

O. A. SMITH.

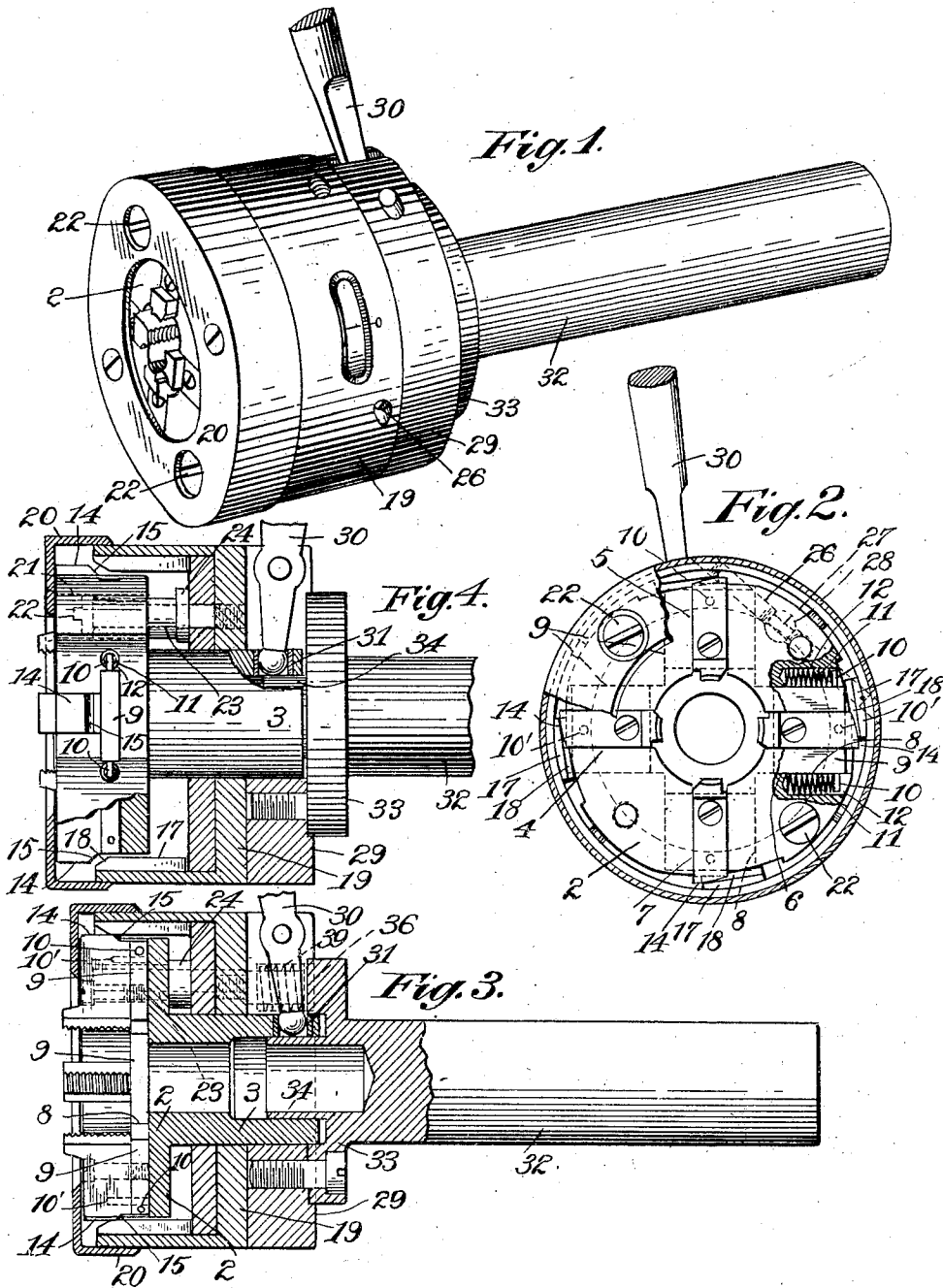
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APPLICATION FILED FEB. 5, 1912.

1,057,014.

