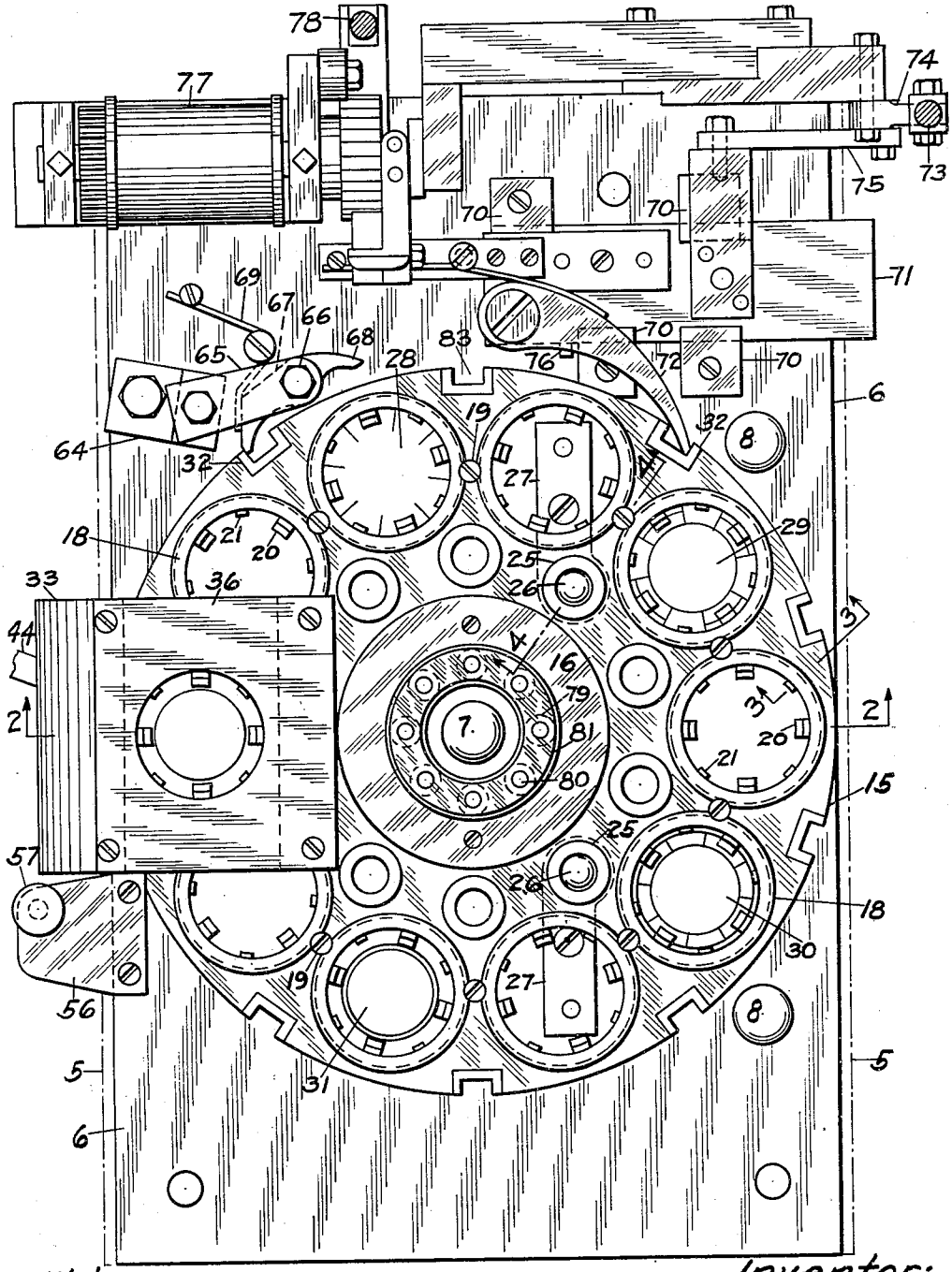
Dec. 27, 1932. C. S. SIEGEL 1,892,168

DIAL DIE MACHINE

Filed Dec. 4, 1928 4 Sheets-Sheet 1



Witnesses:
Leon Mahon
Arthur Lovell

Fig. 1

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DIAL DIE MACHINE

Filed Dec. 4, 1928 4 Sheets-Sheet 2

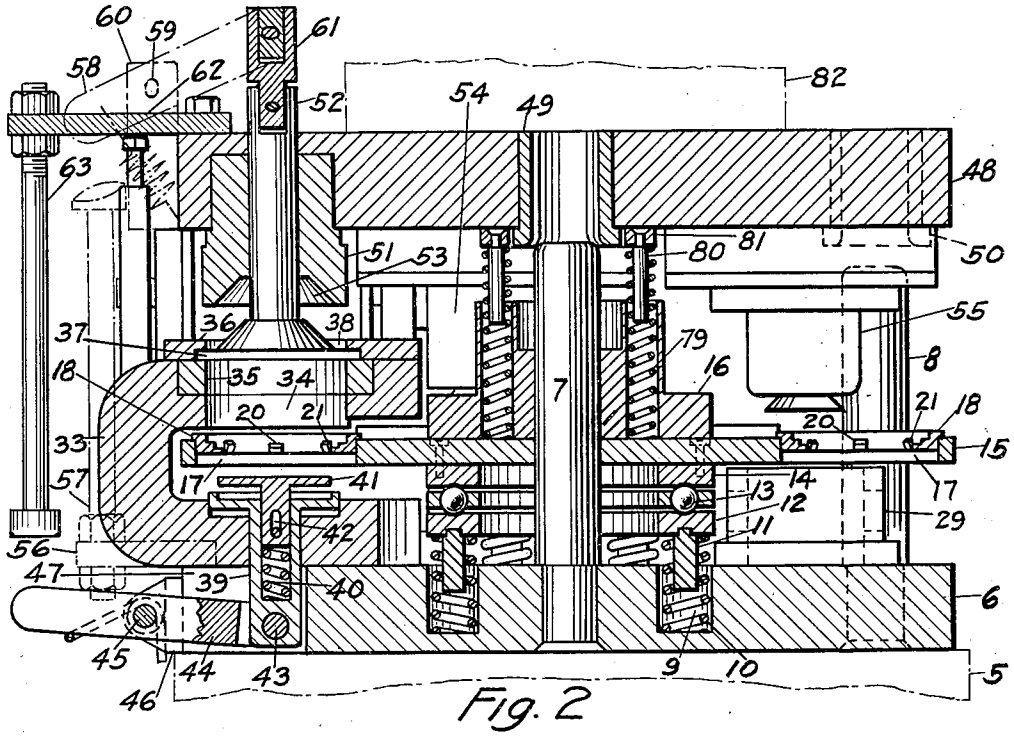


Fig. 2

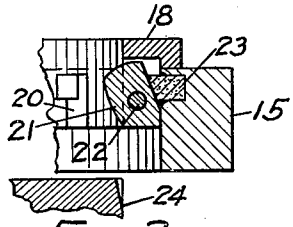


Fig. 3

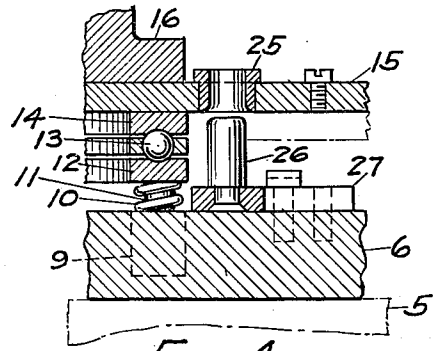


Fig. 4

Witnesses:

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Arthur O'Neil

Inventor:

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Dec. 27, 1932. C. S. SIEGEL 1,892,168

