A. NIEDHAMMER.

THREADING TOOL.

APPLICATION FILED SEPT. 22, 1909.

985,690.

Patented Feb. 28, 1911.

2 SHEETS—SHEET 1.

13

Fig. 1.

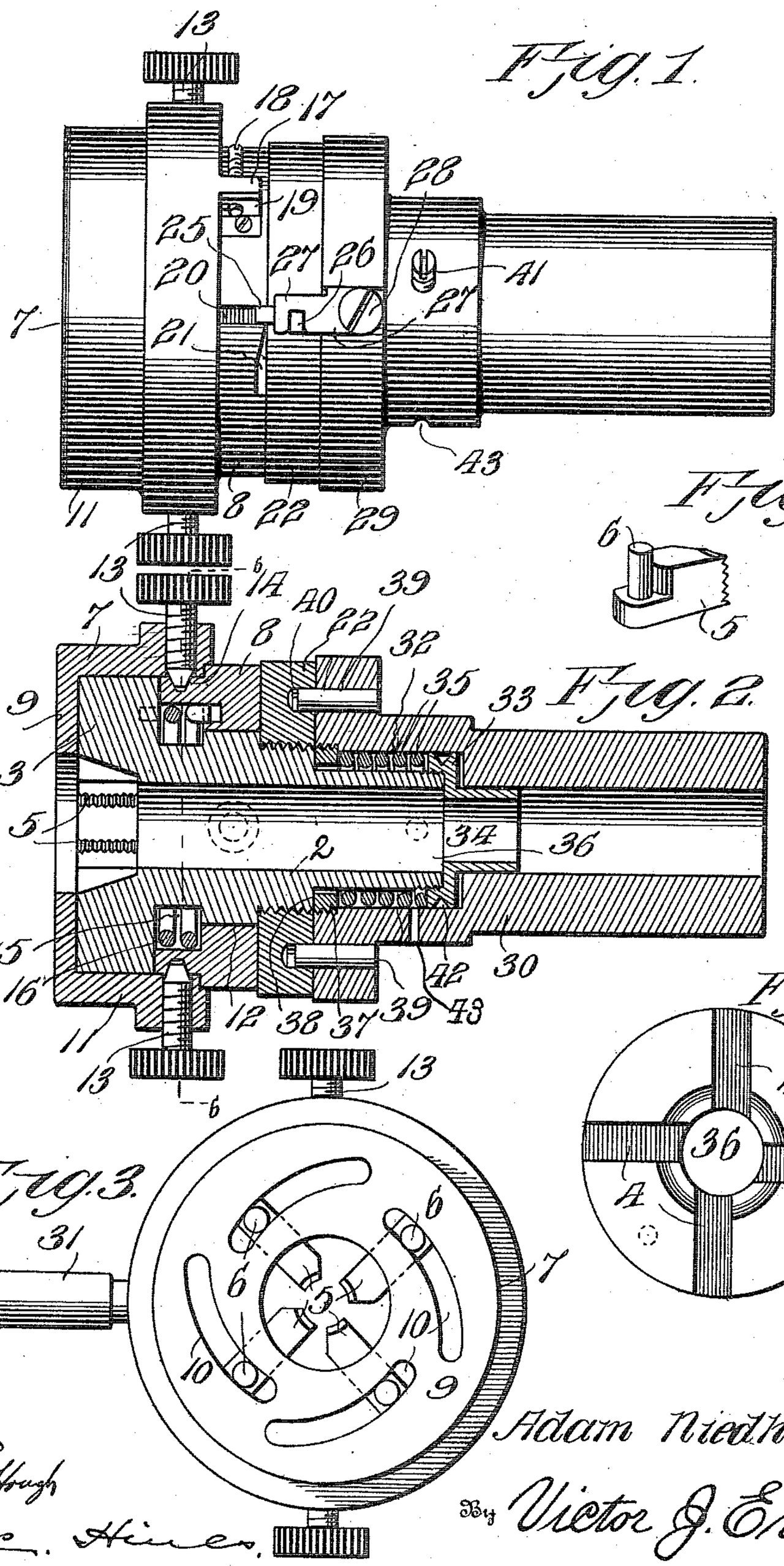

Fig. 11.