Patented Mar. 25, 1913.

2 SHEETS—SHEET 1.



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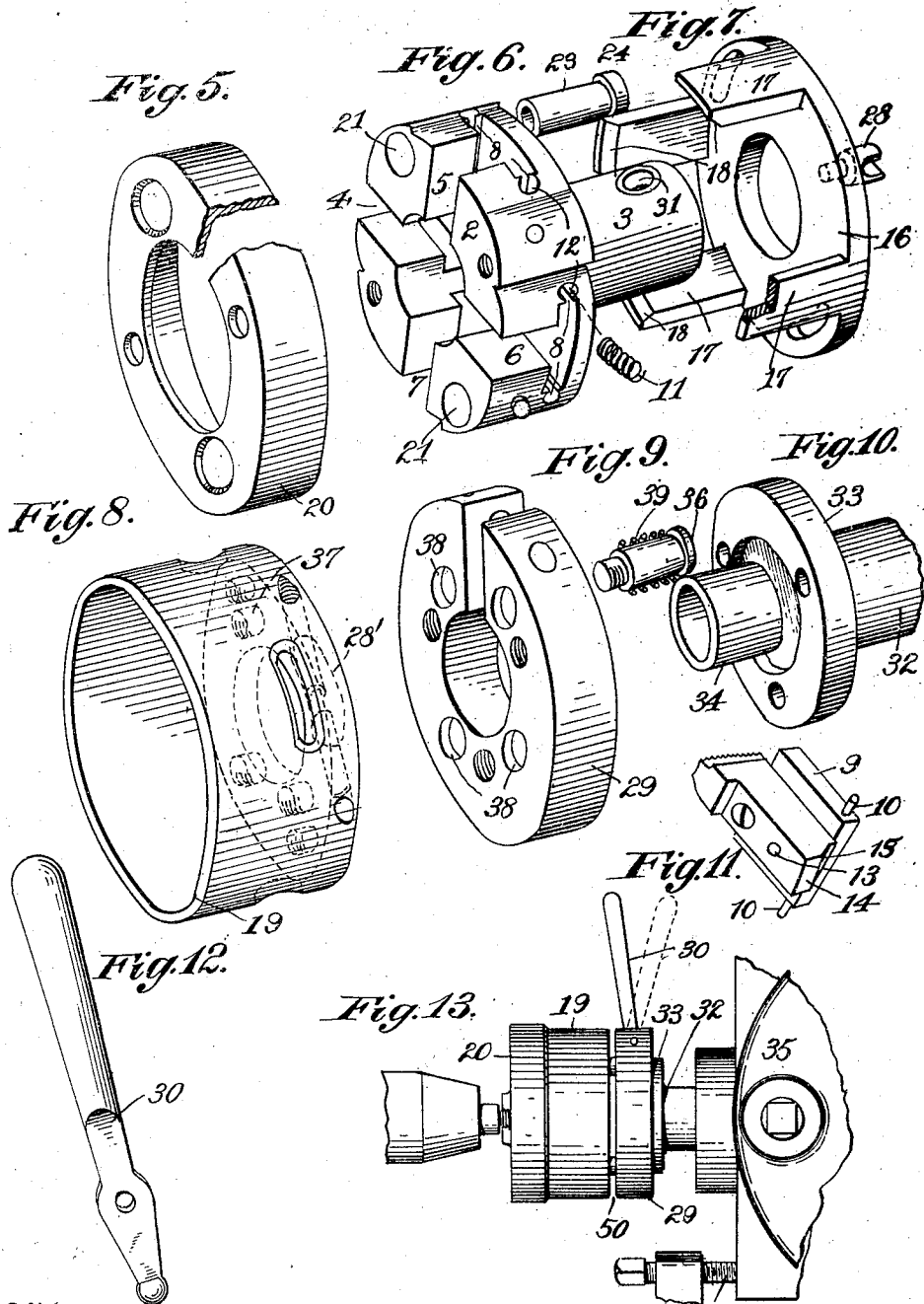
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2 SHEETS-SHEET 2.



