July 12, 1932. R. M. STRICKLAND 1,867,191

CONVERTIBLE ROTARY AND NONROTARY SELF OPENING DIE HEAD

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Fig. 1.

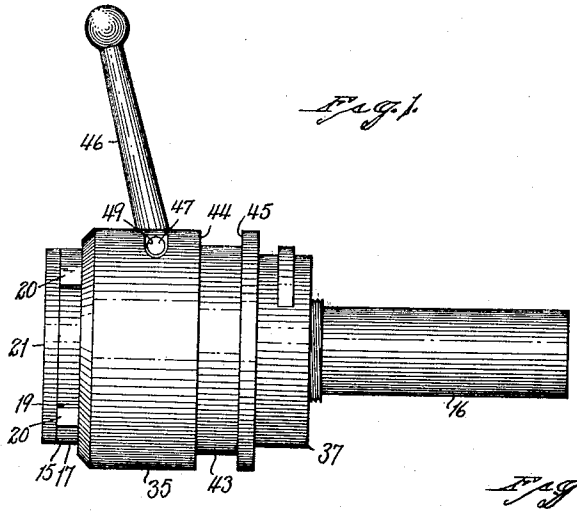


Fig. 2.

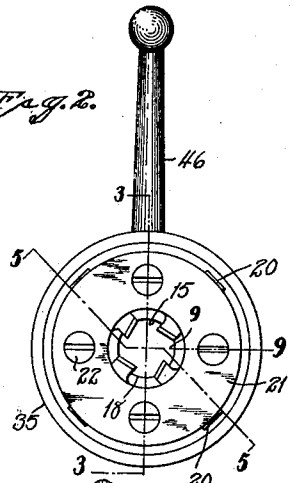


Fig. 3.

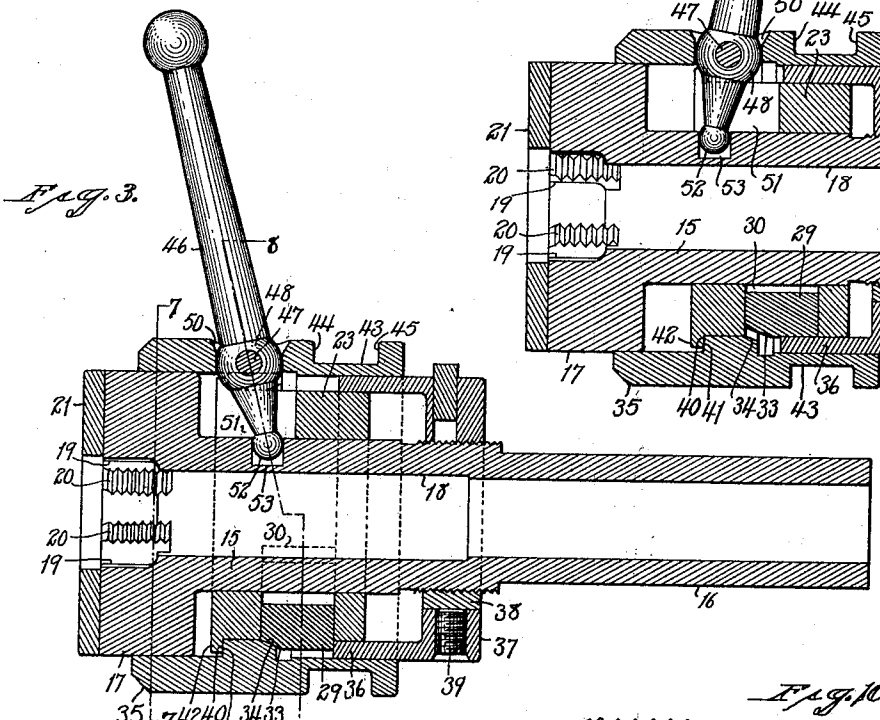


Fig. 4.

Fig. 11.

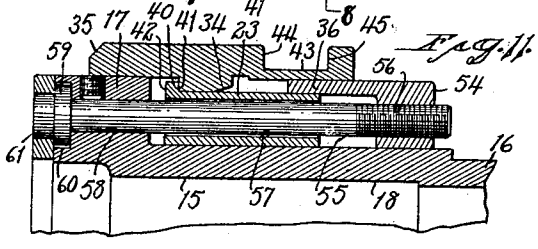
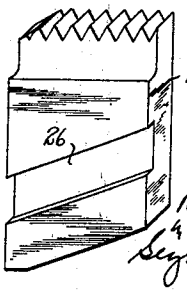


Fig. 10.



