Sept. 21, 1926. 1,600,941

F. J. HEYBACH

AUTOMATIC THREAD CHASING TOOL

Original Filed Oct. 23, 1922 2 Sheets-Sheet 1

Fig 1.

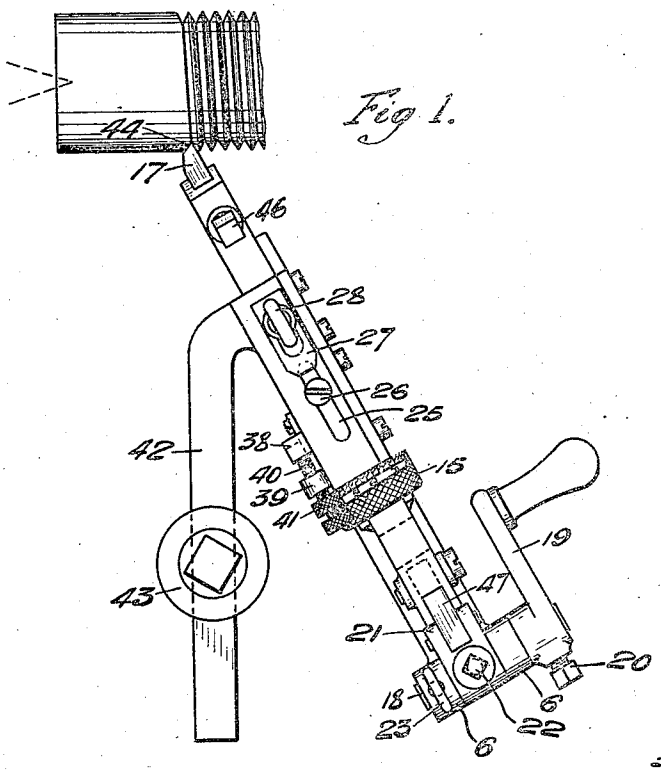


Fig 2.

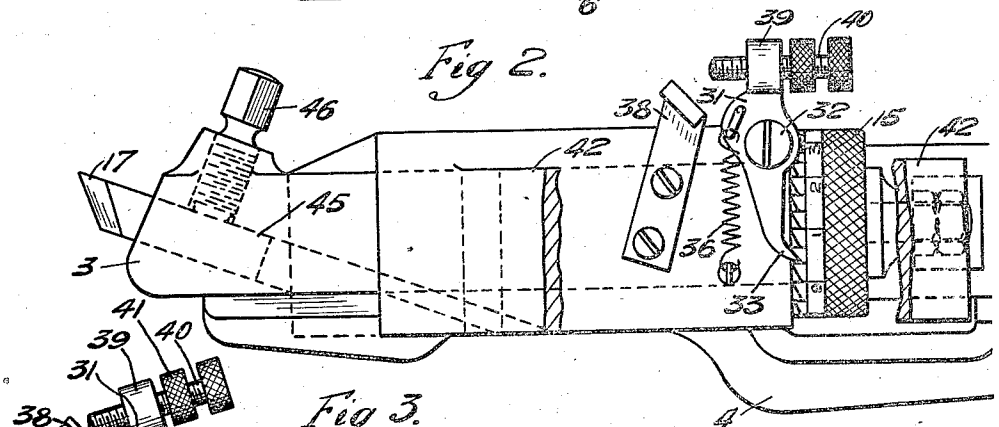
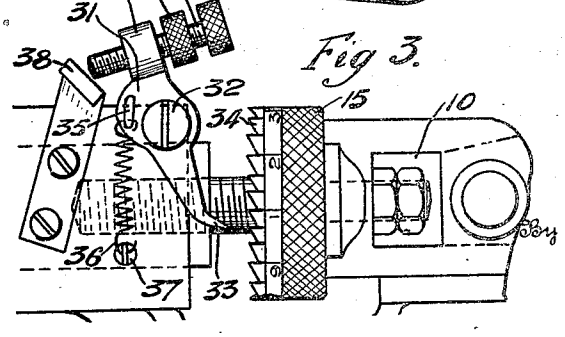


Fig 3.



