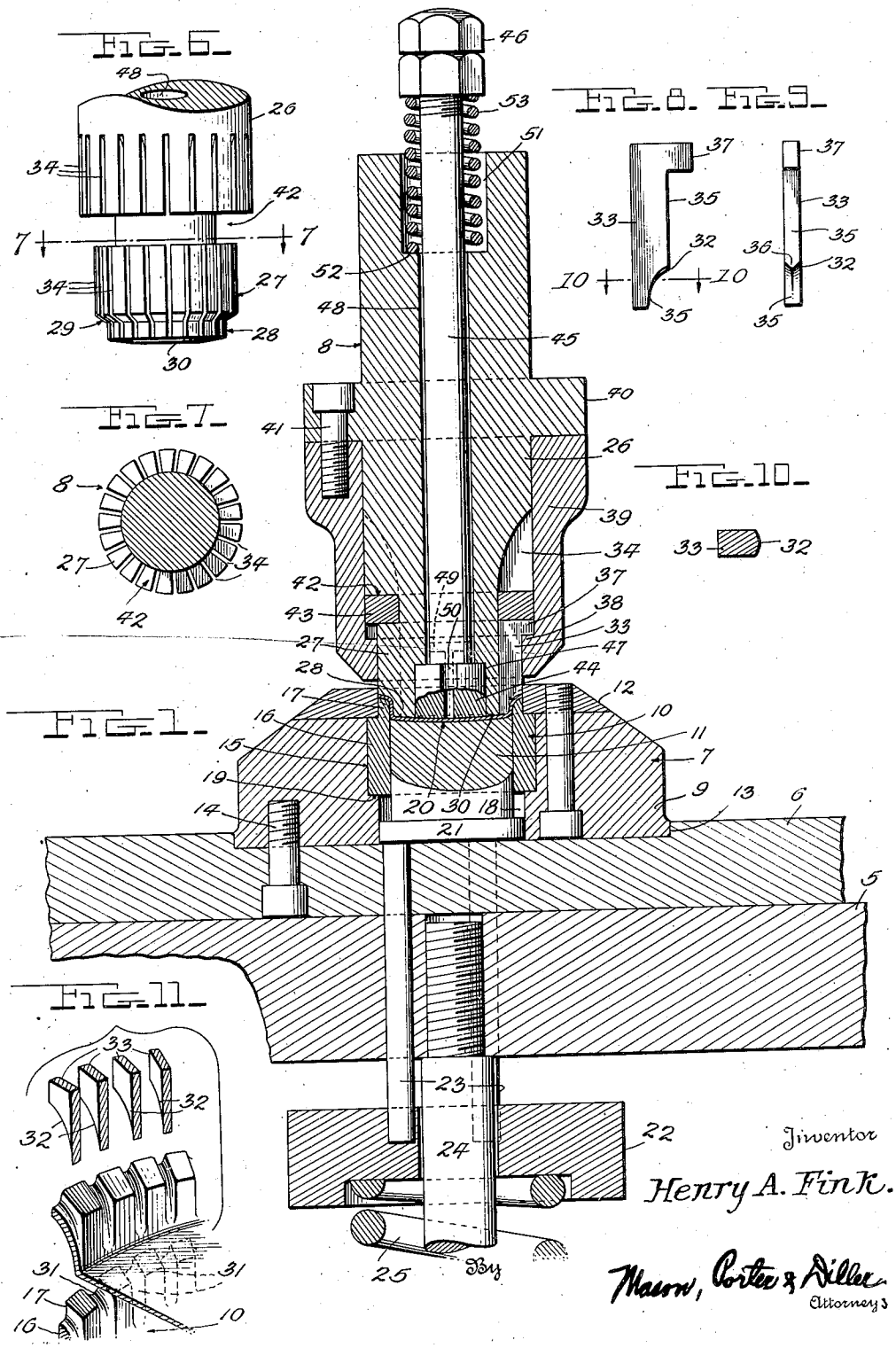
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APPARATUS FOR REFORMING CROWN CAPS

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FIG. 2.