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Fig. 5.

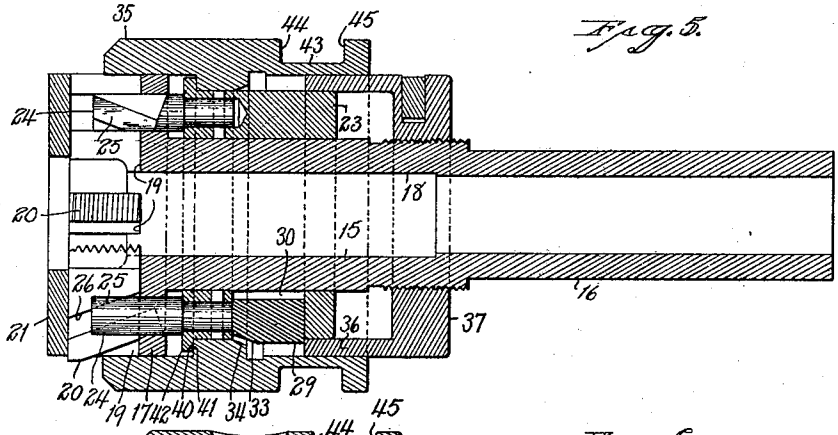


Fig. 6.

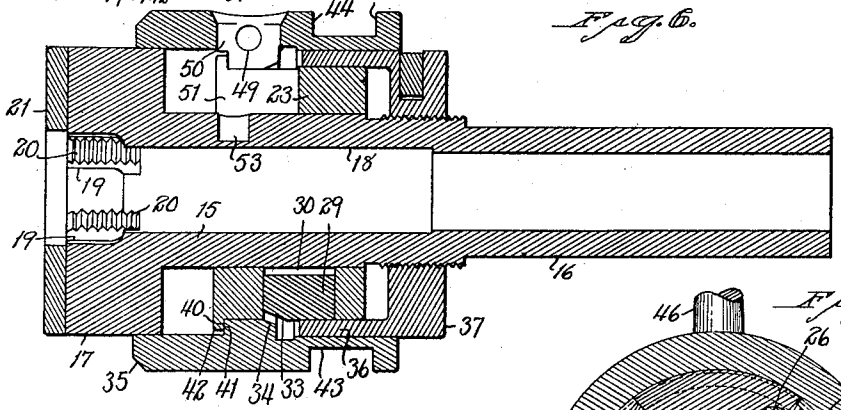


Fig. 7.

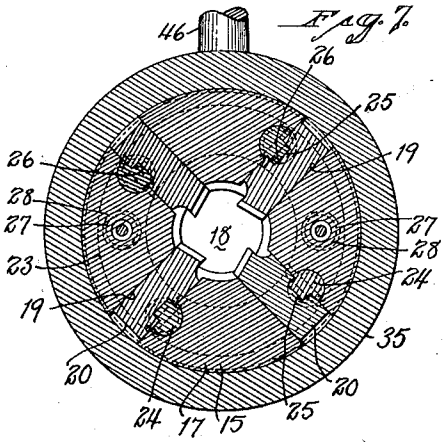


Fig. 8.

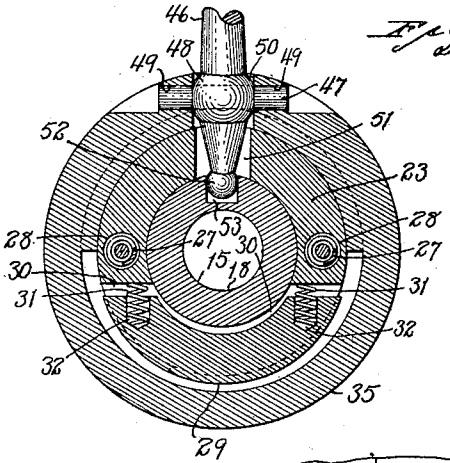
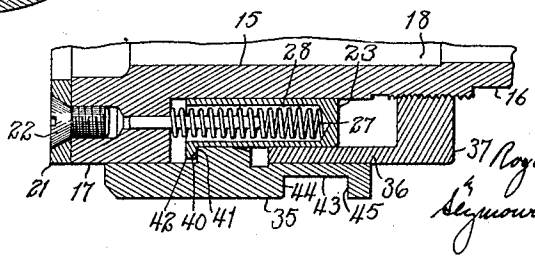


Fig. 9.



