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1,912,298

COLLAPSIBLE TAP

Filed Dec. 16, 1930

2 Sheets-Sheet 1

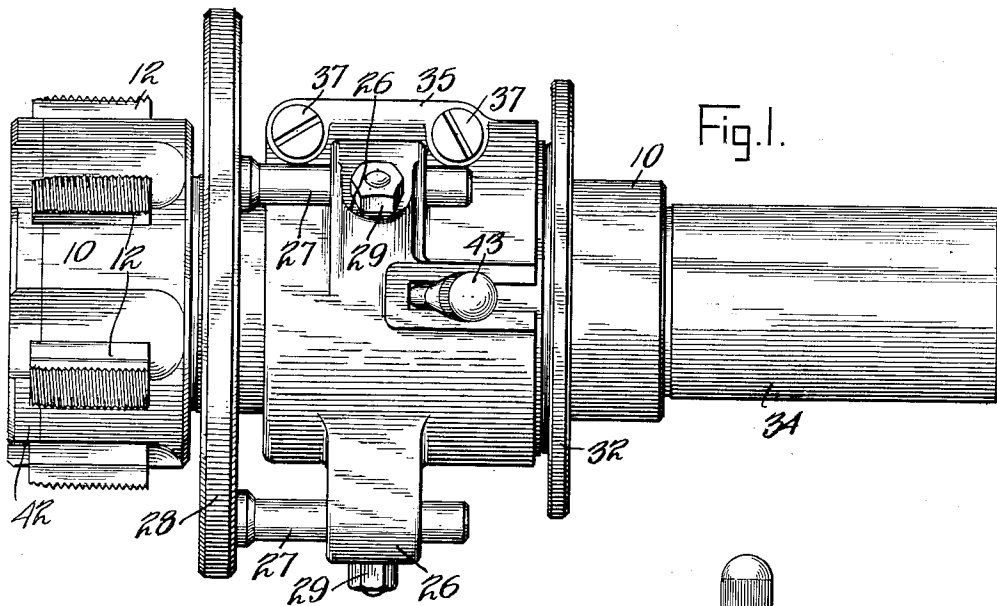


Fig. 1.

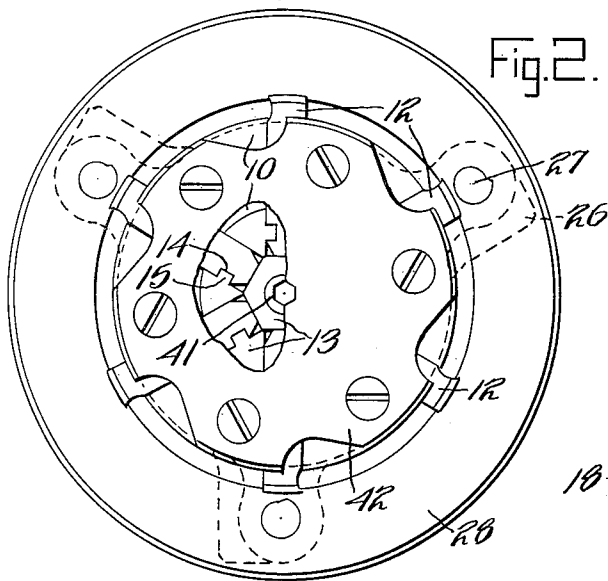


Fig. 2.

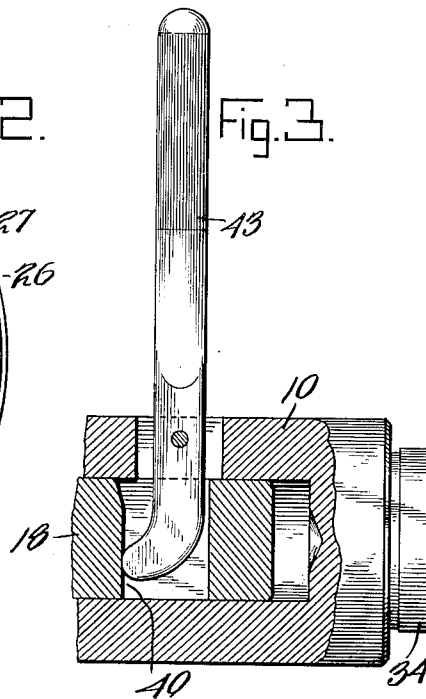


Fig. 3.