Fig. 2.

Fig. 4.

Fig. 3.

Witnesses

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2 SHEETS—SHEET 2.

1918

Fig. 5.

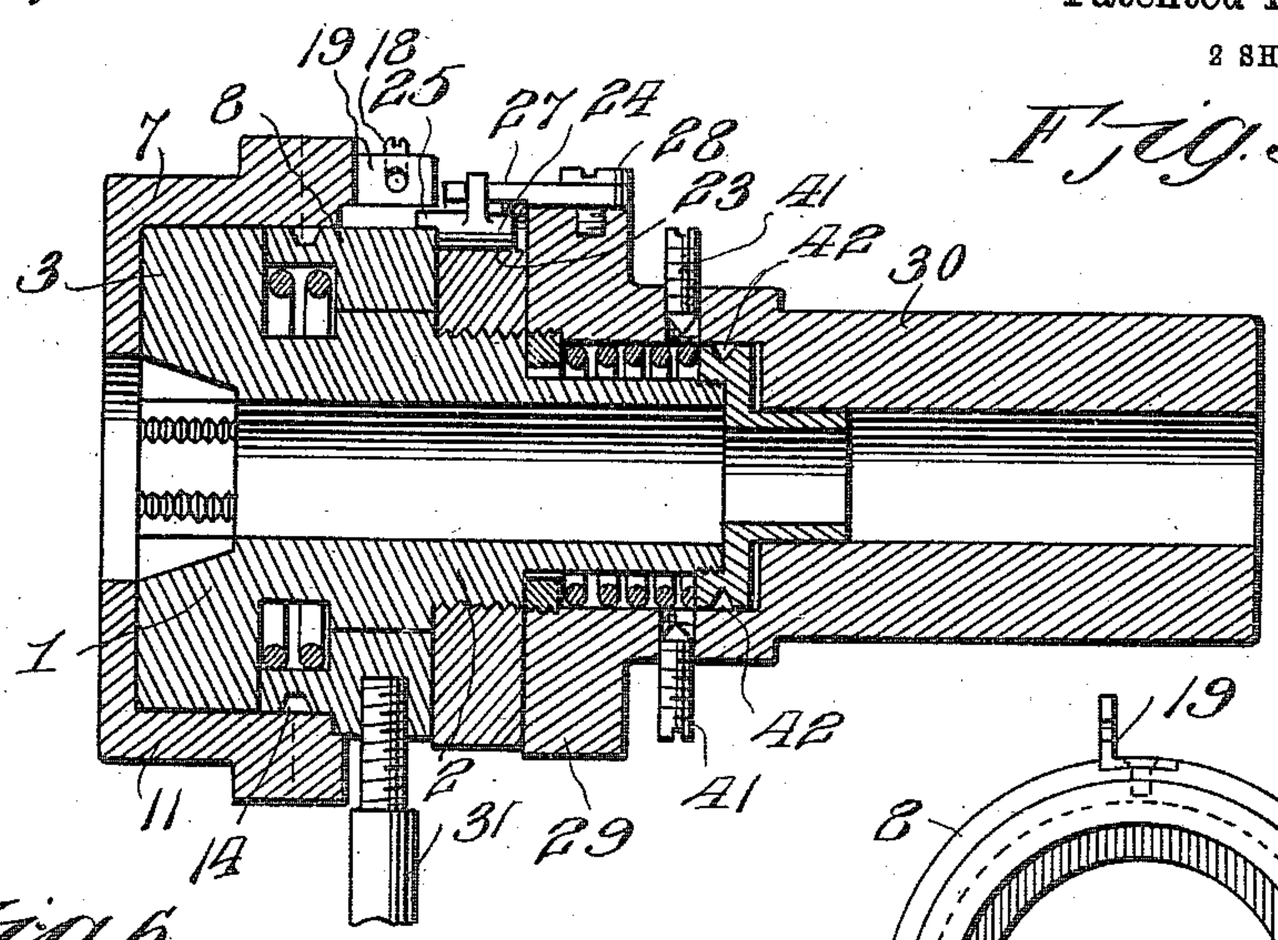


Fig. 6.