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Patented July 12, 1932 1,867,191

UNITED STATES PATENT OFFICE

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CONVERTIBLE ROTARY AND NONROTARY SELF-OPENING DIE-HEAD

Application filed May 19, 1931. Serial No. 538,449.

This invention relates to an improvement in convertible rotary and non-rotary self-opening die-heads, that is to say, die-heads which may be employed either in machines which rotate the die-head with respect thereto, or in machines which non-rotatably hold the die-head and at the same time rotate the work with respect thereto.

Heretofore, self-opening die-heads have fallen into two distinct classes, i. e., one type referred to as "rotary", being designed for use in situations requiring the rotation of the die-head, and another distinct type commonly referred to as "non-rotary" or "hand" type.

The main object of my present invention is to provide a self-opening die-head which may be readily and conveniently converted from a non-rotary to a rotary die-head and vice versa, whereby a single die-head may be relied upon to perform the work usually requiring two distinct and expensive tools.

A further object of my invention is to provide an accurate and durable die-head of the type referred to, and constructed with particular reference to compactness and convenience of operation.

With the above and other objects in view as will appear from the following, my invention consists in a convertible self-opening die-head characterized by a chaser-controlling sleeve having both forwardly- and rearwardly-facing shoulders by means of which the die-head may be tripped and reset respectively; and an outwardly-projecting hand-lever pivotally engaging the said chaser-control sleeve and the body of the die-head for both tripping and resetting the tool, and mounted in such manner as to be readily removable without requiring the disassembly of the die-head; whereby the removal and replacement of the said hand-lever will respectively convert the die-head from a non-rotary to a rotary type and vice versa.

My invention further consists in a convertible rotary and non-rotary self-opening die-head characterized as above and having certain other details of construction and combinations of parts as will be hereinafter described and particularly recited in the claims.

In the accompanying drawings:

Fig. 1 is a view in side elevation of one form which a convertible self-opening die-head constructed in accordance with my invention may assume;

Fig. 2 is a view thereof in front elevation;

Fig. 3 is a central longitudinal sectional view thereof taken on the line 3—3 of Fig. 2, but on a larger scale;

Fig. 4 is a central longitudinal sectional view corresponding to Fig. 3 with certain of the parts broken away and showing the parts of the die-head in the positions which they assume when the die-head has been tripped for effecting the retraction of the chasers;

Fig. 5 is a longitudinal sectional view taken on the line 5—5 of Fig. 2;

Fig. 6 is a vertical central longitudinal sectional view corresponding to Fig. 4, but showing the operating-handle or lever as having been removed to convert the tool for use as a rotary die-head;

Fig. 7 is a transverse sectional view taken on the line 7—7 of Fig. 3;

Fig. 8 is a corresponding view taken on the line 8—8 of Fig. 3;

Fig. 9 is a detail sectional view taken on the line 9—9 of Fig. 2;

Fig. 10 is a perspective view of one of the reciprocating-chasers detached, and on a larger scale; and

Fig. 11 is a broken detail view in longitudinal section illustrating a modified construction in which the adjusting-nut or collar is operated by means of a longitudinal screw.

The particular self-opening die-head herein chosen for the illustration of my invention consists, as shown, of a body-member 15 having a rearwardly-extending shank 16 by means of which the tool may be mounted in any suitable threading machine, and having its forward end shaped to form a head-portion 17 through which extends an axial bore 18 preferably, and as shown, extending also completely through the body-member including the shank 16 thereof.

The head-portion 17 is formed in its forward face with four (more or less) radial guide-grooves 19 in each of which is installed

a radially-movable chaser 20. The four chasers respectively installed in each of the guide-grooves 19 are held in place therein by a retaining-ring 21, secured to the front face of the head-portion 17 of the body-member 15 by means of four equidistant screws 22.