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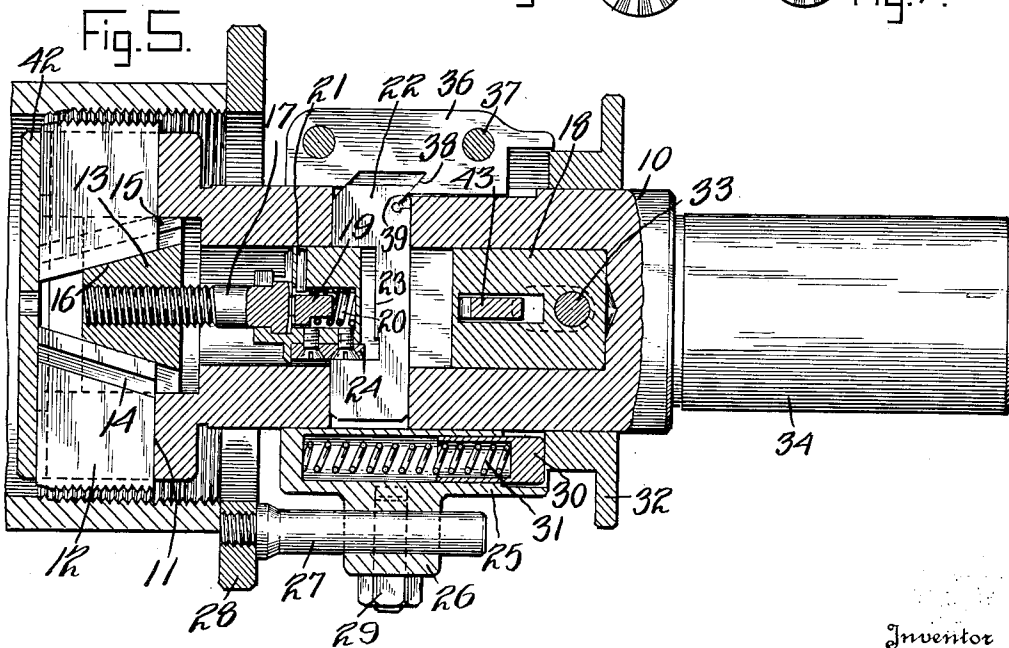
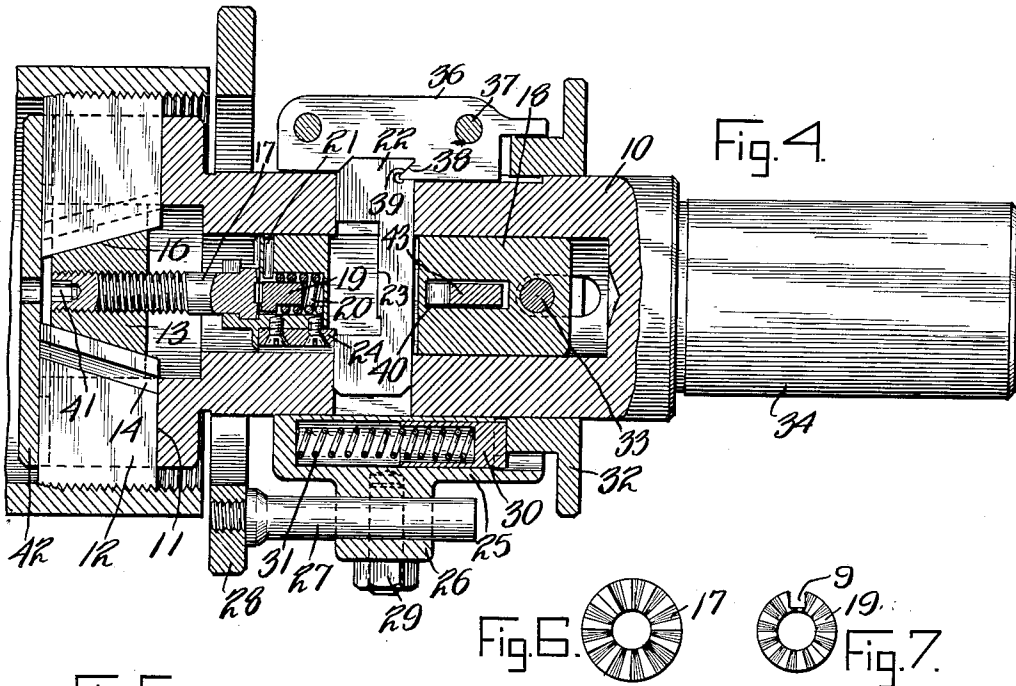
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2 Sheets-Sheet 2



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# UNITED STATES PATENT OFFICE

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## COLLAPSIBLE TAP

Application filed December 16, 1930. Serial No. 502,798.

This invention relates to collapsing taps and such as are used for cutting screw-threads in bored holes, such bored holes being of such a size and nature as will permit collapsing of the thread producing cutters so that the tap can be withdrawn from the bore without the necessity of backing it out.

