G. I. ROCKWOOD AND H. G. CARLSON.

APPARATUS FOR MAKING NUTS.

APPLICATION FILED JAN. 29, 1917.

1,378,980.

Patented May 24, 1921.

3 SHEETS—SHEET 1.

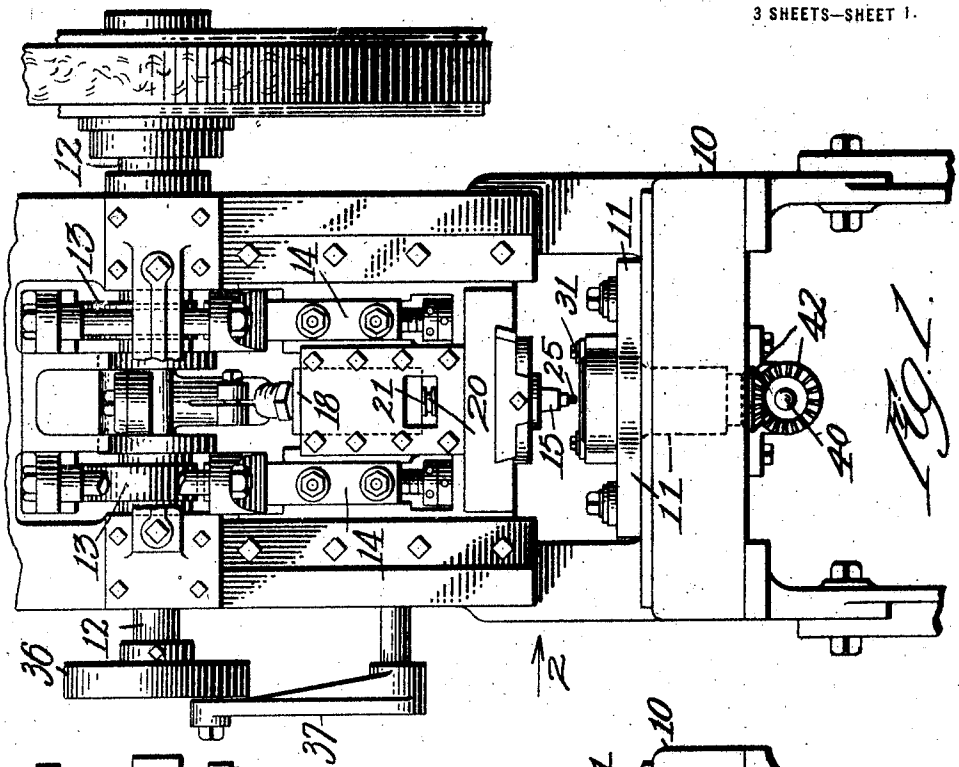


Fig. 1.