DIAL DIE MACHINE

Filed Dec. 4, 1928 4 Sheets-Sheet 3

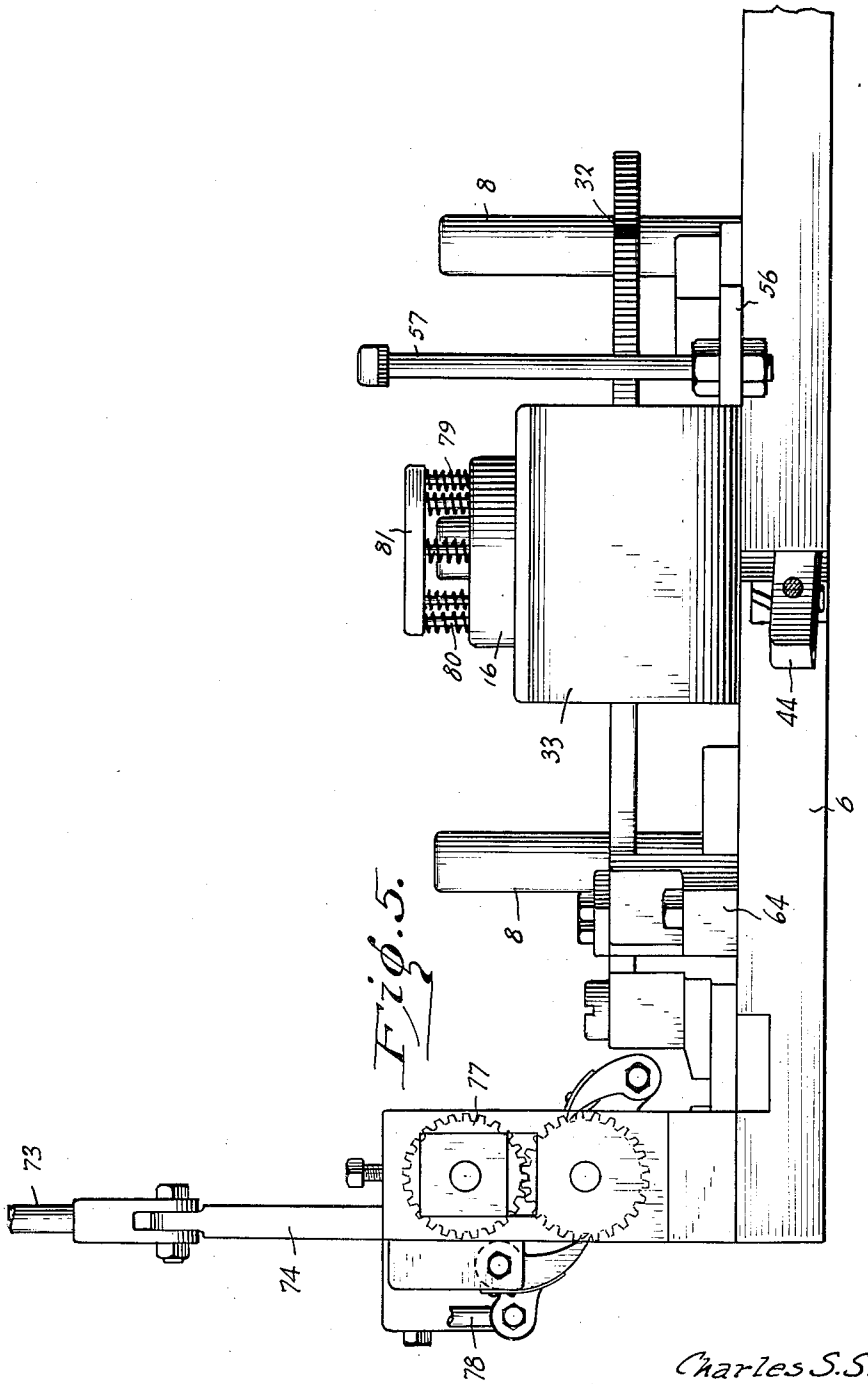


Fig. 5.