Witnesses:
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UNITED STATES PATENT OFFICE.

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DIE.

1,057,014.

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Patented Mar. 25, 1913.

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To all whom it may concern:

Be it known that I, OSCAR A. SMITH, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Dies, of which the following is a specification.

This invention relates to threading dies of the character known as self-opening dies, the object of the invention being to provide an improved tool of this character simple in construction and easily operated and which may be readily reset by hand, and in the use of which there will be no variation of the thread during the operation of the die, by reason of the fact that the construction is such that it is impossible for the die chasers to open while the thread is being cut even though the die chaser operating means should be slightly shifted, and by means of which die the thread will be cut the full length of the stock without mutilation of the last thread being cut or of an adjacent shoulder.

A further object of the invention is the provision of an improved die in which the chasers are provided with intersecting cam faces by means of which the chasers will be directly operated by the cam operating means, and in which the chasers will be provided with means which will prevent the lifting thereof during the threading operation.

In the drawings accompanying and forming part of this specification, Figure 1 is a perspective view of the improved die; Fig. 2 is a front end view thereof with the front cap partly removed, a part of the structure being shown in section; Fig. 3 is a cross-sectional view of the die shown in Fig. 2, with the chasers in their closed or threading position; Fig. 4 is a similar view to that shown in Fig. 3, but illustrating the chaser operating cams in that position which permits the chasers to open; Fig. 5 is a partly sectional perspective view of the front cap; Fig. 6 is a perspective view of the die body, certain details being shown in juxtaposition therewith; Fig. 7 is a perspective view of the chaser operating cam member; Fig. 8 is a perspective view of the main cap; Fig. 9 is a perspective view of the handle carrying member with one of the details of the mechanism in juxtaposition thereto; Fig. 10 is a

perspective view of the spindle and the means for attaching it to the turret; Fig. 11 is a perspective view of the die chaser and its guiding means; Fig. 12 is a perspective view of the resetting handle; and Fig. 13 illustrates the die in position on the turret together with the stop for limiting the forward movement of such turret. Figs. 5, 6 and 7 show the several parts in that position which permits the proper assembling thereof. Figs. 8, 9 and 10 also show the several parts in that position which permits the proper assembling of these parts.

Similar characters of reference indicate corresponding parts throughout the figures of the drawings.

The threading tool, in the embodiment herein shown and described, comprises a die body 2 having a rearwardly extending shank portion 3 and which body is provided with a plurality, as four, guides or ways 4, 5, 6 and 7 extending radially of the die body. The rear portions of these ways are grooved or undercut, as at 8, (see Fig. 6), to form recesses. In the ways 4, 5, 6, 7 slide the die chasers, (see Fig. 11), secured to guide plates or blocks 9 projecting beyond the two side faces of the chasers into the recesses 8, by which construction the chasers are guided in their opening and closing movements and are maintained against depthwise movement. Each of these plates is provided with projecting pins 10 in position to engage coiled springs 11 located in openings 12 in the die body, one at each side of the die chasers. These springs are effective to shift the chasers outwardly from the axis of the body. In practice each plate will be provided with a locating pin 10' adapted to fit in an opening 13 in the chaser. The outer end of each chaser is tapered circumferentially throughout the major portion thereof, as at 14, and at the rear end thereof is also tapered depthwise of the tool, as at 15.

For closing the die chasers suitable means is provided, herein designated as the die chaser operating means or member, and consists of an axially bored disk 16 having forwardly extending projections or arms 17 preferably tapered on their forward ends, as at 18, whereby they will cooperate more easily with the depthwise cam surfaces 15 of the chasers. The shank portion 3 of the die body extends through the bore of this

disk 16. Encircling this disk and its forwardly extending arms is the die head cap or casing 19 centrally bored to receive the shank 3 of the die body. Fitting over the front edge of this cap and secured to the die body is a front, axially bored cap 20.