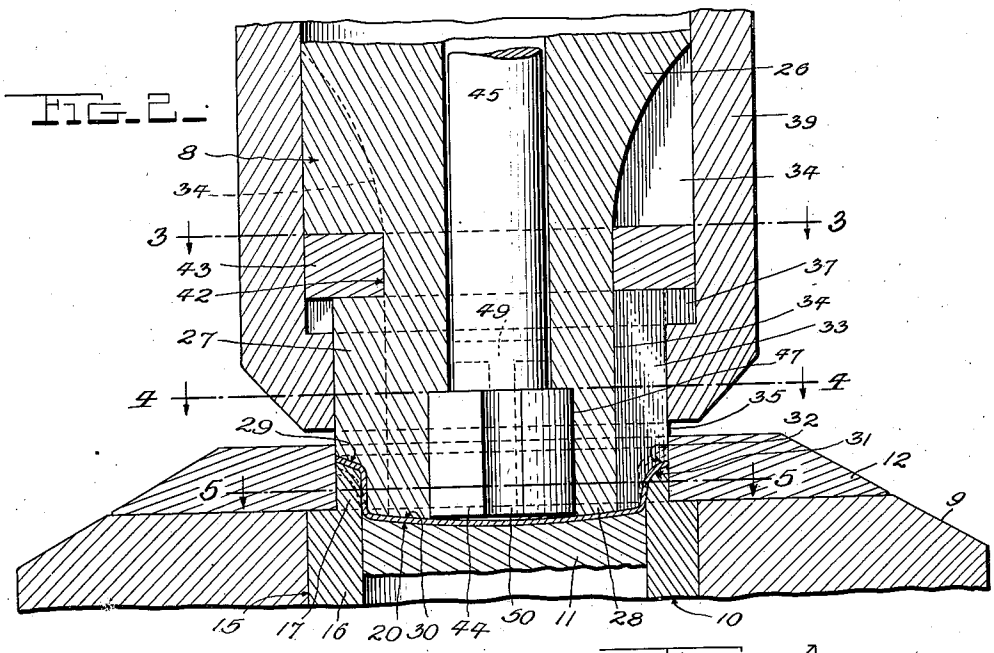


FIG. 3.

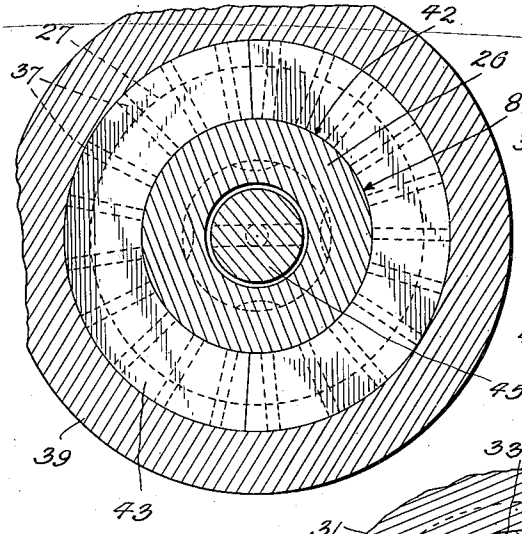


FIG. 4.

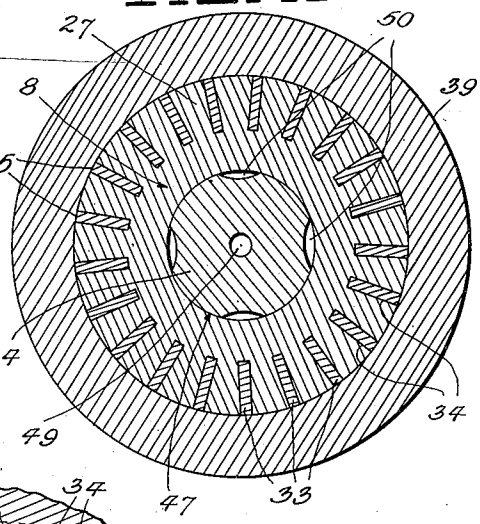
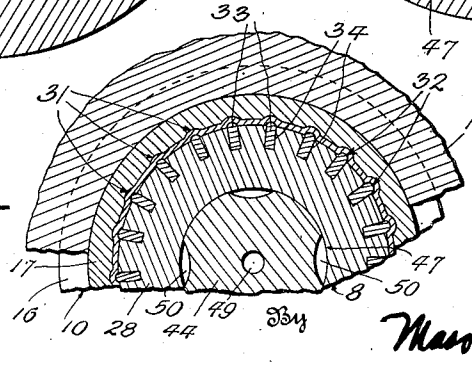


FIG. 5.



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APPARATUS FOR REFORMING CROWN CAPS

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6 Claims. (Cl. 113—38)

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The invention relates generally to apparatus for reforming or reshaping salvaged crown caps and it primarily seeks to provide novel means by employment of which both the main body or dome portion of the caps and also the crimped skirt portions thereof may be accurately reshaped so as to adapt the salvaged cap for re-use as an effective sealing element.