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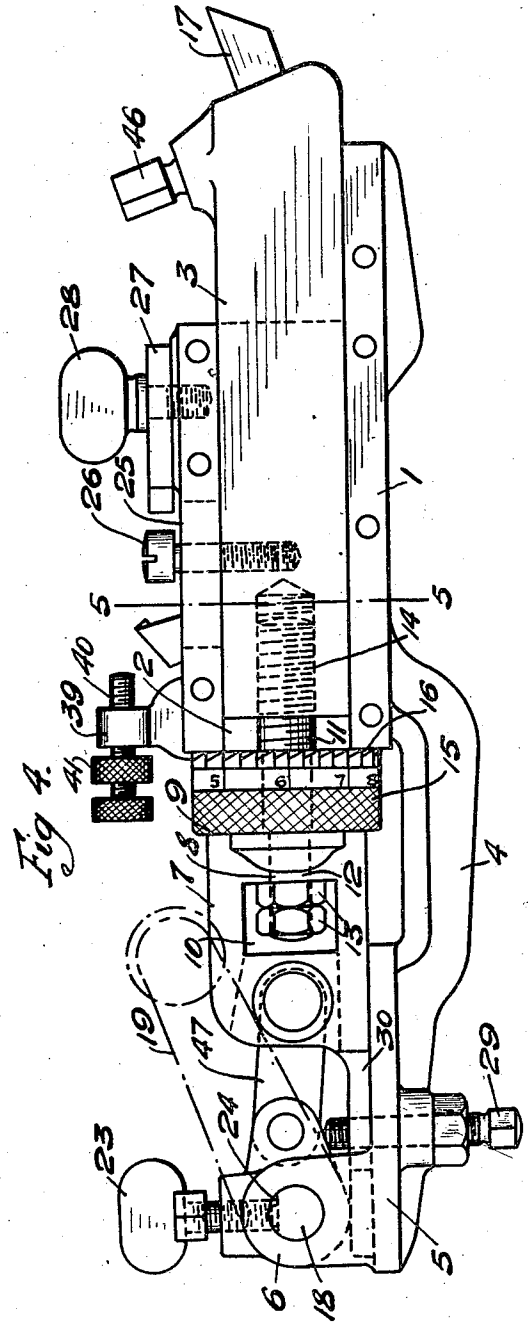


Fig 4.

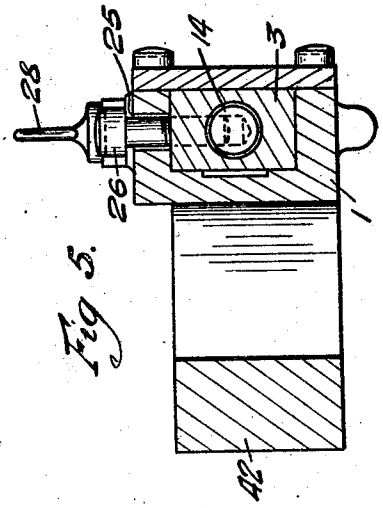


Fig 5.

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UNITED STATES PATENT OFFICE.

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AUTOMATIC THREAD-CHASING TOOL.

Application filed October 23, 1922, Serial No. 596,330. Renewed August 3, 1926.

This invention relates to automatic thread chasing tools and has for one of its objects the construction of a tool of the class designated which operates to form the thread by a succession of cuts of predetermined depth, the cutter being automatically advanced in depth at each cut.

Another object of the invention is the provision of a thread chasing tool for forming a thread of predetermined depth by successive cuts, said tool being provided with means for retracting the cutter from the work and projecting it thereagainst between each cut, said means actuating automatic feeding means for advancing the cutting edge in a depth direction a predetermined distance at each cut.

Still another object of the invention is the provision of means for predetermining the depth of each cut and also the depth of the finished thread.