For holding the die body, the chaser operating cam disk and the cap 19 in proper assembled position relatively one to another, thereby to permit proper movement of the chaser cam disk relatively to the chasers, the die body is provided with a pair of countersunk openings 21 the shoulders of which are engaged by the heads of screws 22, which screws project through sleeves 23 entering such openings in the body, said sleeves having an enlarged head 24 in position to engage the front wall of the cam disk 16 and hold the same in engagement with the wall of the cap 19. These screws 22 pass through the cam disk and are turned into threaded openings 25 of the cap 19. Thus the chaser cam operating disk and cap are maintained in operative engagement for movement forward and backward.

For adjusting the chasers toward and from the work a suitable micrometer screw 26 is provided diagonally through the head cap, and this screw is provided with a portion of less diameter, as 27, for the reception of the bifurcated end of a stud 28, (see Fig. 7), which stud is carried by the cam operating disk 16, so that on the adjustment of this screw it will oscillate or rotate the disk 16 relatively to and independently of the head, provided the screws 22 are first suitably released, in one direction or the other according to the direction in which the adjusting screw is turned, and so adjust the chasers relatively to the work by reason of the fact that the forwardly projecting arms of the disk 16 are, as hereinbefore stated, in engagement with the circumferentially tapered portions of the chasers, this taper being transverse to the axis of the tool. The major portion of the outer end of each chaser is, however, formed as a straight surface in the direction of the axis of the tool or depthwise of the chaser. In other words, each chaser is not tapered in the direction of the axis of the tool except at its rear portion, so that when the chasers are closed by the forward movement of the head and the chaser closing cam disk the arms of the latter are in engagement with the forward depthwise straight surfaces of the chasers, and therefore no slight shifting of the head or of the chaser operating cam disk in a forward or backward direction will permit any movement of the chasers, while by oscillating or rotating the disk 16 by means of the micrometer screw the chasers will be adjusted in the manner stated. Or, to put it in other language, the outer ends of the chasers are tapered transversely to the axis

of the tool, by reason of which taper the chasers may be adjusted on rotating or oscillating the cam disk 16 by means of its micrometer screw, but as the outer or forward portions of these chasers are straight depthwise throughout the major portion thereof it follows that when the tool is at work no slight movement of the disk 16 or of the cap carrying the same forward or backward will permit any movement of the chasers, since the arms of the cam disk at this time have passed beyond or forward of the tapered surfaces 15 and are in engagement with the depthwise straight surfaces of the chasers.

In those dies where the outer ends of the chaser blocks are tapered in the direction of the axis of the tool, or depthwise, with such tapered portions in engagement with the operating means therefor, it follows that any slight movement of the operating means backward or forward would affect the position of the chasers and result in a variation in the thread being cut. In the present improvement the chasers themselves are tapered in two directions, one transversely relatively to the axis of the tool and the other depthwise of the tool, but the latter tapered surface is at the rear of the chaser while the front portion thereof has a straight face, so that when the chasers have been completely closed the arms of the operating disk 16 have passed away from or are forward of the depthwise tapered surfaces of the chasers and consequently there is no opportunity for the chasers to shift from their proper positions should the chaser operating cams be moved backward or forward other than in the proper manner and by the means provided for that purpose. The elongated slot 28' in the cap 19 permits the rotary or oscillatory movement of the cam disk 16 by means of the micrometer screw.

Located on the shank 3 is a disk or head 29 carrying in a slotted part thereof a swinging lever 30, the end of which projects into an opening 31 in the shank 3, and to this disk or head is secured a spindle or rod 32, it being shown screwed thereto by means of an enlarged head 33, and this spindle or rod is provided with a smaller portion 34 projecting into the bore of the disk or head 29 and into the shank 3, fitting loosely therein. The spindle or rod constitutes the means for the attachment of the die to the turret 35, (see Fig. 13), and therefore when so attached the disk or head 29 and this spindle are fixed against movement except forward and backward with the turret. For flexibly connecting this disk or head 29 with the cap 19 of the die is a set of screws 36 turned into threaded openings 37 in the rear wall of the cap 19, these screws being of smaller diameter than the shouldered openings 38 provided therefor in the disk or