In order to satisfactorily reshape salvaged crown caps in the manner stated it is necessary to provide a die and a cooperating punch, the die having the proper scallops and indentations to engage and conform to the exterior of the crimps or corrugations of the skirt of the cap when reformed, and the punch being formed with cooperating projections to engage the interior of the skirt and press all portions thereof into engagement with the reshaping face of the die. In practice the scalloped and indented portion of the die may be, and preferably is, the standard forming ring such as is used in the manufacture of the caps. However, a punch shaped to conform to the die ring, if formed in one piece, would be difficult and expensive to make, as it would require a great amount of machining and considerable hand work.

A further object of the invention is to provide a novel form of punch which may be made at a comparatively low cost and more accurately conform to the die than would be possible if made in one piece without entailing unreasonable expense.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims, and the several views illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a vertical section through a die press assembly embodying this invention.

Figure 2 is a similar sectional view, upon an enlarged scale, of the cooperating portions of the die and punch.

Figure 3 is a transverse section taken on the line 3—3 of Figure 2.

Figure 4 is a similar section taken on the line 4—4 of Figure 2.

Figure 5 is a fragmentary sectional view taken on the line 5—5 of Figure 2.

Figure 6 is an elevation of the lower end of the body portion of the punch without the shaping fingers.

Figure 7 is a section on the line 7—7 of Figure 6.

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Figure 8 is a side elevation of one of the shaping fingers.

Figure 9 is an edge view of the same.

Figure 10 is a section on the line 10—10 of Figure 8.

Figure 11 is a fragmentary perspective view illustrating a portion of a cap, with a portion of the die ring, and portions of several fingers of the punch.

Referring now to the drawings, the assembly includes a bolster 5 of a die press, upon which is supported a shoe 6, to which a die 7 is secured, and a reciprocating punch 8 for cooperation with the die for reshaping the caps, together with a knock-out block for stripping the reformed caps from the die, and means for removing the caps from the punch.

The die 7 comprises an annular base 9, a forming ring 10, a knock-out block 11 and a shearing and clamping ring 12. The base 9 is seated in a recess 13 formed in the upper face of the shoe, and is held firmly therein by screws 14 extending upwardly through the shoe, and tapped into the base as shown clearly in Figures 1 and 2. The forming ring 10 is arranged within a bore 15 in the base member 9, and comprises an annular cylindrical body portion 16 having an upstanding flange 17 which is scalloped and indented to conform to the contour of the outer face of the skirt of the cap, as illustrated in the lower portion of Figure 11. The lower portion of the bore 15 is of reduced diameter as at 18 forming a shoulder 19 upon which the bottom of the ring 10 rests, and the shearing and clamping ring 12 rests upon the upper end of the body 16 of the ring thereby clamping it firmly between said ring and the seat 19. It should be noted that the wall of the ring 10 is thicker than the width of the shoulder 19 so that the inner edge of the ring overhangs the lower portion of the bore for a purpose hereinafter described. The inner face of the bore of the ring 12 fits snugly against the outer face of the flange 17 and extends a distance above the same thereby reinforcing the flange against the impacts from the punch and providing a shearing edge directly above the outer edge of the shaping flange.

Vertically movable within the bore of the ring 10 is the knock-out block 11, the upper face of which is concave as at 20 to conform to the dome of the caps and complement the scalloped and indented flange to complete the die when the block is in lowermost position with its base resting on the shoe 6, or the bottom of the recess 13 formed therein. The block 11 is formed with a base

flange 21 located in the reduced portion 18 of the bore and which engages the inner or overhanging portion of the end of the ring 10 to limit the upward movement of the block. This upward movement of the block is sufficient to raise the upper end of the block to the top of the flange 17 so as to strip the cap from the die ring.

To actuate the knock-out block 11, to force the cap from the die when the punch is retracted, a spring pressed disc 22 is provided which is equipped with a plurality of knock-out pins 23 extending through the bolster 5 and the shoe 6, and engaging the bottom of said block. The disc 22 is slidably mounted on a bumper rod 24 fixed to the bolster 5, and concentric with the axis of the die, and a spring 25 is interposed between the disc and an abutment (not shown).