An object of the invention is to provide an improved collapsible tap.

A further object is to provide improved locking means for the tap and improved means for collapsing the tap when the thread has been cut to the desired length.

Further objects and advantages will become apparent as the description proceeds.

Referring to the accompanying drawings, which are made a part hereof and on which similar reference characters indicate similar parts,

Figure 1 is a side elevation of the tap,

Figure 2, a face view with certain parts broken away in order to show means by which the threading elements are held,

Figure 3, a sectional view showing means for closing the tap,

Figure 4, a longitudinal section showing the cutters in thread cutting position,

Figure 5, a longitudinal section showing the cutters in collapsed position, and

Figures 6 and 7 are detail views showing serrated ends of an adjusting and securing screw for locking the head of the plunger in adjusted position to vary the size of the work.

In the drawings reference character 10 indicates a stock or body member having radial slots 11 at one end for receiving thread cutting elements or chasers 12. The chasers are seated in the head 13 of a plunger 18, the plunger having axial movement in the stock to position the chasers radially of the head. A groove 14 of the chaser is engaged by a tongue 15 on the plunger head 13. The bottom or inner edge of each chaser rests on an outer seat 16 on the plunger head as is best shown in Figures 4 and 5. It will be readily seen that the radial position of the chasers is determined by the axial position of the plunger head 13 and that when the head is in the forward position the chasers will be positioned in their outermost or thread cutting position

and that when the head is withdrawn the chasers are drawn inward radially to move them out of engagement with the work or to the collapsed position whereby the tap may be freely withdrawn from the work.

The head 13 is secured to the plunger 18 by a threaded pin 17, the inner end of which pin is positioned in a socket in the end of the plunger 18. The pin 17 has an enlarged end which prevents its being displaced from the socket in which it is held. The inner end of the pin 17 is serrated as shown in Figure 6 and is engaged by the serrated cooperating end of a plunger 19. The plunger 19 is urged outwardly by means of a spring 20. The plunger 19 is locked against rotary motion by means of a pin 21 engaging a slot 9 said pin permitting the necessary axial movement of the plunger to permit rotation of the pin 17 to adjust the head 13 axially for adjustment of the chasers. The serrations on the pin 17 and plunger 19 are such as that a rotation of the pin 17 through a distance of one serration will result in a known radial movement of the cutters. For example, rotation of the pin a distance of one serration may move the cutters radially one thousandth of an inch.

The plunger 18 is held in locked operating position by means of a transversely slidable latch 22. The latch passes through a slot in the plunger and has a cut-out portion 23 to permit retraction of the plunger. Preferably a hardened plate 24 is secured to one side of the plunger against which an inner edge of the latch 22 engages. Mounted on the body member 10 is a latch controlling ring or collar 25 having ears or lugs 26 in which are secured bolts 27 which are secured at their forward ends to a ring 28 which engages the work. The bolts 27 may be adjusted axially in the ears or lugs and locked in adjusted position by bolts 29. Seated in sockets in the collar 25 are tubes 30 in which tubes and sockets are positioned compression springs 31. The closed ends of the tubes 30 are in contact with a collar or ring 32. The ring 32 is secured to the plunger 18 by means of a pin 33 which passes through a slot in the body member 10, the slot permitting axial movement of the ring or collar. A shank

portion 34 extends rearwardly of the body member 10 which shank is adapted to be held in a machine suitably adapted for doing the work required of a tap. The collar 25 has a cored flange 35 in which is mounted a cam member 36, the cam member being secured in position by means of bolts or screws 37. The cam member is provided with beveled surfaces 38 to cooperate with corresponding surfaces 39 on the latch 22. A lever 43 is pivoted in the stock and has its inner end engageable with a side 40 of a slot in the plunger for moving the plunger forward to reset the tap.

In operation with the cutters in the position shown in Figure 4 relative rotary motion between the tap and the work will cause screw threads to be cut in the work until the ring 28 engages with the work. When this has occurred further axial movement of the tap will move the cam 36 to cause the beveled edges 38 to move back and to force the latch 22 radially inwardly until the recess 23 registers with the edges of the plunger so that the plunger 18 may travel to the rear under pressure of springs 31. This will occur as soon as the latch has slid off the hardened plate 24 under the influence of the springs 31 engaging the ring 32. The plunger 18 is withdrawn carrying with it the head 13 and moving the cutters radially inwardly. This collapses them or brings them to the position shown in Figure 5 at which time the tap may be withdrawn from the work. When the tap has been withdrawn the operator then shoves rearwardly on the lever 43 the inner end of which engages in a slot 40 to move the plunger 18 forwardly. When the plunger has been moved sufficiently forward the slot through this plunger will be moved to the position at which the latch 22 may freely slide laterally through it, at this time the beveled edges 38 again acting on the corresponding beveled edges 39 on the latch move the latch radially outwardly until it latches or locks the plunger in the forward position. The cutters are then positioned for making another cut and the operation proceeds as before.