head 29. Encircling a pair of these screws within the openings provided therefor in the disk or head 29 are springs 39, the inner ends of which engage the shoulders of the openings just referred to in the disk or head 29. Thus, the die body, the cam operating disk and the cap 19 have a forward and backward movement relatively to the disk or head 29 in a manner which will be readily understood, thus forming what may be considered a floating die and permitting these parts to move forward to cut the last thread up against a shoulder, although the forward movement of the turret and the head 29 and its spindle or rod has ceased. In other words, when the turret is stopped at a predetermined point by means of the stop 40, which is usually very close to the finishing of the thread, the die can continue to cut the thread by reason of the fact that the chasers carried by the die body and such body, together with the chaser operating means and the cap, will move forward and away from the fixed disk or head 29, as shown at 50, Fig. 13, the die thus opening at its rear in the manner shown in said Fig. 13 so as to permit the chasers to follow the pitch of the thread. As this operation continues, however, the springs 39 between the fixed disk and the cap 19 gradually exert their force upon such cap and the cam disk and pull back the cam disk from the position shown in Fig. 3, where it holds the chasers in engagement with the work, to the position shown in Fig. 4, and so closes up the opening between the fixed disk and the cap 19, whereupon the springs located in the grooves of the die body immediately open the chasers and release the work. In other words, the springs connecting the fixed disk with the cap are weaker than the pull of the chasers in cutting the thread, so that the continued pull of the chasers endeavoring to follow the pitch of the thread opens the die at the back and therefore allows the cap 19 and the cam disk to recede the length of the travel of the cams on the ends of the chasers and so permits such chasers to be opened by their springs. This thus prevents the chasers from mutilating the work or the shoulder at the end of the thread. In other words, by reason of the construction set forth, the entire die head, comprising the chasers, the die body and the cam operating disk and cap 19, can all move forward during the cutting of the thread a predetermined distance and away from the fixed disk 29, so that at the proper time the springs, having been sufficiently compressed, will pull back the cam disk and its cap 19, this being permitted by the opening or space 50 hereinbefore referred to, and so allow the chasers to be opened by their springs in a manner which will be readily understood, whereupon, by shifting the hand lever for-

ward, the chasers will be reset by pulling the same backward into engagement with the arms of the cam disk.

The foregoing construction allows a slight universal movement of the die head carrying the chasers, making it practically a floating die, and so enables the die to form its own center. In other words, that part of the die structure which has a forward and backward movement independently of the fixed part of the die structure can have a slight oscillatory or eccentric movement and thus allow such movable portion of the die to have a floating movement with relation to the fixed head 29 and the fixed part carried by the turret.

In practice it is not absolutely essential that the springs between the fixed disk 29 and the cap 19 be provided, as the screws connecting these parts at this point may be of such length that while the movable portion of the die structure may move forward with the die chasers yet the forward movement of the cap 19 and the cam operating disk be limited by such screws, so that as the chasers follow the thread and the chaser operating disk is stopped in its forward movement the arms of the disk will disengage the outer ends of the chasers and the chasers be immediately opened by their springs.

By forming the die chasers with the cam faces directly on the ends thereof, and thus dispensing with the chaser blocks or holders usually provided, and by securing the chasers directly to the guide blocks or plates located in the grooves of the die body, several important advantages are obtained. This hardened steel block or plate secured to the chaser permits a more accurate positioning and travel of the chasers and affords a much broader surface for resistance, so that as the chaser fits directly into the die block itself and is secured directly to the guide plate the construction and assembling of the parts is very much simplified, and as the cam is formed directly on the chasers and at their outer ends this places the support for the chasers directly in line with the greatest resistance or strain when the chasers are cutting. In other words, the tendency of the chasers when engaging the work is to lift up, and by providing the broad guide plate therefor working in the recesses of the die body this tendency is overcome.

I claim as my invention:

1. A threading die comprising a head consisting of a movable part and a fixed part, said movable part comprising a die body having ways, chasers located in said ways and shiftable means supported in juxtaposition to the die body and shiftable axially of the die to effect the normal opening and closing movement of said chasers, and means connecting said movable and fixed parts whereby during a part of the threading op-

eration the movable part of the body may move away from the fixed part a predetermined distance sufficient to allow the chaser shifting means to disengage the chasers and permit the opening thereof when the work is completely threaded.