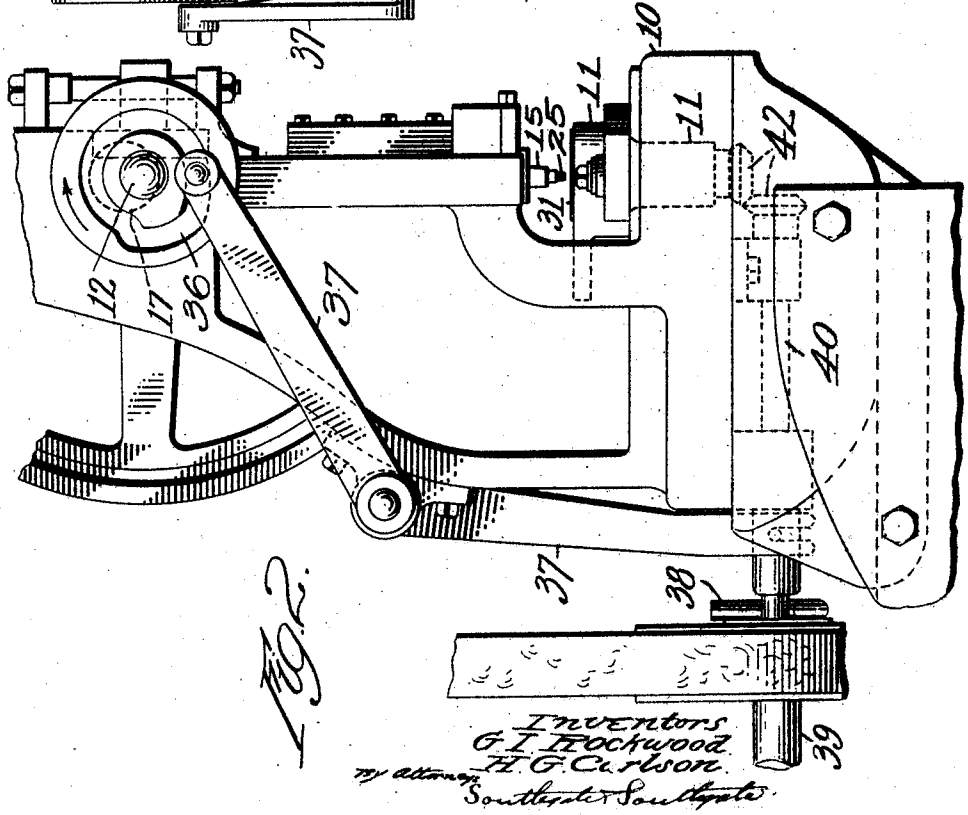


Fig. 2.

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3 SHEETS—SHEET 2.