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Dec. 27, 1932. C. S. SIEGEL 1,892,168

DIAL DIE MACHINE

Filed Dec. 4, 1928 4 Sheets-Sheet 4

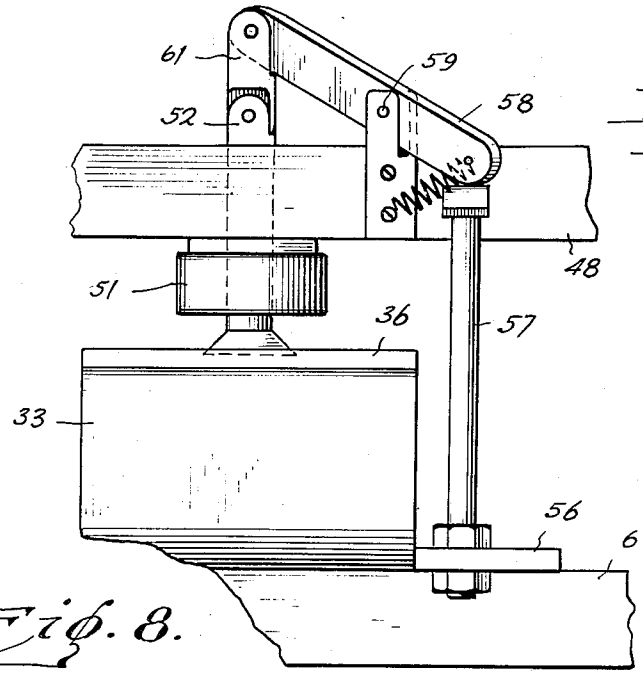


Fig. 6.

Fig. 8.

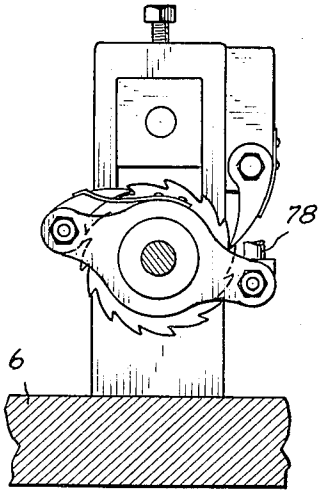
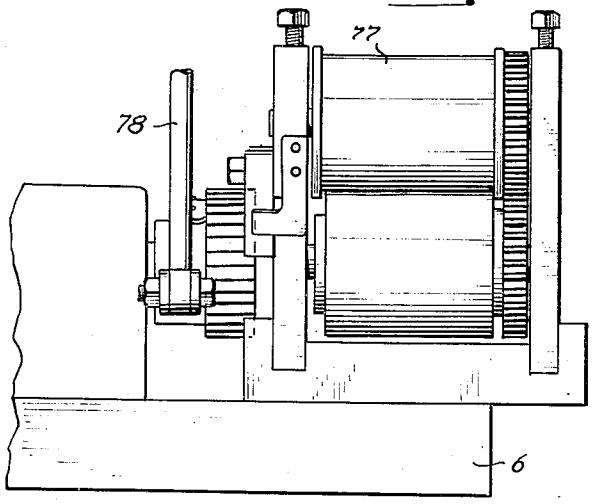


Fig. 7.



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WITNESS J. Mank

Patented Dec. 27, 1932 1,892,168

UNITED STATES PATENT OFFICE

CHARLES S. SIEGEL, OF NEW YORK, N. Y., ASSIGNOR TO DIAL ENGINEERING CORPORATION, A CORPORATION OF NEW YORK

DIAL DIE MACHINE

Application filed December 4, 1928. Serial No. 323,769.

My invention relates to improvements in dial die machines.

The principal object of my invention is to produce punchings and stampings for various articles, in the manufacture of which a multiplicity of operations are required, such as caps and closures for bottles and other containers, more rapidly and economically than by other means now employed.

Another object of the invention is to provide a die forming press with certain novel features which enable the blanking, feeding and forming operations to be performed with a greater degree of precision and economy, whereby a number of operations may be consecutively performed in less than one revolution of the dial and quantity production of a completed article at minimum manufacturing cost may be effected;

One novel feature of my invention resides in the provision of a rigid construction of a U shaped blanking die holder arranged to accommodate the depressing and returning movements of a blank carrying dial, by which the blanks may be cut from a strip or roll.