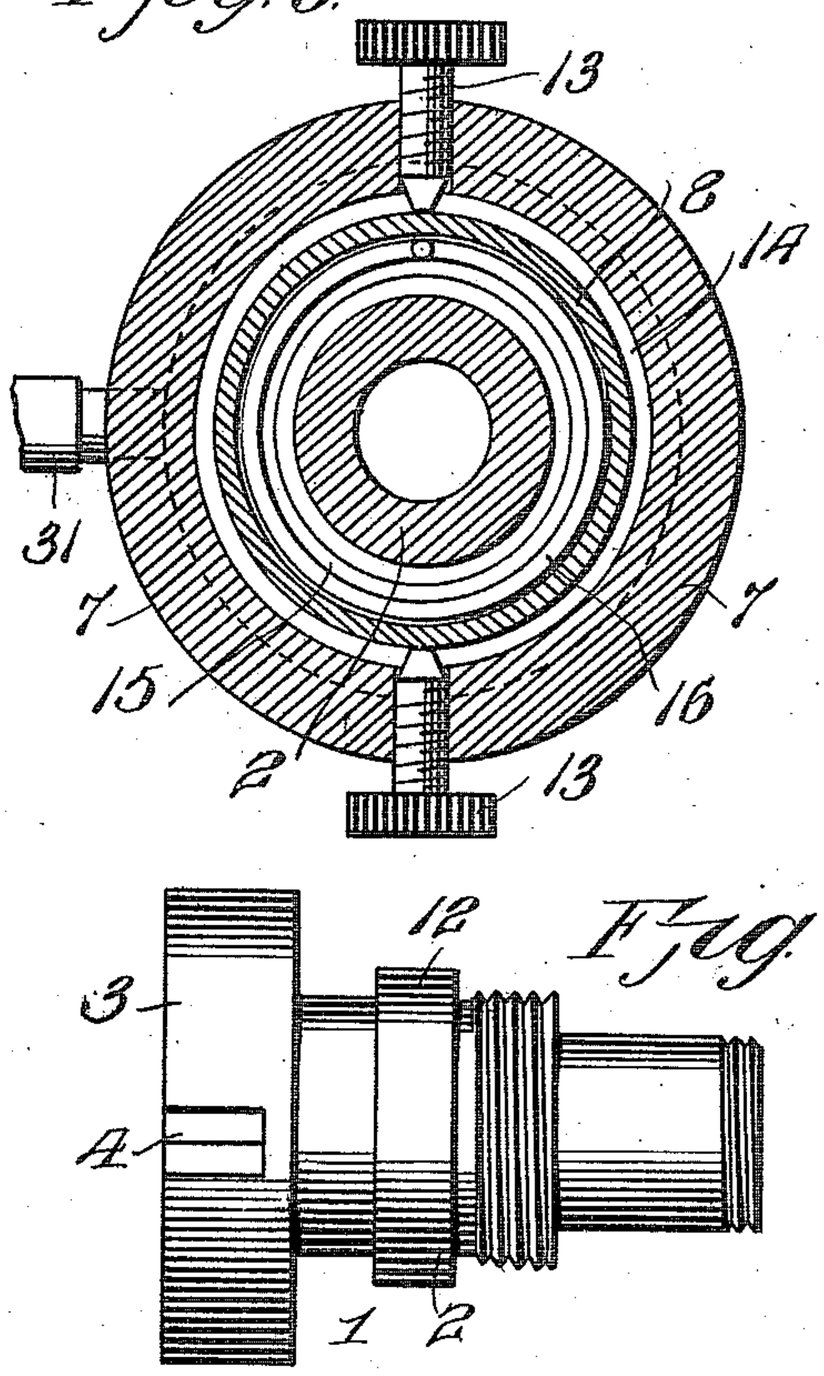


Fig. 7.

Fig. 8.