For the purpose of concurrently reciprocating the chasers 20 radially to engage and disengage them from the work, I employ a sleeve-like chaser-operating member 23 mounted upon the body-member 15 with capacity for axial reciprocating movement and carrying four forwardly-projecting operating-pins 24 (one for each of the chasers 20). Each of the operating-pins 24, just referred to, is cut away on one side to form an inclined operating-rib or key 25 fitting into a similarly-inclined groove 26, one of which is formed in the side face of each of the chasers 20.

For the purpose of normally urging the chaser-operating member 23 rearward so as to thereby effect the concurrent outward retraction of the chasers 20, I employ a pair of complementary retracting-springs 27, each of which is housed within a forwardly-opening socket 28, formed in the said chaser-operating member 23, as clearly shown in Fig. 9, and bearing at its forward end against the rear face of the head-portion 17 of the body-member 15.

For the purpose of releasably holding the chaser-operating member 23 in its forward position against the counterurge of the springs 27 so as to maintain the chasers 20 in their inwardly-projected or cutting positions, I employ a segmental locking-member 29 mounted in a transverse groove 30 formed in the chaser-operating member 23.

The said locking-member 29 above referred to is normally urged radially outward by a pair of complementary springs 31—31, housed in pockets 32—32 formed in the upper face of the respective opposite ends of the said locking-member which also has its forward outer corner beveled to form a cam-surface 33, adapted to be engaged by a similarly-sloped cam-surface 34 formed within the interior of a combined resetting-and-tripping sleeve 35, substantially enveloping the periphery of the said chaser-operating member 23 and axially movable with respect thereto and with respect to the body-member 15 upon the periphery of the head-portion 17 upon which it bears for guidance.

The rear face of the locking-member 29 is adapted to engage, for the purpose of locking the die-head in position for a cutting operation, the forward face of the flange 36 of a cup-shaped adjusting-nut 37 threaded upon the body-member 15, just forward of the shank 16 thereof, as clearly shown in Figs. 3 to 6 inclusive, and provided with a locking-shoe 38 adapted to be forced into engagement with the said body-member for anchoring the adjusting-nut against accidental rotation by means of a set-screw 39.

The interior of the combined resetting-and-tripping sleeve 35 is formed with an annular forwardly-facing resetting-shoulder 40 adapted to engage the rear face of a similar shoulder 41 constituting the forward face of an annular flange 42 formed upon the chaser-operating member 23 before referred to; the relationship of the shoulders 40 and 41 being such that the sleeve 35 will move the said chaser-operating member 23 forward from the position in which it is shown in Fig. 4 to that in which it is shown in Fig. 3, but will still be free for relative rearward movement with respect thereto for the purpose of operating the locking-member 29 as will hereinafter appear.

The combined tripping-and-resetting sleeve 35 is formed upon its outer periphery near its rear end with an annular groove 43, the respective front and rear walls of which constitute a resetting-shoulder 44 and a tripping-shoulder 45 adapted to be engaged by a yoke-like fixture forming a usual feature of threading machines, for the purpose as will hereinafter appear.

For the purpose of providing for the use of my improved die-head as a non-rotary hand-operated tool, I employ a combined chaser-releasing and chaser-resetting hand-lever 46 radially projecting from the die-head structure and mounted by means of a transverse pin 47 for rocking movement forward and backward with respect to the die-head.

The pin 47, just referred to, projects through a spherically-contoured annular rib 48 formed upon the said handle and into complementary tangential bores 49 formed in the sleeve 35, on the respective opposite sides of a radial passage 50 therein, which latter is closed against the entrance of dirt and chips by the said spherically-contoured rib 48 of the handle.

The inner end of the hand-lever 46 passes through a radial notch 51 formed in the forward face of the chaser-operating member 23 and is provided with a spherically-contoured terminal 52 entered into a radial socket 53 formed in the periphery of the body-member 15 to the rear of the head-portion 17 thereof.

Let it be supposed that it is desired to employ my improved convertible die-head as a non-rotary tool in which case the handle-lever 46, if not already in place in the die-head structure, will be installed in the combined tripping-and-resetting sleeve 35 by positioning it therein and inserting the pin through one of the tangential bores 49, through the bore in the rib 48 of the handle, and thence into the complementary bore 49 as clearly shown in Fig. 8.