Another novel feature of my invention resides in the provision of means by which the punched blanks may be placed in position in a dial feeding retainer for a subsequent forming operation.

Another novel feature resides in the provision of means for holding the work in the dial while being extracted from one forming die and being carried to another forming die.

Another novel feature resides in the provision of means for releasing the work in the dial after a forming operation.

Another novel feature resides in the provision of means for positively registering the dial form holders with the dies prior to each forming operation.

Another novel feature resides in the provision of means for locking and unlocking the dial for the timing operations and to prevent "coasting" of the dial.

A still further novel feature of the improved dial die machine, is the provision of a special U-shaped die holder, providing an upper and lower jaw, a rotary dial plate arranged to shift metal blanks between the jaws, means for imparting an upward return motion to the dial plate, and means for producing a step-by-step rotative movement thereof, so that successive forming operations may be performed on the blanks carried by said rotary plate, and the blanks released from the die after the forming operations.

Another novel feature resides in the provision of means for depressing and returning the dial during the punching, placing and forming operations.

Still another novel feature resides in the provision of novel combinations and arrangement of parts more fully shown in the drawings, described in the specification and set forth in the claims.

My invention is illustrated in the accompanying drawings in which:

Fig. 1 is a plan view of a dial die machine in accordance with my invention.

Fig. 2 is a sectional elevation taken on line 2—2 of Fig. 1.

Fig. 3 is an enlarged sectional elevation taken on line 3—3 of Fig. 1 through portions of the dial, form holder and releasing means; a portion of a lower forming die being also shown.

Fig. 4 is a sectional elevation taken on line 4—4 of Fig. 1 showing means for registering the dial and for returning the dial from a depressed position.

Fig. 5 is a side elevation with certain parts broken away and other parts removed.

Fig. 6 is a detail elevation of the mechanism for operating the knock-out plunger.

Fig. 7 is a detail side elevation of the feed rollers; and

Fig. 8 is a detail end elevation of the feed rollers.

Like numerals refer to like parts throughout the several views.

Referring to the drawings, a dial die machine may embody constructions in accordance with my invention, as follows:

Adapted to be mounted upon and secured to a platen 5 indicated as a supporting member of a press, by dot and dash lines, is the lower portion of the dial die machine assembly as shown in Fig. 1. Adapted to be carried and guided by the reciprocating cross-

