axial alinement with the die ring, and having an external and internal diameter corresponding respectively with the internal diameter of the die ring and the external diameter of the hollow central die pin, a solid center pin fixed to the shank at the center of the bit ring in axial alinement with the hollow central die pin,

and being of a diameter corresponding with the internal diameter of the hollow central die pin.

5. A die including a fixed die ring, a hollow die pin fixed at the center of the die ring, a bit including a movable bit ring adapted to coöperate with the die ring and hollow die pin in cutting a larger washer, a solid pin fixed at the center of the bit ring for movement with it, said hollow die pin cooperating with the bit ring and solid pin in cutting a smaller washer, said solid pin cooperating with the hollow die pin in punching the center from the smaller washer, and means arranged respectively within the die ring and within the bit ring for ejecting respectively the larger and smaller washers.

6. The combination of a die including a fixed ring, and a hollow die pin fixed at the center of the ring, a reciprocating bit coöperating with the die in simultaneously cutting a larger and a smaller washer, and including a bit ring and a solid pin fixed at the center of the bit ring, an ejector ring arranged within the die ring, an ejector ring arranged within the bit ring, means for actuating the first said ejector ring upon withdrawal of the bit from the die, and means for subsequently actuating the second said ejector ring.

7. The combination of a die, a bit movable into and out of the die, said die and bit having coöperating means for simultaneously cutting a plurality of washers of different sizes, means for ejecting certain of the cut washers from the die upon movement of the bit out of the die, and means for subsequently ejecting others of the cut washers from the bit.

8. The combination of a die and a bit having coöperating means for simultaneously cutting washers of different sizes, and means for ejecting the washers of different sizes at respective different times.

9. In a washer cutter, a bit including a shank having a hollow internally threaded head, a cutting ring bearing against the head of the shank and having an externally threaded portion screwed into the head of the shank, said cutting ring having an internal annular shoulder, a pin fixed to the shank at the center of the ring, an ejector ring slidably arranged in the cutting ring and surrounding the pin, said ejector ring having an annular shoulder coöperating with the shoulder on the cutting ring in limiting the outward movement of the ejector ring, and means carried by the shank for actuating the ejector ring.

10. In a washer cutter, a die including a die plate having an offset externally threaded portion, an annular die ring internally threaded and screwed onto the said threaded portion of the die plate, a hollow central die pin fixed to the die plate at the center of the die ring, an internal annular shoulder formed on the die ring, an ejector ring slidably arranged within the die ring and surrounding the hollow central die pin, and having a shoulder coöperating with the shoulder on the die ring in limiting the outward movement of the ejector ring, and spring actuated means for operating the ejector ring.

11. In a washer cutter, a bit including a shank, cutting means carried by the shank including a center pin, a rod on which the center pin is carried, said rod extending through an opening arranged axially of the shank, and having means mounted on the rod at the upper end of the shank, for securing the center pin in place, an ejector ring surrounding the center pin, rods slidable through the shank for actuating the ejector ring, a cap arranged above the shank to which the ejector actuating rods are fixed, said cap having a hollow portion for receiving the said means for securing the said pin supporting rod in place, substantially as described.

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Witnesses:
J. C. PRITCHARD,
PAUL ROSE.