A further object of the invention is the construction of a thread chasing tool which is presented angularly to the work and automatically fed thereto at the angle of its presentation so that the leading edge only of the cutter performs the cutting operation, thus avoiding chattering or gouging of the work, this being a common fault of thread cutting tools, which as ordinarily constructed cut both sides of the thread at once.

With the above and other objects in view, my invention consists in the improved automatic thread chasing tool illustrated in the accompanying drawings, described in the following specification, and particularly claimed, and in such variations and modifications thereof as will be obvious to those skilled in the art to which my invention relates.

In the drawings accompanying and forming a part of this specification, and wherein the preferred embodiment of my invention is illustrated:

Figure 1 is a plan view of my improved automatic thread chasing tool.

Figure 2 is a side elevation on a slightly larger scale of the tool shown in Figure 1, parts being broken away.

Figure 3 is an elevation showing a detail of the invention with the parts in the position assumed when the tool is retracted from the work.

Figure 4 is a side elevation of the tool shown in Figure 1 on a slightly larger scale taken from the side opposite that shown in Figure 2.

Figure 5 is a cross section taken along the line 5—5 of Figure 4.

Referring now in detail to the several figures, the numeral 1 represents the casing of the tool which is formed with a polygonal bore 2 adapted to function as a guideway for the slidable cutter block 3. The bracket 4 which is here shown as integral with the casing 1, but may be attached thereto in any suitable manner carries at its rearward end a plate 5 provided with the upstanding lugs 6 and forming a slide for the cross head 7.

Said cross head 7 is formed with a bore 8 leading from its forward face 9 to a recess 10. A coupling member 11 is provided having a reduced portion 12 passing through the bore 8 and journally secured to the cross head 7 by means of the nuts 13 housed in the recess 10. The forward end of the member 11 is threaded and passes into a threaded socket 14 in the adjacent end of the cutter block. A ratchet cylinder 15 is keyed to an intermediate portion of the member 11. This ratchet member may be turned either manually or mechanically and is provided on one side with a knurled surface and on the outer face with a plurality of peripherally arranged ratchet teeth 16. It is apparent that by rotating the ratchet cylinder relatively to the casing 1 the threaded member is advanced or retracted with relation to the socket 14 thus varying the distance of the cuttter block 3 from the ratchet cylinder. A graduated scale is provided adjacent the ratchet teeth, each mark representing a definite degree of depth-cut, for instance the thousandth part of an inch and is used to determine the depth of a thread without the use of calipers or micrometers.

The cross head 7 and cutter block 3 are joined together by means of the threaded member 11 and means are provided for imparting a reciprocatory movement to the cross head, whereby the cutter block 3 and the cutter 17 are moved either toward or away from the work. The means here employed for accomplishing this reciprocatory movement consist of a shaft 18 journally carried by the lugs 6 and having a handle 19 secured thereto by the set screw 20. A yoke 21 is arranged between the lugs 6, which has a bore aligning with the aper-

tures in the lugs 6 and through which the shaft 18 passes. Said yoke is secured to said shaft by means of the set screw 22. The thumb screw 23 penetrates one of the lugs 6 and engages a notch 24 in the shaft 18 holding the latter rigid, or tight when it is desired to dispense with the function of the reciprocating mechanism holding the knife for any length of time in fixed position. The yoke 21 is connected to the cross head 7 by means of the link 47. The means which I have shown for retracting the cross head 7 is one of a number of equivalent devices that might be advantageously employed for this purpose.