head member of the press as indicated by dot and dash lines, is the upper portion of the dial die machine assembly as shown in section in Fig. 2. Secured to and extending perpendicularly from base plate 6 are guide posts 7 and 8. Formed in the base plate and radially arranged about a guide post 7 are recesses 9 into each of which is arranged a spring 10 into which is inserted a pin 11 carried by a thrust washer 12 which is supported by the springs and is provided with an annular race way for balls 13 which are arranged to rotate in a similar annular race way which is formed in thrust washer 14 secured to the dial 15 which is slidably and rotatably arranged about the guide post 7 in co-operation with collar 16. Formed through the dial equi-distant from the guide post 7 and equi-distant from each other are apertures 17 into which are inserted blank and form holders 18, which are interchangeable, and are secured to the dial by screws 19 and provided with fixed blank and form holding lugs 20 and also with releasing fingers 21 which are arranged to rock upon pins 22 by action of resilient cushion member 23 which holds each finger in an extended position until forming die surface 24 is encountered by the blank. Inserted into apertures formed through the dial equi-distant from the post 7 and equi-distant from each other in corresponding relation with apertures 17 are registering bushings 25 adapted to be slidably depressed over guide pins 26 the lower ends of which are secured to plates 27 which are mounted upon and secured to the base plate in such positions that the blank and form holders will accurately register with lower forming dies 28, 29, 30 and 31. Arranged at the periphery of the dial and securely inserted into notches formed therein are inserted contacts 32 in corresponding radial relation with the registering bushings. Mounted upon and securely attached to the base plate is a rigid U shaped blanking die holder 33 formed in such manner that the movements of the dial may be accommodated. Formed through the upper portion of the blanking die holder and arranged to register with a blank and form holder at a point equi-distant from the guide pins is aperture 34, concentric with which is a countersunk depression into which is inserted blanking die 35. Mounted upon and secured to the blanking die holder is guide 36 in which is formed a recess or rest 37 for inserting the material from which the blank for the article is to be cut. Formed through the guide concentric with the blanking die is an aperture 38. Slidably arranged in a countersunk aperture formed through the lower portion of the blanking die holder is a placing plunger guide 39 in which is formed a receptacle for spring 40 which is held in a state of compression by the placing plunger 41 which is slidably arranged therein and provided with an elongated aperture 42 through which a pin extends and is arranged through the walls of the placing plunger guide. Arranged near the lower end of the placing plunger guide and fitted therein is pin 43 the protruding ends of which are slidably arranged in the forked end of blank placing lever 44 which is fulcrumed upon pin 45 arranged in bracket 46 which is secured to the base plate at either side of slot 47. Arranged through punch holding plate 48 and adapted to be slidable on the guide posts 7 and 8 are bushings 49 and 50 respectively. Concentrically arranged above the blanking die and securely fitted into the punch holding plate is punch 51 through which is slidably arranged knock-out plunger 52, and recess 53 therefor is provided at the end of the punch. Secured to the punch holding plate in positions corresponding with the forming dies 28, 29, 30 and 31 are the upper forming similarly constructed but differently shaped dies, of which two are shown in Fig. 2. Forming dies 54 and 55 are similar in construction and correspond with forming dies 28 and 29 respectively, and similarly constructed upper forming dies may be provided to cooperate with the lower forming dies 30 and 31. Secured to the base plate is plate 56 through which is securely arranged post 57 adapted to actuate lever 58 which is fulcrumed on pin 59 mounted in post 60 which is secured to the punch holding plate. The lever 58 is connected with the upper end of lever 61 which is hinged at the upper end of the knock-out plunger. Secured to the punch holding plate is plate 62 through which is securely arranged stem 63 adapted to actuate the blank placing lever by the downward movement of the punch holding plate. Mounted upon and secured to the base plate is bracket 64 at the top of which is secured arm 65 through which is arranged pin 66 carrying a pivotally mounted safety latch 67 having a cam shaped end 68 and adapted to be forced into engagement with the inserted contacts by spring 69. Mounted upon and secured to the base plate are guides 70 between which a slide 71 is slidably arranged upon the base plate and carries a spring actuated pivoted ratchet 72 adapted to be engaged with the contacts by movement of rod 73, bell crank 74 and link 75 which are actuated by the press. Securely arranged at one side of the slide is tooth 76 adapted to actuate the safety latch. Mounted upon and secured to the base plate is a pair of geared rolls 77 arranged to be driven by vertical movements of rod 78 which is actuated by the press. Inserted into apertures formed through the collar 16 are springs 79 into which are inserted pins 80 the upper ends of which are secured to thrust washer 81 which is supported by the springs and arranged to bear against the punch holding plate.

The rod 73 is connected by suitable means with the crank shaft of the press, so that it will be reciprocated thereby, and the bell crank lever 74 will operate the link or pitman 75, thereby shifting the slide 71. The rod 78 operates the pawl of Fig. 8 to turn the feed rollers in a strip feeding direction, step-by-step, in accordance with the usual practice of strip feeding to automatic die forming presses. This rod 78 is connected with the crank shaft of the press so that it will operate in properly timed relation to the strokes of the press ram 82.