2. A threading die comprising a head consisting of a movable part and a fixed part, said movable part comprising a die body having ways, chasers located in said ways and shiftable means supported in juxtaposition to the die body and shiftable axially only of the die to effect the normal opening and closing movement of said chasers, means connecting said movable and fixed parts whereby during a part of the threading operation the movable part of the body may move away from the fixed part a predetermined distance sufficient to allow the chaser shifting means to disengage the chasers and permit the opening thereof when the work is completely threaded, and means carried by the fixed part for re-setting the chasers.

3. A threading die comprising a head consisting of a movable part and a fixed part, said movable part comprising a die body having ways, chasers located in said ways and shiftable means supported in juxtaposition to the die body for shifting said chasers, means connecting said movable and fixed parts whereby during a part of the threading operation the movable part of the body may move away from the fixed part a predetermined distance sufficient to allow the chaser shifting means to disengage the chasers and permit the opening thereof when the work is completely threaded, and means carried by the fixed part for re-setting the chasers and comprising a handle having an end projecting into a part of the chaser carrying member.

4. A threading die comprising a head consisting of a movable part and a fixed part, said movable part comprising a die body having ways, chasers located in said ways and each having its end provided with a pair of cam surfaces extending in transverse directions and shiftable means supported in juxtaposition to the die body and having a part cooperating with said chaser surfaces for shifting said chasers, and means connecting said movable and fixed parts whereby during a part of the threading operation the movable part of the body may move away from the fixed part a predetermined distance sufficient to allow the chaser shifting means to disengage the chasers and permit the opening thereof when the work is completely threaded.

5. A threading die comprising a head consisting of a movable part and a fixed part, said movable part comprising a die body having ways, chasers located in said ways and each having its end provided with a pair of cam surfaces extending in transverse

directions and a straight surface extending depthwise of the die and shiftable means supported in juxtaposition to the die body and having a part cooperating with said chaser surfaces for shifting said chasers, and means connecting said movable and fixed parts whereby during a part of the threading operation the movable part of the body may move away from the fixed part a predetermined distance sufficient to allow the chaser shifting means to disengage the chasers and permit the opening thereof when the work is completely threaded.

6. A threading die comprising a head consisting of a movable part and a fixed part, said movable part comprising a die body having ways, chasers located in said ways and each having its end provided with a pair of cam surfaces extending in transverse directions and a straight surface extending depthwise of the die and shiftable means supported in juxtaposition to the die body and having a part cooperating with said chaser surfaces for shifting said chasers, means connecting said movable and fixed parts whereby during a part of the threading operation the movable part of the body may move away from the fixed part a predetermined distance sufficient to allow the chaser shifting means to disengage the chasers and permit the opening thereof when the work is completely threaded, and means for swinging said shiftable means thereby to adjust the chasers relatively to the work.

7. A threading die comprising a head consisting of a movable part and a fixed part, said movable part comprising a die body having ways, chasers located in said ways and shiftable means supported in juxtaposition to the die body and shiftable axially of the die to effect the normal opening and closing movement of said chasers, and spring connecting means between said movable and fixed parts whereby during a part of the threading operation the movable part of the body may move away from the fixed part a predetermined distance sufficient to allow the chaser shifting means to disengage the chasers and permit the opening thereof when the work is completely threaded.

8. A threading die comprising a head consisting of a movable part and a fixed part, said movable part comprising a die body having ways, chasers located in said ways and shiftable means supported in juxtaposition to the die body for shifting said chasers and comprising a chaser operating member and a cap inclosing the same, means for holding said body, chaser operating member and cap in assembled relation with the chaser operating member in engagement with the cap, and means connecting said movable and fixed parts whereby dur-

ing a part of the threading operation the movable part of the body may move away from the fixed part a predetermined distance sufficient to allow the chaser shifting means to disengage the chasers and permit the opening thereof when the work is completely threaded.