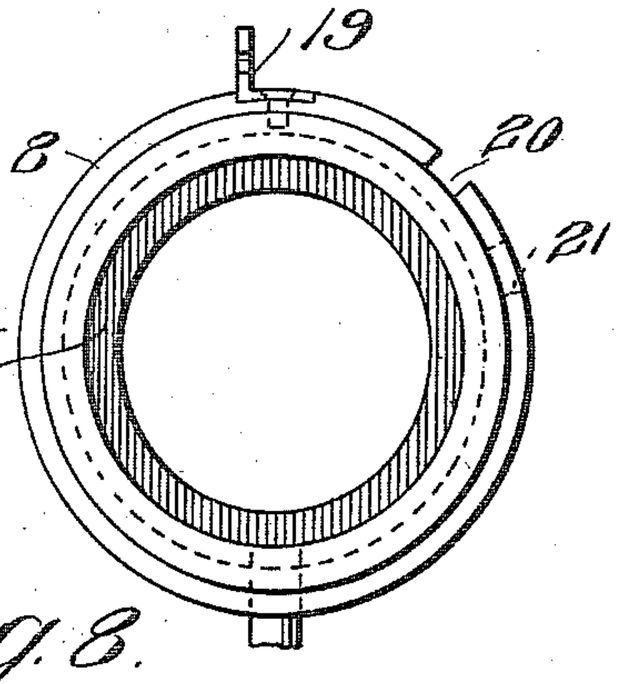


Fig. 9.

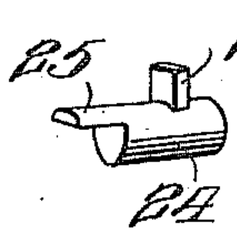
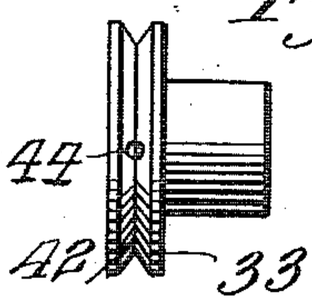


Fig. 10.



Witnesses

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THREADING-TOOL.

985,690. Specification of Letters Patent. **Patented Feb. 28, 1911.**

Application filed September 22, 1909. Serial No. 518,931.

To all whom it may concern:

Be it known that I, ADAM NIEDHAMMER, a citizen of the United States, residing at Schenectady, in the county of Schenectady and State of New York, have invented new and useful Improvements in Threading-Tools, of which the following is a specification.

The present invention relates to threading tools and particularly to die heads of the type adapted for use in turrets and similar supports of screw threading machines.

One object of the invention is to provide a threading tool in which novel provision is made for automatically retracting the dies at the limit of their threading movement.

A further object of the invention is to provide a safety connection between the parts of the tool by which the dies will be freed to rotate with the work in the event of the failure of said die retracting means to operate.

With these and other objects in view, the invention consists of the features of construction, combination and arrangement of parts hereinafter fully described and claimed, reference being had to the accompanying drawings, in which:—

Figure 1 is a side elevation of a threading tool embodying my invention, showing the parts in locked or operative position; Fig. 2 is a vertical longitudinal section of the same; Fig. 3 is a front elevation of the tool; Fig. 4 is a face view of the die holder or carrier; Fig. 5 is a vertical longitudinal section of the tool taken on a plane at right angles to that shown in Fig. 2; Fig. 6 is a vertical transverse section on line 6—6 of Fig. 2; Fig. 7 is a side elevation of the die holder or carrier; Fig. 8 is a front view of the collar; Fig. 9 is a detail view of the locking bolt; Fig. 10 is a side view of the flanged nut or sleeve, and Fig. 11 is a perspective view of one of the threading dies or cutters.

Referring to the drawings, 1 designates the die holder or carrier of the tool, which comprises a shell 2 and a die carrying head 3 formed thereon, which head is formed in its outer face with a series of radial grooves 4, Fig. 4, extending from the central bore thereof and in which is slidably mounted a series of threading cutters or dies 5, each having in its outer end a pin or projection 6 extending therefrom. It is to be understood that the dies do not normally rotate but are moved with the head in axial direction by the sliding turret of the lathe.