In order to adjust the size of the threaded work the operator may insert a suitable wrench in a socket 41 in pin 17 and by rotating this pin the head 13 is moved axially with respect to the plunger 18. This adjusts the cutters radially.

It will be obvious to those skilled in the art that various changes may be made in my device without departing from the spirit of the invention and therefore I do not limit myself to what is shown in the drawings and described in the specification, but only as indicated in the appended claims.

Having thus fully described my said invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a collapsible tap having thread cutting elements and means for collapsing the cutting elements when threads of predetermined length have been cut, means for adjusting the thread cutting elements to vary the diameter of the work cut comprising an adjustable screw having a serrated end said end engaging the serrated end of a spring pressed friction locking plunger, substantially as set forth.

2. A collapsible tap comprising a body member having radial slots in its forward end, thread cutting elements mounted in said slots, a plunger axially slidable in the body member, said plunger having cam grooves in its forward end engageable with corresponding ribs on the inner edges of the thread cutting elements and biased rearwardly to retract the thread cutting elements, a ring positioned about the body member having secured thereon work engaging means for moving it axially of the body member, a slide movable through the body member and the said plunger, said slide having a cut out portion adapted to receive a portion of the plunger, one edge of the cut-out portion engaging a corresponding abutting portion on the plunger to hold the plunger in fixed forward position during threading, the cut-out portion permitting retraction of the plunger when the slide has been moved radially to a predetermined position, a collar surrounding the body member and secured to the said plunger, and resilient means carried by the said ring for moving the said collar to retract the said plunger, and means on the said ring having cam surfaces engageable with corresponding cam surfaces on the said slide for moving the slide radially inwardly and outwardly of the body member upon axial movement of the said ring in either direction, substantially as set forth.

3. In a collapsible tap having a body member and an axially slidable plunger therein for collapsing thread cutting elements, a transverse slide in said body member means on said slide engaging with the plunger for locking it in fixed forward position to hold the thread cutters in fixed position and movable to permit the plunger to collapse the thread cutters, a plurality of cams engageable with said slide for moving the slide in one direction by positive cam action to permit collapsing of the thread cutters and in another direction to lock them in thread cutting position, substantially as set forth.

4. In a collapsible tap, a body member having radial slots therein adapted to receive threading cutters, a plunger axially slidable in the body member and operably connected to said cutters to hold them in thread cutting position when the plunger is in a forward position and to collapse the cutters when the plunger is in a retracted position, a latch slidable through the plunger and having an abut-

ment in engagement with a corresponding abutting portion on the plunger for locking the cutters in a fixed forward position during threading, said latch having a cut out portion to receive the abutting portion of the plunger to permit the plunger to be retracted to collapse the cutters when the abutting portions are released, substantially as set forth.

5. In a collapsible tap, a body member having radial slots therein adapted to receive threading cutters, a plunger axially slidable in the body member and operably connected to said cutters to hold them in thread cutting position when the plunger is in a forward position and to collapse the cutters when the plunger is in a retracted position, a latch slidable through the plunger and having an abutment in engagement with a corresponding abutting portion on the plunger for locking the cutters in a fixed forward position during threading, said latch having a cut out portion to receive the abutting portion of the plunger to permit the plunger to be retracted to collapse the cutters, and a cam operably connected to means engageable by the work for moving said slide by positive cam action in one direction to permit collapsing of the cutters and in the other direction to lock the plunger in fixed forward position to hold the cutters in threading position, substantially as set forth.

6. A collapsible tap comprising a body portion having radial slots in its forward end, an axially adjustable plunger positioned in said body member, said plunger having beveled slots therein, radially positioned cutters mounted in said slots and extending through the slots in the end of the body member, a slide positioned in the body member and extending through said plunger, a portion of the slide engaging a portion of the plunger to hold the plunger in fixed forward position to hold the thread cutters in fixed radial position during threading, said slide having cams cut in its outer end, a ring positioned about said body portion and movable by the work, said ring carrying a cam engaging with the cam on the said slide to move the slide radially inwardly to permit retraction of the cutters, the cutters being held in fixed cutting position until the thread of a predetermined length has been cut, and means for quickly withdrawing the plunger when released by the said slide to effect substantially instantaneous retraction of the plunger and cutters, substantially as set forth.

In witness whereof, I have hereunto set my hand at Waynesboro, Pennsylvania, this 12th day of December, A. D. nineteen hundred and thirty.

SAMUEL F. NEWMAN.