The punch 8 comprises an elongated cylindrical body 26, means on the lower end thereof for forcing the skirt of the cap into the scallops and indentations of the die, and means for knocking the cap from the end of the punch when the punch is retracted from the die. Adjacent its lower end the body of the punch is reduced in diameter, as at 27 to fit within the bore of the ring 12, and at the lower end is further reduced in diameter as at 28, to fit snugly within the cap resting in the die. Between the adjacent portions 27 and 28, the punch is obtusely tapered forming a bevelled face 29 for flaring the edge of the cap skirt. The lower face of the punch is convexly formed as at 30 to correspond to and cooperate with the concave face 20 of the knock-out block 11 to reshape the dome of the cap.

In order to force the skirt of the cap into the scallops and indentions of the die, the punch is provided with a plurality of projections corresponding in number to and cooperating with said scallops and indentations. The standard crown cap has twenty-one scallops in its skirt, and therefore the die and the punch have a like number of corresponding parts to reform the same.

To this end the die flange has twenty-one scallops and indentations 31, and the punch is provided with a like number of projections 32. These projections are formed as part of fingers 33, made of tool steel of the proper gauge, and are seated in radially formed grooves 34 milled longitudinally in the lower portion of the body of the punch as illustrated clearly in Figures 6 and 7 of the drawings. The fingers are shaped to fit exactly in their respective grooves except that the outer edge 35 extends slightly below the lower edge of the reduced portion 27 of the punch to form the projection 32, and then curved inwardly and downwardly until the lower portion is flush with the outer face of the reduced lower end 28 of the punch. The edge of the projection 32 is V-shaped as indicated at 36, and this tapers off as it approaches the bottom so that the lower end is flush and smooth with the surface of the portion 28. At the upper end, each finger is formed with an outwardly extending lug 37 which projects beyond the face of the portion 27 of the punch to be engaged by an inwardly extending annular flange 38 on a sleeve 39 inclosing the lower portion of the punch except the die engaging end. The body of the punch is provided with an annular flange 40 to which the sleeve 39 is secured, as by screws 41.

Directly above the portion 27 of the punch, in which the fingers 33 are located, the body of the punch is provided with an annular groove 42 coextensive in depth with the grooves 34, and in said groove is fitted a hardened steel ring 43 which is formed in two parts, and constitutes a backing or abutment for the fingers 33 to take the thrust thereon. This two part ring is illustrated clearly in Figure 3 of the drawings.

To knock the caps from the end of the punch, when said punch is retracted, a block 44 is provided in the end of the punch and is fixed to the end of a stem 45 which extends longitudinally through the punch, and terminates in a head 46 which engages an abutment (not shown) when the punch reaches the limit of its upward stroke. The block 44 fits snugly in a recess 47, and the stem extends loosely through a bore 48. Extending through the block 44 and communicating with the bore 48 is a vent 49 to facilitate loosening the cap from the block, and the periphery of the block is formed with grooves 50 which constitute vents to assure free reciprocation of the block.

The upper end of the bore 48 is enlarged as at 51 to provide a seat 52 for a spring 53 interposed between said seat and the head 46.

The operation of the device is as follows:

With the punch elevated, the spring 25 will raise the block 11 through the medium of the disc 22 and the pins 23, so that the upper face of the block is above the upper edge of the die ring 10. The cap to be reformed is placed by any suitable means in position upon the die, and the punch lowered. As the punch end enters the die the projections 32 will engage the original corrugations in the cap and carry the cap downwardly in the die ring 10 forcing the knock-out block 11 downwardly against the tension of the spring 25 until the parts assume the position illustrated in the drawings, particularly Figures 1 and 2, which is the position of greatest compression, and which will perfectly reshape the cap as hereinbefore described. Should the cap being reformed be one so distorted that a perfect centering is impossible, the skirt will be slightly longer on one side of the cap than on the diametrically opposite side. In this case, when the edge of the skirt is flared outwardly by the beveled portion of the punch between the portions 27 and 28, the edge of the punch at the bottom of the portion 27 will cooperate with the inner upper edge of the shearing ring 12 to remove the excess from the skirt. The punch is then retracted, and as it leaves the die, the spring 25 will force the knock-out block upwardly, following the punch and stripping the cap from the die. As the punch reaches the limit of its retraction, the head 46 engages an abutment (not shown) which forces the stem 45 downwardly projecting the lower end of the block 44 from the recess 47, thereby knocking the cap loose from the punch.