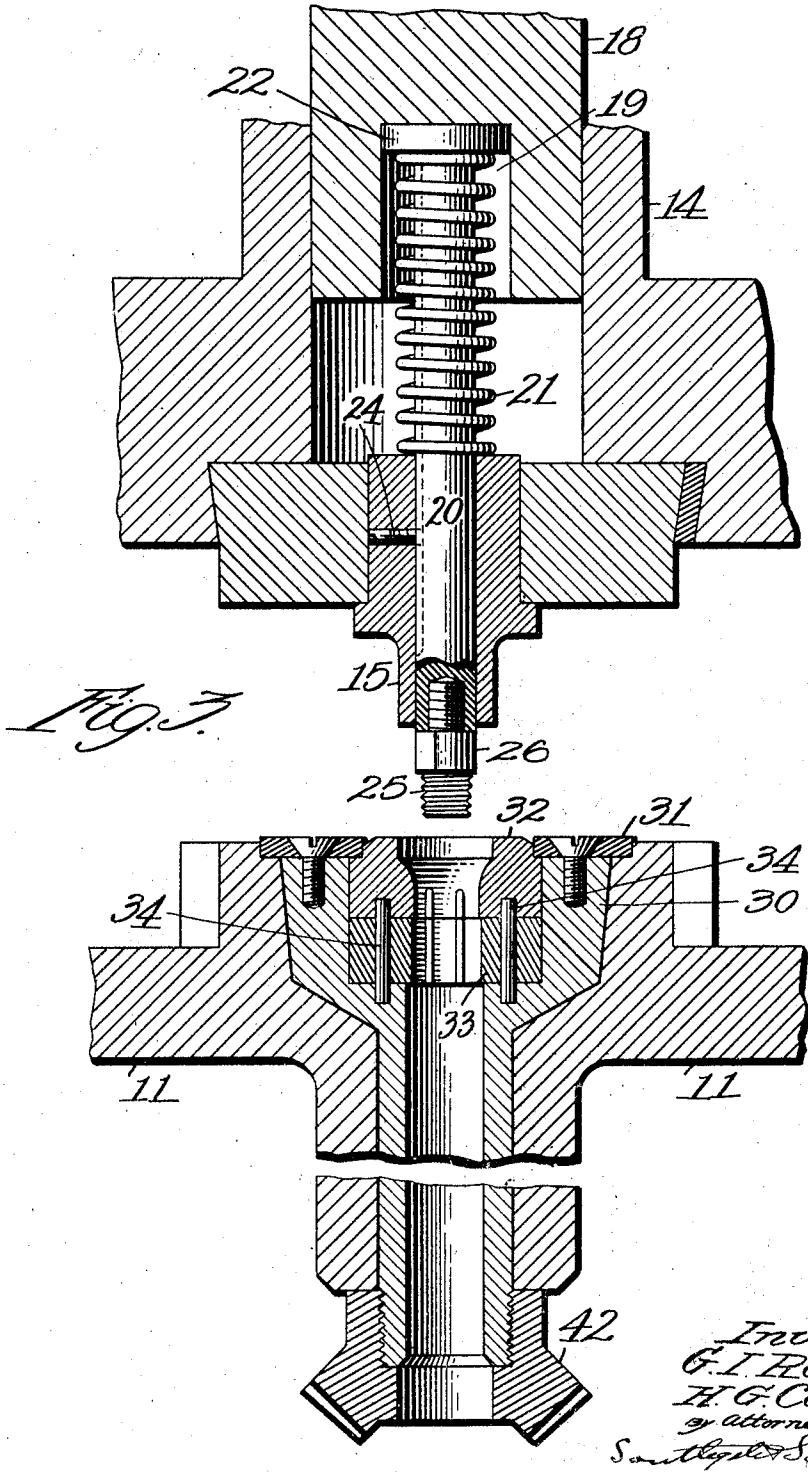


Fig. 3.

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3 SHEETS—SHEET 3.

Fig. 4

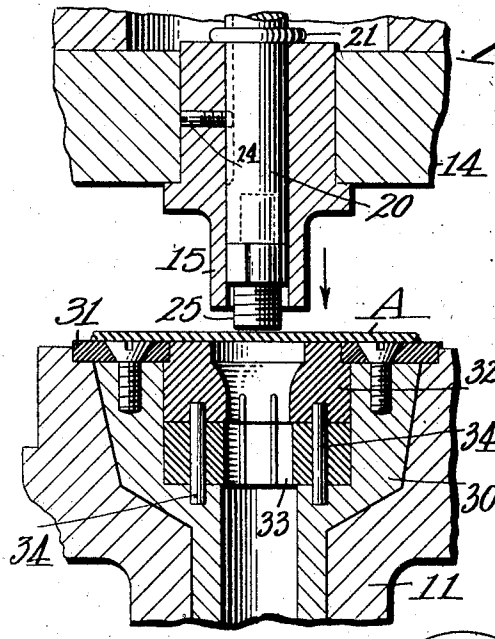


Fig. 5

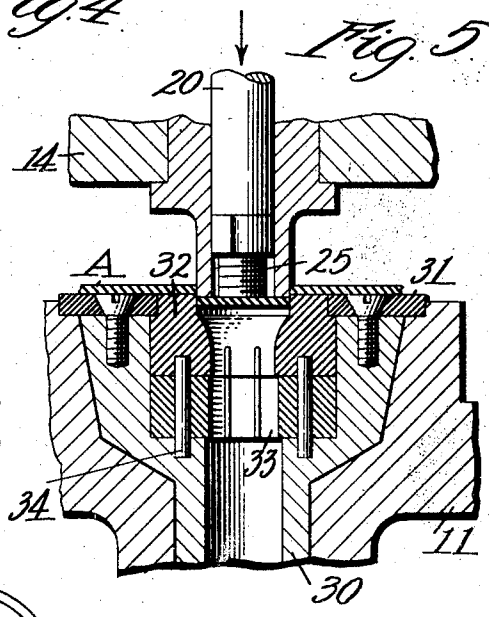


Fig. 8.

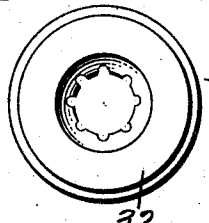


Fig. 6.