The casing 1 is provided with a slot 25 in which plays a cap screw 26 which is threaded into the cutter block 3. A gauge plate 27 is adjustably secured to the side of the casing 1 by means of a thumb screw 28, the latter passing through a slot in said gauge plate and being secured to the wall of the casing. The gauge plate 27 and the head of the cap screw 26 cooperate to determine and limit the depth of the thread to be cut. A gauge, not shown, equal to the depth of the desired thread is placed between the cap screw and the gauge plate 27 and the latter pushed against said gauge and secured from further movement by turning the thumb screw 28. The gauge is then withdrawn and the space between the head of the cap screw and the gauge plate represents the extreme distance through which the cutter block may be advanced in cutting the thread. In order to protect the gauge plate and cap screw from forcibly striking each other during the operation of the tool in such a manner that the depth adjustment might be altered, a set screw 29 is secured to the bracket 4, passing through a threaded aperture in said bracket and through a slot 30 in the end of the cross head. The inner end of said set screw projects into the path of movement of the yoke 21 and may be adjusted to contact with said yoke exactly at the moment when the cap screw 26 and the gauge plate 27 come together.

Means are provided for automatically feeding the cutter 17 forwardly in a depth direction which in the present illustration takes the form of a pawl 31 pivotally mounted upon the casing 1 by means of the cap screw 32 and having one end 33 thereof arranged to contact with ratchet teeth 34 and thereby to actuate the ratchet cylinder 15 and the threaded member 11 thereto secured. The pawl 31 is provided with tensioning means, consisting of a spring 36, one end of which hooks in the slug 35, the other end being fastened to a stationary post 37, said spring being normally tensioned to maintain the end 33 of the pawl biased in the direction of the ratchet cylinder. Stop means 38 is secured to the casing 1 adjacent the opposite end 39 of the pawl and an adjusting screw 40 passes through said end carrying the usual lock nut 41. The adjusting screw 40 normally contacts with the stop 38 to determine the position of the end 33 of the pawl when the latter is out of contact with the ratchet teeth 34.

When the handle 19 is turned in a direction to retract the cross head 7 and cutter block 3, the ratchet cylinder 15 moves away from the pawl 31, as shown in Figure 3, permitting the end 33 of the latter to assume its extreme position by movement in a counter-clockwise direction as viewed from Figure 3. When the handle is turned in the opposite direction and the parts are advanced toward the work, the ratchet cylinder 15 first engages the end 33 of said pawl. Further inward movement of said ratchet cylinder forces the end of said pawl to move arcuately to the left as viewed from figure 3 causing a partial rotation of the ratchet cylinder and consequent relative movement between the threaded member 11 and the cutter block projecting the latter slightly forward in a depth direction. This movement is completed by the time the cutter 17 engages with the work and the pitch of the threads on the threaded member 11 is such as to make the automatic feeding movement irreversible so that the cutter 17 is locked against recession from its depth position.

By adjusting the screw 40 the arc of movement of the end 33 of the pawl 31 is changed so that it may be determined whether said pawl shall rotate the ratchet cylinder the distance of one, or more than one tooth at a single movement of the handle 19.

The casing 1 is carried by a shank 42 of polygonal shape and adapted to be clamped in the tool post 43. The shank extends angularly from said casing so that the tool is presented at an angle to the axis of rotation of the work as is indicated in Figure 1. The cutter 17 is so shaped that one side thereof lies parallel to a side of the thread the leading edge only of said cutter performing the cutting operation as is clearly shown at 44 in Figure 1. By this arrangement it is possible to cut the thread smoothly with a thin shaving without chattering of the tool or gouging the work. The cutter is removably secured in an oblique channel 45 as shown in Figure 2 and held rigidly in position by means of the set screw 46.

In the operation of my improved automatic thread chasing tool, it is set up in the tool post angularly as shown in Figure 1. The cutter 17 is then projected against the work by manually turning the ratchet cylinder 15, the bar of course, at the time, being unthreaded. A gauge representing the depth of the desired thread is then intro-