While one form of the invention has been shown for purposes of illustration, it is to be clearly understood that various changes in the details of construction and arrangement of parts may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. In a device for reshaping crown caps, a support, a die on said support, said die comprising a base member having a vertical bore formed with an annular seat, a forming ring having a cylindrical body portion resting on said seat and an upwardly extending flange serrated and indented to fit the outer crimped face of the skirt of the caps, a ring fixed to said base member and

clamping the body of said forming ring on said seat, said ring fitting snugly about said flange and extending above the upper edge thereof, a block slidably mounted in said forming ring and having an end face complementing said ring to complete the die when the block is in fully retracted position, and means normally tending to raise said block to strip the caps from the die, in combination with a punch comprising a body portion having an end shaped to enter the cap being reshaped and force the skirt into the serrations and indentations of the die.

2. In a device for reshaping crown caps, a support, a die on said support, said die comprising a base member having a vertical bore formed with an annular seat, a forming ring having a cylindrical body portion resting on said seat and an upwardly extending flange serrated and indented to fit the outer crimped face of the skirt of the caps, a ring fixed to said base member and clamping the body of said forming ring on said seat, said ring fitting snugly about said flange and extending above the upper edge thereof, a block slidably mounted in said forming ring and having an end face complementing said ring to complete the die when the block is in fully retracted position, means normally tending to raise said block to strip the caps from the die, in combination with a punch comprising a body portion having an end shaped to enter the cap being reshaped and force the skirt into the serrations and indentations of the die, and means for knocking the cap from the punch when said punch is retracted, said means when retracted being seated entirely within the punch and forming a part of the shaping face thereof.

3. In a device of the class described, a die including a forming ring provided with a flange having corrugations and indentations to conform to the exterior of the crimped skirt of a crown cap, a clamping ring engaging the upper end of said forming ring and having a bore to snugly receive said flange of the forming ring and extend above the upper edge thereof, in combination with a reciprocating punch comprising a cylindrical body portion adapted to enter snugly within said bore of the clamping ring, the lower end of said body portion being reduced in diameter to enter within the flange of said forming ring, said body portion being formed with radially disposed grooves extending longitudinally thereof, fingers fixed in said grooves and having projections thereon for engaging the inner face of the skirt of the cap and forcing the same into the corrugations and indentations of the die, and an abutment for the inner ends of said fingers.

4. In a device of the class described, a die including a forming ring provided with a flange having corrugations and indentations to conform to the exterior of the crimped skirt of a crown cap, a clamping ring engaging the upper end of said forming ring and having a bore to snugly receive said flange of the forming ring and extend above the upper edge thereof, in combination with a reciprocating punch comprising a cylindrical body portion adapted to enter snugly within said bore of the clamping ring, the lower end of said body portion being reduced in diameter to enter within the flange of said forming ring, said body portion being formed with radially disposed grooves extending longitudinally thereof, and fingers fixed in said grooves and having projections thereon for engaging the inner face of the skirt of the cap and forcing the same into the corrugations and indentations of the die, an abutment for the ends of said fingers and means for retaining said fingers and abutments in position and the portion of the body of the punch between the said reduced body portion and said end portion being obtusely bevelled to flare the edge of the skirt.

5. In a device of the class described a die shaped to conform to the outer surface of a crown cap, and a punch for forcing salvaged caps into all portions of said die, said punch comprising a cylindrical body portion, said body portion being reduced in diameter adjacent its die engaging end, and the end portion being further reduced in diameter, to fit within the cap being reshaped, said reduced portion and said end portion being formed with longitudinally extending radially disposed grooves, fingers fitting said grooves and having projections extending below the first mentioned reduced portion of the punch, said body portion having an annular groove above the upper ends of said fingers, a hardened ring in said groove, outward extending lugs on said fingers, a sleeve enclosing the lower part of the punch except the die engaging portion, and an inwardly extending flange on said sleeve engaging beneath said lugs.

6. In a device of the class described a die shaped to conform to the outer surface of a crown cap, and a punch for forcing salvaged caps into all portions of said die, said punch comprising a cylindrical body portion, said body portion being reduced in diameter adjacent its die engaging end, and the end portion being further reduced in diameter, to fit within the cap being reshaped, said reduced portion and said end portion being formed with longitudinally extending radially disposed grooves, fingers fitting said grooves and having projections extending below the first mentioned reduced portion of the punch, said body portion having an annular groove above the upper ends of said fingers, a "two part" hardened ring in said groove, outward extending lugs on said fingers, a sleeve enclosing the lower part of the punch except the die engaging portion, and an inwardly extending flange on said sleeve engaging beneath said lugs, holding said fingers in their respective grooves and said two part ring in place.

HENRY A. FINK.

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