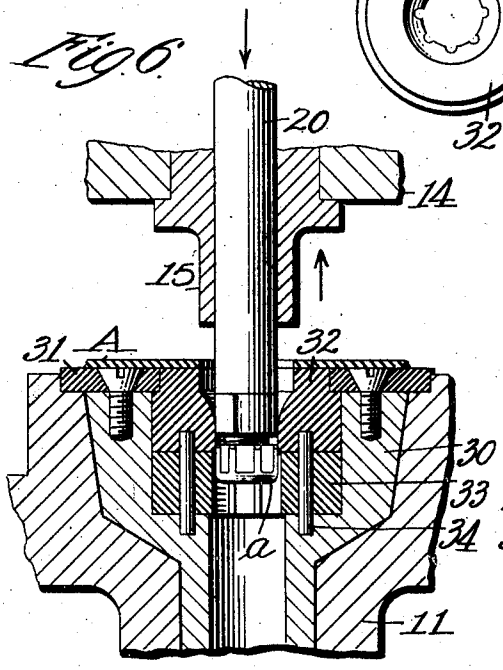
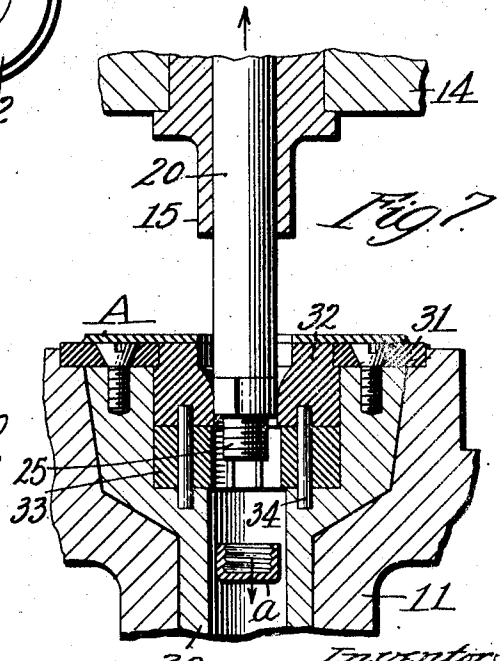


Fig. 7.



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UNITED STATES PATENT OFFICE.

GEORGE I. ROCKWOOD AND HJALMAR G. CARLSON, OF WORCESTER, MASSACHUSETTS; SAID CARLSON ASSIGNOR TO ROCKWOOD SPRINKLER COMPANY OF MASSACHUSETTS, OF WORCESTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

APPARATUS FOR MAKING NUTS.

1,378,980. Specification of Letters Patent. **Patented May 24, 1921.**

Application filed January 29, 1917. Serial No. 145,124.

To all whom it may concern:

Be it known that we, GEORGE I. ROCKWOOD and HJALMAR G. CARLSON, citizens of the United States, both residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Apparatus for Making Nuts, of which the following is a specification.

This invention relates to an apparatus for making nuts, and the principal objects of the invention are to provide for making an internally screw-threaded body in such a manner as to avoid a complete operation of screw-threading by means of a motion of rotation, and at the same time to avoid the necessity of handling the product and centering it between the formation of the blank and the screw threading thereof and to provide for forming the article and discharging it with a minimum number of operations. In this manner the production of the article is greatly simplified, its cost decreased, and an article produced that is equal to the best produced by the old method and materially better than the ordinary malleable cast iron articles of similar character now on the market.

These results are accomplished according to this invention by punching out a blank from sheet stock as has been done before, but adding the step of screw threading it on the interior while it is being shaped up into cup shape. This is done by the simple expedient of forming it over a screw-threaded plunger which imprints screw threads on the interior of the article during the operation of forming the cup-shape blank. This leaves the article completely formed on the plunger and it remains only to unscrew it therefrom so that the process of turning a tap into the nut or the nut blank on a tap is entirely eliminated, and only the unscrewing operation retained; and furthermore this latter operation can be and preferably is performed while the plunger is completing its stroke, coming to rest and starting back so that the articles can be formed substantially with the same rapidity as smooth surfaced articles of the same shape.

The invention is designed to be applied to nuts of any kind and is shown herein as applied to the manufacture of a cap nut which can be converted into an ordinary nut if desired by cutting off the closed end.

Further objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a front elevation of an ordinary punching press with a preferred embodiment of this invention applied thereto;

Fig. 2 is a side view of the same;

Fig. 3 is a central sectional view on enlarged scale showing the construction of the plunger and certain connected parts;

Fig. 4 is a similar view showing the movable elements descending and just about to commence the operation on the sheet stock which is shown in position;

Fig. 5 shows the parts in the next stage in which the blank has just been cut out of the sheet metal;

Fig. 6 shows the parts in the position in which the screw-threaded plunger has descended and formed the blank up into its final shape in the die;

Fig. 7 shows the parts in the position in which the nut has just been unscrewed and is dropping out of the machine, the reciprocating parts having just commenced their return motion, and

Fig. 8 is a plan of the die shown in the other figures.