With the parts positioned as shown in Fig. 3, the tool is either advanced toward the work

or the work toward the tool, until the desired length of thread has been cut, at which time the handle-lever 46 may be swung rearwardly, which will effect a relative rearward movement of the sleeve 35 with respect to the body-member 15 and cause the cam-surface 34 of the said sleeve to move the locking-member 29 inward, so as to disengage its rear face from the forward face of the sleeve-portion 36 of the cup-shaped adjusting-nut 37.

The relative rearward movement of the sleeve 35 with respect to the chaser-operating member 23, is permitted by the one-way connection, so to speak, of the same with the chaser-operating member 23. In other words, when the sleeve 35 is moved rearward as described, its shoulder 40 will ride away from the shoulder 41 on the said chaser-operating member.

Immediately upon the clearance of the locking-member from the sleeve 35, as above described, the retracting-springs 27—27 will assert themselves and snap the chaser-operating member 23 rearwardly so as to cause the operating-pins 24 thereof to retract the chasers away from the work and release the same.

Preparatory to another threading operation, the hand-lever 46 will be swung forwardly with the effect of similarly moving the combined tripping-and-resetting sleeve 35 forwardly so as to cause its resetting-shoulder 40 to engage the resetting-shoulder 41 of the chaser-operating member 23 to effect the concurrent forward movement thereof with the said sleeve 35.

The forward movement of the chaser-operating member 23 just described, as effected through the intermediary of the outer sleeve 35, will cause the operating-pins 24 thereof to move the chasers 20 radially inward into position for engagement with the work and permit the locking-member 29 to be snapped radially outward by its springs 31—31 for locking engagement with the forward end of the sleeve-portion 36 of the adjusting-nut 37.

Now should production requirements demand the use of my improved die-head as a rotary tool, the same may be converted for such purpose by axially removing the tangential pin 47 upon which the hand-lever 46 is mounted, and removing the latter from the die-head structure. A suitable plug may, if desired, be then installed in the radial passage 50 in the sleeve 35 to exclude dirt and chips.

The die-head structure will now have assumed the form shown in Fig. 6 and may be rotated at a rapid rate in an automatic machine. In this arrangement of parts, the die-head may now be tripped by any desired means such as a yoke, forming a usual feature of threading machines which will be so set that when the desired length of thread has been cut, it will press relatively rearwardly upon the tripping-shoulder 45 of the sleeve 35 so as to cause the same to retract the locking-member 29 and thus unlock the chaser-operating member 23 for rearward movement to effect the retraction of the chasers.

The tool may be reset for another threading operation by any means pressing forwardly upon the resetting-shoulder 44 of the combined tripping-and-resetting sleeve 35, which will cause the latter to move the chaser-operating member forwardly and thus bring the chasers into their cutting positions and at the same time permit the locking-member 29 to move radially outward for engagement with the forward face of the sleeve-portion 36 of the adjusting-nut 37.

The convertible feature of my improved die-head is accomplished mainly through the fact that the hand-lever 46 is pivotally connected to the combined chaser-releasing and chaser-resetting sleeve 35 from which it is removable without requiring the disassembly of the die-head structure, as already described, to permit the use of my improved die-head as a rotary tool.

Instead of providing an adjusting-nut such as 37 which is threaded upon the body-member 15 so as to be adjustable forward and back with respect thereto to regulate the size of the thread to be cut by the chasers, I may, as shown in Fig. 11, mount an adjusting-sleeve 54 upon the body-member with capacity for sliding movement. The sleeve 54 just referred to corresponds to the adjusting-nut 37 of the preceding figures, with the exception that it is mounted upon the body-member for axial sliding movement under the control of an adjusting-screw 55, having its threaded inner end engaged in a threaded bore 56 in the said sleeve and extending through a clearance-passage 57 in the chaser-operating member 23, and through a bore 58 in the head-portion 17 of the body-member 15. The head 59 of the said adjusting-screw is located in a counter-bore 60 in the head 17 and is held in place therein by the chaser-retaining plate 21 which is formed with an aligned hole 61 permitting the engagement of a screw driver with the said screw for turning the same to effect the adjustment of the sleeve 54.

It will be understood by those skilled in the art that my invention may assume varied physical forms without departing from my inventive concept and I, therefore, do not limit myself to the specific embodiment herein chosen for illustration, but only as indicated in the appended claims.