Mounted upon the head and forward portion of the shell of the die carrier is a die retaining and controlling device formed of two parts to wit: a cap 7 and a collar 8. The cap 7 has a body portion 9 forming a face plate which covers the face of head 3 and has a central opening in line with the bore of the head and shell. This body portion holds the dies 5 in position within the radial grooves 4 and prevents their outward displacement therefrom. Said body portion 9 is also provided with a series of cam slots 10, Fig. 3, receiving the pins or projection 6 of the dies, the arrangement of the said slots being such that when the cap is turned in one direction the dies will be moved radially inward to engage the object to be threaded, while upon the movement of the cap in the reverse direction, the dies will be moved radially outward or retracted.

Formed integral with the body portion 9 is an annulus 1 which incloses head 3 and projects rearwardly beyond the same, and which receives the reduced forward end of the collar 8. The said collar is mounted to move axially with the shell and also to turn slightly upon the annular shoulder 12 formed upon the shell which shoulder is of materially less diameter than the head 3. Locking screws 13 are mounted upon diametrically opposite sides of the flange 11 and have pointed ends to engage the annular groove or recess 14 formed in the reduced portion of the collar 8 by which the cap is coupled to the collar and is held against independent axial movement. By angularly adjusting the cap 7 on the head 3, the position of the cam slots 10 in Fig. 3 can be changed with the result that the dies or chasers 5 may be caused to cut threads of varying depth. This arrangement also forms a means for adjusting the tool for use with stock of different sizes. After the cap is adjusted to the proper position for the stock to be threaded, the screws 13 are screwed into engagement with the rotary collar 8 and thereafter these parts move as a unit both axially and angularly, as will appear later.

An annular groove 15 is provided in the

circumference of the shell, and between the head and the collar 8 is a coiled die-controlling spring 16. One end of this spring is attached in a suitable manner to the head 3, while the other end thereof is attached to the collar 8 whereby the spring is adapted to exert its energy in turning the collar and consequently the cap to a predetermined position to hold the dies retracted. In this position of said dies pins 6, Fig. 3, occupy the outer portions of the cam slots 10. In other words the spring 16 acts by torsion to turn the cap 7 and collar 8 about the head and withdraw the dies from the stock so that the tool as a whole can be moved to the right to clear the stock or work, the latter in the meanwhile continuing to rotate.

Formed on or secured to the flange of the cap 7 is a rearwardly projection lug 17, Fig. 1, having a threaded opening for the reception of an adjusting screw 18 which is swiveled within the bracket 19 attached to the collar 8, by which the cap may be circumferentially adjusted with respect to the collar to set the cap with relation to the dies so as to vary the adjustment of the latter to compensate for wear. This also permits of adjustment for threads of different depths and for stock of different diameter.

The collar 8 is provided at one point in its circumference with a longitudinal groove 20 and on its rear face adjacent said groove with a recess 21. In threaded engagement with the shell 2 in the rear of the collar 8 is a fixed nut 22 having a longitudinal groove 23 in which is slidably mounted a locking dog 24 provided at its forward end with a locking pin 25 that enters the groove 20 when the tool is in condition for cutting. It enters the recess 21 under other conditions as will appear later. The locking dog is formed with an outwardly extending lug or projection 26 adapted to be engaged by the bifurcated end of a latch 27 pivoted upon the screw 28 carried by the head or flange 29 upon the forward end of the hollow shank 30 of the tool. The shank is intended to be clamped in the sliding turret on the lathe and hence does not rotate. When the cap 9 and collar 8 are moved to the left by the action of the dies, as distinguished from that of the turret, and by an amount sufficient to disengage the locking finger 25 and the walls of the groove 20, the torsion spring 16 turns the cap or die controlling member in a manner to free the dies from the stock. This angular movement of the collar is sufficient to permit the deepest part of the recess 21 to register with and receive the locking pin 25. A handle 31 is affixed to the collar 8 for returning it and the dies to their normal position. In other words the handle is used to reset the parts for further use after the completion of a thread cutting operation and the tool has been moved far enough to the right to clear the work. The locking pin 25 will automatically enter the groove 20 when said parts register due to the action of the spring 35, Fig. 2.