The invention is shown as applied to a double action punching press of a well-known type which as usual comprises a frame 10 having a bed or plate 11 for supporting a die. This press as ordinarily made and as shown herein involves a main driving shaft 12 mounted on the frame and carrying a pair of cams 13 which through connections 14 operate a cutting die 15. Also on this shaft 12 is an eccentric 17 which operates a slide 18 having a depression 19 in its lower end for receiving the upper end of a plunger 20. This plunger is provided with a spring 21 engaging under the head 22 thereof for normally forcing the plunger up as far as the slide 18 will permit, the spring bearing at its bottom on the top of the cutting die 15 which itself is reciprocated as stated.

This die 15 is fixed against turning in the supports, with which it is provided, and has a screw 24 projecting into a longitudinal groove in the plunger 20 to keep that from turning. The bottom of the plunger 20 is screw-threaded at 25. The end of the plun-

ger is shown separate and secured to the plunger by means of a screw, these two parts being connected by an integral portion 26 having a slot in it to permit application and removal of the screw-threaded tip or male die.

As stated, the bed of the machine is also provided with a die. In this case it has a rotary die holder 30 axially alined with the plunger 20 of course and having a plate 31 screwed to it and projecting inwardly over the edge of a socket therein for holding the female die 32 in place. This die is shaped on the interior to take a sheet of metal forced down by the plunger and form it into a cup shape, as indicated in Fig. 7. This die is supported below by a plate 33 also resting in the socket in the die holder 30, and having a passage therethrough of the same shape as the passage in the die but slightly larger. We shall refer to this as a wrench member. Pins 34 extend from the die holder up through the member 33 and into the die 32 to prevent their turning with respect to each other. The passages in the die 32 and wrench member 33 are of course made to register with each other.

For the purpose of operating the die holder 30 the main shaft 12 is shown as provided with a cam 36 which operates levers 37 and moves a clutch 38 once during each rotation of the shaft 12, and holds it in for a sufficient portion of a revolution, as will be seen by reference to the shape of the cam 36. This clutch connects a shaft 39, which can be operated by a separate motor or from any desired source of power, with a shaft 40 on which one part of the clutch 38 slides. The shaft 40 by means of bevel gears 42 drives the die holder 30. One of the bevel gears 42 is mounted on the bottom of this die holder by means of a left-hand thread. This mechanism is driven to give a sufficient number of revolutions to the die holder 30 to unscrew the formed nut from the punch 25 and it then stops. It is always driven of course in the same direction.

The method of producing a nut according to this invention is as follows:—Sheet stock A is placed on the plate 31 and fed along by hand or otherwise as is usual in the case of punching machines of this type. The cutting-out die 15 comes down upon it and cuts out a circular blank and presses it down into the top of the die 32, as shown in Fig. 5. This die 15 has a dwell at this point and while in that position the plunger 20 comes down through and presses the blank into the shaping portion of the die 32 and finally projects it below the bottom of the same into the wrench member 33. Fig. 6 shows the nut *a* just being forced into this position. From the relative location of the eccentrics 17 and cam 36, shown in Fig. 2, it will be seen that at just this point the eccentric part of the cam 36 lowers the upper end of the lever 37 and forces the clutch member 38 to the right so as to start the shaft 40 and the die holder 30 into rotation. This rotation continues throughout a part of the rotation of the shaft 12 and gives several complete turns to the die holder 30. The result of this is that while the nut *a* is on the screw-threaded die 25 and, while the latter is completing its stroke, coming to rest, and starting back, the nut is engaged loosely by the member 33, the passage through which is slightly larger than the nut, and it is unscrewed. On account of this passage being larger there is no danger of the nut lodging in it, and yet it is positively turned by it. The nut then drops out and through the passage shown down through this die holder, and the eccentrics raise the slide 18, allowing the spring 21 to raise the plunger 20 and the die 25. This produces an article of manufacture which is completely finished for some purposes by its formation in the dies 25 and 32 and simply has to be ground off on the outer edge for others. The product here is shown in the form of a cap nut, but it will be obvious that the bottom wall, as shown in these figures, can be cut off to produce a common nut.

It will be seen that great saving is made on the production of these articles, and that they can be punched out and removed with a rapidity heretofore unapproached. Furthermore, there is no danger of the machine clogging, its speed can be run very high because there are no cutting tools that would be heated up at a high speed if the nuts were made in accordance with the ordinary methods; and the screw-threaded die 25, having no cutting edges, need not be resharpened or frequently replaced, thus affording a material economy over the use of a tap. It will be seen also that the raising of this plunger by means of a spring instead of by the positive eccentric is a feature of importance because in that way there is no danger of its tearing through the threads of a product made upon it. The timing of the unscrewing mechanism is provided for in a simple and absolutely accurate manner by this mechanism.