The operation of a dial die machine arranged to be operated by movements of a press or similar mechanism may be as follows:

A strip or roll of material to be blanked and formed, propelled by the feed rollers 77 in a strip feeding direction, is passed through the slot 37 and by a downward movement of the reciprocating member or ram 82 of the press, the punch 51 shears the material at the blanking die 35, and the lever 58 makes contact with the post 57 and actuates the knockout plunger 52, which insures the insertion of the blank into the blank and form holder 18 while the blank placing lever 44 is actuated by movement of the stem 63 and controls the placing plunger 41 which properly places the blank as the dial is depressed and by compression of the springs 79 by a downward movement of the reciprocating member 82. The dial is returned to its upper position by action of springs 10 at which time the blank is supported by the releasing fingers 21. The slide 71 then moves horizontally and brings the tooth 76 into contact with the cam end 68 of the safety latch sufficiently to disengage the contact 32 as the ratchet 72 enters notch 83. On its return movement the slide causes the ratchet to turn the dial around until the safety latch engages the next contact. The slide then makes a reverse movement which releases the safety latch and engages the adjacent contact and by a second return movement of the slide the dial is advanced to a position which brings the cut blank above the lower forming die 28. The reciprocating member of the press being timed in relation to the repeated movements of the slide, makes a downward movement during which the registering bushings 25 are accurately positioned by the guide pins 26 bringing the blank and depressed dial into correct position as the first forming operation is performed between the lower forming die 28 and the upper forming die 54. The material to be cut having been manually fed forward through the slot toward the pair of rolls or having been engaged between the rolls, the same downward movement of the reciprocating member causes a repetition of the blanking operation. During the return movement of the reciprocating member, the article having received its first forming operation, the dial is then moved upward and the form holding lugs 20 serve to lift the form from the lower forming die 28. Assuming that the strip or roll of material has been engaged between the rolls, movements of the rod 78 will intermittently feed the material through the guide 36 as required and the repeated movements of the slide and safety latch in timed relation causes rotation of the dial which carries the article to a position above the lower forming die 29 and carries the blank to a position above the lower die 28. The reciprocating member repeatedly makes timed operations with those of the ratchet and dial by which the article being formed is progressively advanced to the lower dies 30 and 31, where the completed article is ejected by any suitable means as the dial makes a movement to its upper position such means preferably being arranged so that the article encounters a fixed stem, not shown, but which it is understood may be secured to the press and may extend through an aperture which may be formed through the punch holding plate. It is obvious that as the successive forming operations are being performed, blanks will be successively cut, placed in the blank and form holders and carried by the dial to the forming dies, while the scrap material will be carried away by the rolls and the completed article will be successively ejected. The blank and form holders may be made in various shapes other than the circular form shown in the drawing. Although I have shown spring actuating mechanism as a means for returning the dial to the upper position, it is obvious that other equivalent mechanism may be employed.

The particular construction of the dies does not form any part of the present invention. The die sets used will vary according to the type of finished product. What is important, however, is that a multiplicity of die sets is used, comprising radially spaced sets, which are designed to perform successive operations on the same blank, and that the rotary dial 15 carries the blanks from one forming station to another.

While rotary dials have been used in the past in connection with die forming punch presses, the present invention particularly embodies a rotary dial plate which is constructed to have a vertical movement to disengage the work from the lower set of dies, and which is advanced step-by-step so that successive die forming operations are carried out automatically.

Various other changes may be made in the construction and arrangement of parts other than those shown in the drawings, without departing from the spirit of my invention, and what I claim and desire to secure by Letters Patent is:

1. A die holder of U-shaped construction

having opposed jaws separated from each other, means for holding a die on one of said jaws, and a vertically shiftable dial plate rotatably mounted to extend between said jaws.

2. The combination with a power punch press having a ram, a plate attached to said ram, a series of dies carried on said plate, a base, a post mounted on said base, a rotary dial plate slidable upon said post and having openings therein spaced from and around said post, compressible springs for holding said dial normally elevated, means for advancing said dial plate step-by-step on said post, work retaining fingers disposed in radially spaced groups in said openings, and a plurality of mated dies, whereby the work will be progressively shifted for successive die forming operations.