The supporting portion of the tool comprises the head 29 and shank 30 and is chambered as at 32, to receive the reduced rear end of the shell 2, upon the rear end of which shell is threaded a hollow nut or sleeve 33 having a central projection 34 that enters the bore of the shank. The chamber 32 incloses a coiled compression spring 35 which surrounds the reduced rear portion 36 of the shell 2 and bears at one end against the sleeve 33 and at the other end against a nut 37 threaded into the forward end of said chamber 32. The expansive action of this spring serves to hold the die carrying and controlling members of the tool consisting of the die carrying head, cap and rotary collar and the supporting portion, consisting of the shank and head 29 close together, with the said head 29 engaging the fixed nut 22. The head 29 carries locking pins 39 projecting forwardly therefrom to enter recess 40 formed in the nut 22 to lock the support to the die carrying member and prevent independent rotation so long as said support and member are held in abutting contact by the action of the spring 35.

The operation of my improved threading tool is as follows, it being understood that the shank 30 is mounted in the sliding carriage or turret of the lathe and held against turning while the stock to be threaded rotates. The handle 31 is first given a slight angular movement which moves the cap 7 and its cams sufficiently to reset the dies. This same action causes the groove or slot 20 to register with the pin or projection 25, and when this happens the spring 35 draws the parts together and thereafter the projection is forced into the groove and holds the parts in the desired angular relation with the dies or chasers in cutting position. The turret carrying the tool is then moved slowly toward the work and since the latter rotates a thread will be cut thereon. The work is prevented from moving axially during the cutting operation by reason of being clamped in the lathe. The carriage moves forward until it strikes a stop located at any convenient point on the bed. The work continues to rotate, however, and in so doing one or more additional threads are cut thereon because the spring 35 yields and permits the dies, head 3, cap 7 and collar 8 to move to the left after the shank 30 and its carriage stop. As a result the collar 8 gradually moves away from the nut 22 and since the latch 27 is carried by the part 29 and the latter is carried by the turret it cannot

follow. There finally comes a time when the axial movement of the collar 8 is sufficient to pull it out of engagement with the pin or projection 25. Just as soon as this happens the torsion spring 16 turns the cap 7 on the head 3 and in so doing moves the dies or chasers by means of the cams 10 away from the work, said dies moving radially. After this, the tool as a whole can be moved to the right by moving the turret. This is the usual and normal action of my invention, the dies automatically freeing themselves at the proper time or when the requisite number of threads have been cut. Before each operation the handle 31 is used to reset the parts. The next step is to consider the operation under what may be termed abnormal or emergency conditions, *i. e.* when for any reason the dies or chasers are not freed at the end of the normal working stroke, or the dies and their connected parts continue to move to the left. Under these conditions the head 3, dies, cap 7, etc., will continue to move away from the part 29 carrying with them the nut 22. As the parts separate the latch 27 continues to hold the locking pin or projection 25, the latter being arranged to slide freely in the annular nut 22. In other words, the work to be performed by the latch is limited to the normal operating conditions. When this axial movement is great enough to free the ring from the locking pins 39, it will turn freely with the work and toward the operator, the spring 35 in the meanwhile being put under abnormal compression. As viewed in Fig. 1, the projection 26 moves downward under these conditions and in so doing, passes out of the notch in the latch 27. On making a complete revolution, the projection hits the latch on its back side and knocks it out of the way. This rotating action may continue without damage until the machine is stopped when the parts can be backed off of the work by any suitable means. To reset the parts after such an emergency operation, the cap 7, head 3, dies, and ring 22 are rotated until the pins 39 register with the holes 40, when the spring 35 will move the parts together to the position shown in Fig. 2, after which the handle 31 is moved angularly as before to reset or restore the dies or chasers to cutting position.

Screws 41 are mounted on diametrically opposite sides of the shank to engage a groove 42 in the flanged sleeve 33 to hold the latter in position during the assembling and disassembling of the parts of the tool. An opening or peep sight 43 is also provided in the chambered portion of the shank at right angles to the openings receiving the screws 41. Recesses 44 are formed at diametrically opposite sides of the flanged sleeve 33 at right angles to the groove 42. In assembling the parts, the correct position of the sleeve 33 with the groove 42 in alinement with the screws 41 may be determined by turning said sleeve until one of the recesses 44 is in alinement with the peep sight 43, when the screws 41 may be screwed in to fix the ring from movement. The spring 35 may then be inserted, the nut 37 applied and then the die carrier with its parts assembled threaded into the fixed nut 22, the latter being held from rotating by the pins 39. When this is done, the screws 41 are backed out to release the sleeve 33 and permit it to seat.