Although we have illustrated and described the production of an article of a definite form and the application of the mechanism to a press of well-known construction, and shown only one form of the invention, we are aware of the fact that all these can be changed within wide limits without departing from the scope of this invention as expressed in the claims. Therefore we do not wish to be limited to the construction of the particular article shown, the application of the invention to the particular press illustrated or to the particular mechanism described, but what we do claim is:—

1. In a machine for making nuts, the com-

bination of a plunger having non-cutting screw threads thereon, a single female drawing die coöperating therewith and located in position for the plunger to force the blank into it, said female die having die surfaces for forcing the metal of the blank into the screw thread on the plunger to produce a nut, and means for unscrewing the nut while the plunger is completing its stroke, coming to rest, and starting back.

2. In a machine for making nuts, the combination of a die, a screw threaded plunger movable into the die, to form an internally screw threaded article, and a wrench member for rotating the article with the die to unscrew it from the plunger, said wrench member having a non-circular passage therethrough for receiving the article, causing it to turn with it, and to be discharged through it.

3. In a machine for making nuts, the combination of a plunger having a continuous screw thread thereon and adapted to be forced into a blank to form an imprint of said screw thread on the interior thereof, a rotary die holder, and a wrench member located with the die in said die holder, rotatable therewith, and having a passage therethrough through which the article from the die can pass freely but of a shape to cause the article to turn with it.

4. In a machine for making nuts, the combination of a non-rotatable plunger having a non-cutting screw thread thereon, a female die coöperating therewith and located in position for the plunger to force a blank into it, said female die having die surfaces for forcing the metal of the blank around and into the screw thread on the plunger, a rotary die holder having a socket in which said die is located, and a wrench member also located in said socket and in axial alinement with the die, and having a passage therethrough of substantially the same shape as the passage through the die, and pins seated in the die holder and passing through the wrench member and into the die to keep the die and wrench member in registration and cause them to rotate with the die holder.

5. In a machine for making nuts, the combination of a plunger having a non-cutting screw thread thereon, a female die coöperating therewith and located in position for the plunger to force a blank into it, said female die having die surfaces for forcing the metal of the blank around and into the screw thread on the plunger, a rotary die holder having a socket in which said die is located, a wrench member also located in said socket and in axial alinement with the die, and having a passage therethrough of substantially the same shape as the passage through the die, means for keeping the die and wrench member in registration and causing them to rotate with the die holder, and means for rotating said die holder a plurality of times while the punch is substantially in its lowermost position.

6. In a machine for making nuts, the combination of a plunger having a non-cutting screw thread thereon and adapted to be forced into a blank to form an imprint of said screw thread on the interior thereof, a rotary die member located adjacent thereto, and having a passage therethrough through which the article can pass freely, but of a shape to cause the article to turn with it, means for operating said plunger, and means for causing said die member to rotate and unscrew the nut from the plunger and discharge it through the die member.

7. In a machine for making nuts, the combination of a reciprocatory slide, a reciprocatory member having a cutting-out punch thereon, a screw-threaded non-cutting plunger movable through the cutting-out punch, means for preventing said plunger from turning, a die for receiving the plunger, and means for rotating an article formed between the plunger and die to remove it from the plunger through the die.

8. In a machine for making nuts, the combination of a reciprocatory slide, a reciprocatory member having a cutting-out punch thereon, a screw-threaded plunger movable through the cutting-out punch, and a spring for drawing said plunger back into the punch, the slide being located and arranged to control and limit the movement of said plunger.

9. In a machine for making nuts, the combination of a reciprocatory slide, a reciprocatory member having a cutting-out punch thereon, a screw-threaded plunger movable through the cutting-out punch, a spring for drawing said plunger back into the punch, the slide being located and arranged to control and limit the movements of said plunger, means for preventing said plunger from turning, a die for receiving the plunger, and means for rotating an article formed between the plunger and die to remove it from the plunger.

In testimony whereof we have hereunto affixed our signatures.

GEORGE I. ROCKWOOD.
HJALMAR G. CARLSON.