3. A die form mechanism including a die holder formed in U-shape, a die therein, said die holder having a recess in its upper part for feeding material through said U-shaped die holder, and a reciprocable punch for cutting material against said die.

4. A forming die device including; a plurality of mated forming dies arranged in a circular series, means for carrying the article to be formed, said carrying means being arranged about a center of rotation from which said dies are equidistant, said carrying means adapted to support a plurality of article holding devices interchangeable relative to said plurality of forming dies.

5. A forming die device including; a plurality of mated forming dies arranged in a circular series, means for carrying the article to be formed, said carrying means being arranged about a center of rotation from which said dies are equidistant, and means for axially moving said carrying means while in a registered alignment with respect to the movement of a die member.

6. A forming die device including; a plurality of mated forming dies arranged in a circular series, means for carrying the article to be formed, said carrying means being arranged about a center of rotation from which said dies are equidistant, means for rotating said carrying means, and automatic means for locking and unlocking said carrying means from a previous position and locking said rotating means in a new position.

7. A forming die device including; a plurality of mated forming dies arranged in a circular series, means for carrying the article to be formed, said carrying means arranged about a center of rotation from which said dies are equidistant, means for rotating said carrying means, means controlled by said rotating means for axially moving said carrying means while in registered alignment with respect to the movement of a die member, and means for positively registering said carrying means with said mated die members.

8. A forming die device including; a plurality of mated forming dies arranged in a circular series, means for carrying the article to be formed, said carrying means being arranged about a center of rotation from which said dies are equidistant, means for rotating said carrying means, means for axially moving said carrying means while in a registered alignment with respect to the movement of a die member, and means for timing said axial movement in relation to said rotating movement.

9. A cutting and forming device including; mated cutting dies, a plurality of mated forming dies, means for carrying a succession of the articles to be formed, said carrying means being arranged about a center of rotation from which said dies are equidistant, means for rotating said carrying means, means for successively cutting the blank and means for successively performing a series of forming operations whereby to produce a succession of completely formed articles.

10. A cutting and forming device including; mated cutting dies, a plurality of mated forming dies, means for carrying a succession of the articles to be formed, said carrying means being arranged about a center of rotation from which said dies are equidistant, means for rotating said carrying means, a die mounting member adapted to be secured to a reciprocating member of a press, and a mounting member for cooperating dies, said carrying means and said rotating means, adapted to be secured to a platen of a press.

11. A forming die device including; a punch, mated forming dies arranged in a circular series, means for carrying the article to be formed, said carrying means being arranged about a center of rotation from which said dies are equidistant, and a U-shaped die holding member adapted to receive a blanking die in registered alignment with respect to movement of said punch and said carrying means.

12. A forming die device including; a punch, mated forming dies arranged in a circular series, means for carrying the article to be formed, said carrying means being arranged about a center of rotation from which said dies are equidistant, a U-shaped die holding member adapted to receive a blanking die, said blanking die being in registered alignment with respect to movement of said punch and said carrying means, and means for placing a punched blank into said carrying means.

13. A forming die device including; a punch, mated forming dies, means for carrying the article to be formed, said carrying means being arranged about a center of rotation from which said dies are equidistant, a U-shaped die holding member adapted to receive a blanking die in registered alignment with respect to movement of said punch and

carrying means, and means for intermittently feeding strip or roll material when out of contact with said punch.

14. A cutting and forming device including; means for cutting a blank to be formed, mated forming dies, a dial provided with a plurality of apertures, said dial being arranged about a center of rotation from which said dies are equidistant, means for rotating said dial, and means for axially moving said dial while in registered alignment with respect to the movement of one of said forming dies.

15. A die forming mechanism including; a die holder having separated jaws rigidly connected to each other, one of said jaws having a die provided with an opening, a reciprocable punch for forming the material against said die and forcing the material through said opening, and a vertically shiftable rotary dial plate mounted to turn step-by-step between successive reciprocations of the punch while always projecting between said jaws.

In testimony whereof, I have signed my name to this specification, this ninth day of November, 1928.

CHARLES S. SIEGEL.