9. A threading die comprising a head consisting of a movable part and a fixed part, said movable part comprising a die body having ways, chasers located in said ways, springs for shifting the chasers outwardly and shiftable means supported in juxtaposition to the body and shiftable axially of the die to effect the normal opening and closing movement of said chasers, and means including springs connecting said movable and fixed parts whereby during a part of the threading operation the movable part of the body may move away from the fixed part a predetermined distance sufficient to allow the chaser shifting means to disengage the chasers and permit the opening thereof when the work is completely threaded.

10. A threading die comprising a head consisting of a movable part and a fixed part, said movable part comprising a die body having ways, chasers located in said ways and each having a straight surface and a pair of cam surfaces on its outer end, springs in said ways for moving the chasers outwardly and shiftable means supported in juxtaposition to the die body and having a part cooperating with said chaser surfaces for shifting said chasers and comprising a disk-shaped member and a cap inclosing the same, and means for holding said disk-shaped member and cap in engagement and in proper assembled position with the die body, connecting devices including springs between the fixed part and movable part and effective to limit the forward movement of said chaser shifting means, and a handle carried by said fixed part and in engagement with the movable part for re-setting the chasers, the organization being such that during a part of the threading operation the movable part of the body may move away from the fixed part a predetermined distance sufficient to allow the chaser shifting means to disengage the chasers and permit the opening thereof when the work is completely threaded.

11. A threading die comprising a head consisting of a movable part and a fixed part, said movable part comprising a die body having ways provided with oppositely located recesses, chasers located in said ways and a plate secured to said chasers and sliding in said recesses, shiftable means supported in juxtaposition to the die body and shiftable axially of the die to effect the normal opening and closing movement of said chasers, and means connecting said movable and fixed parts whereby during a part of

the threading operation the movable part of the body may move away from the fixed part a predetermined distance sufficient to allow the chaser shifting means to disengage the chasers and permit the opening thereof when the work is completely threaded.

12. A chaser for a die having a separable broad guide plate secured to the back throughout the major portion thereof and extending beyond the sides of the chaser without surrounding any part of such sides.

13. A chaser for a die having a separable broad guide plate secured to the back throughout the major portion thereof, and extending beyond the sides of the chaser without surrounding any part of such sides, said guide plate and chaser having a locating pin.

14. A threading die having a die body having ways provided with oppositely located recesses, chasers fitting into the ways of the body, each of said chasers having a separable broad guide plate secured to the back thereof to project beyond the sides into a pair of recesses and without surrounding any part of such chaser sides, whereby the chaser will be guided by its guide plate and also by the ways of the body.

15. A threading die comprising a fixed member and a movable body having chaser carrying means, chasers located therein, means connecting said body and fixed member whereby during a part of the threading operation the body may move away from the fixed member a predetermined distance, and normally non-rotatable means supported in juxtaposition to the body and shiftable backwardly and forwardly axially of the die to effect the normal opening and closing movement of the chasers, said chasers and means one having cam surface cooperating with the other.

16. A threading die comprising a fixed member and a movable body having chaser carrying means, chasers located therein, means connecting said body and fixed member whereby during a part of the threading operation the body may move away from the fixed member a predetermined distance, and normally non-rotatable means supported in juxtaposition to the body and shiftable backwardly and forwardly axially of the die to effect the normal opening and closing movement of the chasers, said chasers and means one having cam surfaces cooperating with the other, said cam surfaces extending in transverse directions.

17. A threading die comprising a fixed member, a movable body having chaser supporting means, chasers carried thereby, means connecting said fixed member and body to permit during a part of the threading operation a predetermined movement of the body away from the fixed member, and normally non-rotatable means for shifting

and holding the chasers in their threading position and shiftable with the body during a predetermined part of its movement away from the fixed member and normally shiftable axially of the die away from the body to effect the release of the chasers at a predetermined time.

Signed at Cleveland, Ohio, this 30th day of January, 1912.

OSCAR A. SMITH.

Witnesses:

A. W. HENN,
PAUL E. RYAN.