I claim:

1. In a convertible rotary and non-rotary self-opening die-head, the combination as a unitary structure for operation in either capacity; of a body-member; a plurality of outwardly-retractable chasers carried by the said body-member; a reciprocating chaser-operat-

ing member carried by the said body-member for operating the said chasers and having chaser-closing and chaser-retracted positions; spring-means normally urging the said chaser-operating member into its chaser-retracted position; locking-means for releasably holding the said chaser-operating member in its chaser-closing position; a combined resetting-and-tripping sleeve operatively connected to the said locking-means for releasing the same and having a rearwardly-facing annular resetting-shoulder and an annular forwardly-facing tripping-shoulder and provided with means engageable directly with the said chaser-operating member for moving the same forwardly into its locked position but free for relative rearward movement with respect thereto for releasing the said locking-means; and a combined tripping-and-resetting hand-lever outwardly projecting from the die-head structure and having operative bearings in the said body-member and the said tripping sleeve respectively, means for pivotally connecting said lever with one of the members in which it has a bearing and characterized by being removable from such member so that the lever may be separated from the die-head structure without requiring the disassembly thereof; whereby the said chaser-operating member is capable of being tripped and reset both by the said lever and by the said tripping-sleeve so that the die-head may be readily converted from a non-rotary to a rotary die-head by the removal of the said lever and vice versa by the re-installation of the said lever.

2. A convertible rotary and non-rotary self-opening die-head as defined in claim 1 in which the said handle-lever is pivotally connected with the said chaser-resetting-and-tripping sleeve.

3. A convertible rotary and non-rotary self-opening die-head as defined in claim 1 in which the pivotal connection of said hand-lever comprises an axially-removable pivot pin projecting therethrough and bearing at its ends in the said tripping-and-resetting sleeve.

4. In a convertible rotary and non-rotary self-opening die-head, the combination as a unitary structure for operation in either capacity; of a body-member; a plurality of outwardly-retractable chasers carried by the said body-member; a reciprocating chaser-operating member carried by the said body-member and having chaser-closing and chaser-retracted positions, and provided with forwardly-projecting operating-pins engaging the said chasers for operating the same in both directions; spring-means normally urging the said chaser-operating member into its chaser-retracted position; locking-means for releasably holding the said chaser-operating member and the chaser-operating pins carried thereby in their chaser-closing positions respectively; a combined resetting-and-tripping sleeve operatively connected to the said locking-means for releasing the same and having a rearwardly-facing annular resetting-shoulder and an annular forwardly-facing tripping-shoulder and provided with means engageable directly with the said chaser-operating member for moving the same forwardly into its locked position but free for relative rearward movement with respect thereto for releasing the said locking-means; and a combined tripping-and-resetting hand-lever outwardly projecting from the die-head structure and having operative bearings in the said body-member and the said tripping-sleeve respectively, means for pivotally connecting said lever with one of the members in which it has a bearing, and characterized by being removable from such member so that the lever may be separated from the die-head structure without requiring the disassembly thereof; whereby the said chaser-operating member is capable of being tripped and reset both by the said lever and by the said tripping-sleeve so that the die-head may be readily converted from a non-rotary to a rotary die-head by the removal of the said lever and vice versa by the re-installation of the said lever.

5. In a convertible rotary and non-rotary self-opening die-head, the combination as a unitary structure for operation in either capacity; of a body-member and chasers thereof; a reciprocating chaser-controlling sleeve formed with a forwardly-facing annular chaser-releasing shoulder and with a rearwardly-facing annular chaser-resetting shoulder, both adapted to be engaged by a relatively fixed member carried by a threading machine to which said die-head is applied, said member adapted to effect the retraction and resetting of the said chasers by appropriate reciprocation of said sleeve; and a combined chaser-releasing and chaser-resetting hand-lever having an operative connection with the said chaser-controlling sleeve and adapted for reciprocating the same, said lever mounted in the die-head structure with capacity for ready removal therefrom without disassembling the same; whereby two optional means are provided for operating the said chaser-controlled sleeve without disturbing the unitary die-head structure, so that the die-head may be readily converted from a non-rotary to a rotary die-head by the removal of the said lever and vice versa by the re-installation of the said lever.

In testimony whereof, I have signed this specification.

ROYCE M. STRICKLAND.