It will thus be seen that my improved threading tool has an automatic means for retracting the dies at the end of the threading operation, as well as a safety device which releases the dies and die carrier and permits them to have free rotary motion with the work in the event that, through accident or otherwise, the die retracting device fails to operate. Liability of injury to the dies or works is thus prevented in an effective manner. Further the time required to perform the various operations is very small and hence the cost of turning out work is reduced to a minimum. It will also be seen that by reason of its capacity for adjustment the tool can be used for cutting stock of different size.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A threading tool comprising a shank, a carrier supported by the shank that is normally held in fixed relation with respect thereto, radially movable dies mounted on the carrier, a die controlling member forming a cap that fits over one end of the carrier and is provided with cams for moving the dies, a collar that is attached to and moves with the member, a torsion spring arranged in coil form and located in a recess between the collar and carrier and attached at its ends to the collar and carrier respectively, an annular nut mounted on the carrier, a locking pin carried by the nut and engaging the collar, and means attached to the shank for controlling the pin so that as the dies move axially forward with the carrier beyond a certain point the collar is released and turned angularly with respect to the nut by the spring to withdraw the dies.

2. A threading tool comprising a carrier having a slotted head, dies mounted in the slots, a cap that fits over the head and holds the dies, cams on the cap that move the dies into and out of engagement with the work, a collar mounted to move angularly on the carrier, a torsion spring, one end of which is attached to the carrier and the other to the collar, a shank arranged to receive one end of the carrier and which is adapted to be secured in a support, a locking pin mounted

on the carrier and arranged to enter the collar and prevent it from turning under the action of the spring, a second spring that holds the carrier within the shank and opposes its axial movement and a latch carried by and located on the periphery of the shank for controlling the action of the pin.

3. A threading tool comprising a carrier having a slotted head, dies mounted in the slots in the head, a cap that fits over the head and covers its front face and also a portion of its periphery, cams carried by the front face of the cap for moving the dies in and out, a collar that is mounted for angular movement on a reduced part of the carrier back of the head, means for adjustably connecting the cap and collar, a spring that rotates the cap and collar on the carrier when released, a nut threaded on the carrier, a shank hollowed out to receive one end of the carrier, a locking pin carried by the nut which resists the action of the spring so long as it is in engagement with the collar, a spring that holds the carrier within the shank and resists the axial movement thereof, and a latch carried by the shank that controls the release of the cap and collar by the pin.

4. A threading tool comprising a shank, a carrier, dies mounted thereon, a member for moving the dies into and out of engagement with the work, a spring that tends to free the dies from the work at the end of the cutting operation, a locking means that resists the action of the spring until the threading operation moves the carrier longitudinally a predetermined distance on the shank, and a safety device which permits the carrier to rotate with the work when said spring and member fail to release the dies at the end of the thread cutting operation.

5. A threading tool comprising a shank, a carrier, dies mounted thereon, a member for moving the dies into and out of engagement with the work, a spring that tends to free the dies at the end of the cutting operation, a lock for resisting the action of the spring until the carrier is moved longitudinally a certain distance on the shank by the dies, a clutch between the shank and carrier that normally holds one part of the lock against rotation and is released by a definite and greater longitudinal movement of the carrier on the shank, and a coiled compression spring that resists said movement.

6. A threading tool comprising a hollow shank having a peripheral flange, a hollow carrier that fits into the bore of the shank, a collar and pin for normally preventing the carrier from rotating within the shank, a compression spring that normally holds the collar and pin in engagement, dies mounted on the carrier, a die controlling member mounted to move angularly on the carrier, a spring that tends to turn the member in a direction to release the dies from engagement with the work, a lock which prevents the member and spring from acting until the dies have moved the carrier longitudinally a definite distance and independently of the shank.

In testimony whereof I affix my signature in presence of two witnesses.

ADAM NIEDHAMMER.

Witnesses:

EDWARD WILLIAMS,

ALEX. F. MACDONALD.