duced between the cap screw 26 and the gauge plate 27 and the latter secured in a position touching said gauge. The gauge is then removed. The thread is to be formed by a succession of cuts, the tool travelling axially relatively to the bar-stock. If the material is such that a light cut is essential the operator adjusts the screw 40 so that the arc traversed by the end 33 of the pawl 31 is sufficient to move the ratchet cylinder a distance equal to the space of one of the teeth 34. Should the nature of the material permit a heavy cut the adjusting screw 40 is retracted accordingly to permit the pawl 31 to rotate the ratchet cylinder 15 an angular distance sufficient to give the desired cut. The handle 19 is then turned in a direction to advance the cutter while the tool travels axially in the direction of the arrow in Figure 1. The handle 19 is then reversed withdrawing the cutter 17, and the tool returned to its original position relatively to the bar-stock. The handle 19 is then again moved in a forward direction the change in depth of the cutter being accomplished through the actuation of the ratchet cylinder 15 by the pawl 31 before the cutter 17 engages the stock. The tool again travels in the direction of the arrow. This operation is repeated until the thread is completed, it being impossible to carry the thread to too great a depth on account of the limit to the depth movement of the tool imposed by the contact of the head of the cap screw 26 with the gauge plate 27.

While in the embodiment above described I have exemplified my invention by the use of specific mechanical elements it is to be understood that I do not consider the invention limited to the utilization of said specific mechanisms, but that it extends to any and all mechanical arrangements which may be included within the terms of the claims.

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

1. A thread chasing tool comprising a casing, a cutter block slidably mounted in said casing, a cross-head a coupling member swivelly mounted in said cross-head and loosely threaded to said cutter block, means for reciprocating said cross-head and means operable upon reciprocation of said cross-head for rotating said coupling member, thereby moving said cutter block longitudinally with respect to said coupling member.

2. A thread chasing tool adapted to cooperate with a rotating work holder comprising a casing, a cutter block slidably mounted in said casing, means for reciprocating said cutter block, a threaded coupling member connecting said reciprocating means and said cutter block and means for advancing said cutter block along the threads of said coupling member at each reciprocation thereof for advancing the latter a predetermined distance toward said work holder.

3. A thread chasing tool adapted to cooperate with a rotating work holder comprising a casing, a cutter block slidably mounted in said casing, means for reciprocating said cutter block, a threaded coupling member connecting said cutter block and reciprocating means, means for rotating said coupling member to advance the cutter block along the threads thereof, and means for actuating said rotating means upon each reciprocation of said reciprocating means.

4. A thread chasing tool adapted to cooperate with a rotating work holder comprising a casing, a cutter block slidably mounted in said casing, means for reciprocating said cutter block, a threaded coupling member connecting said reciprocating means and cutting block and a pawl and ratchet movement actuatable upon reciprocation of said reciprocating means to rotate said coupling member for advancing the cutter block along the threads thereof a predetermined distance in a depth direction.

5. A thread chasing tool adapted to cooperate with a rotating work holder comprising a casing, a cutter block slidably mounted in said casing, means for reciprocating said cutter block in a direction angularly with respect to a plane perpendicular to the axis of rotation of said work holder, a threaded coupling member connecting said reciprocating means and cutter block, pawl and ratchet means for imparting a step by step rotation to said coupling member at each reciprocation of said reciprocating means, to advance the cutter block along the threads of said coupling member a predetermined distance in a depth direction and means for adjustably changing the length of the step of rotation of said coupling member.

6. An automatic thread chasing tool comprising a casing, a cutter block carried by said casing, means for repeatedly reciprocating said cutter block, means actuatable upon each reciprocation of said cutter block for advancing the latter a predetermined distance in a depth direction away from said casing and means for setting a final limit to the aggregate distance said block may be advanced.

7. An automatic thread chasing tool comprising a casing, a cutter block slidably mounted in said casing, means for repeatedly reciprocating said cutter block, a threaded coupling member connecting said reciprocating means and cutter block, means actuatable upon each reciprocation of said reciprocating means for advancing the cutter block along the threads of said coupling member for moving said cutter block a pre-

determined distance in a depth direction away from said casing and means for setting a final limit to the aggregate distance said block may be advanced.

8. An automatic thread chasing tool comprising a casing, a cutter block slidably mounted in said casing, means for reciprocating said cutter block, a threaded coupling member connecting said reciprocating means and cutter block, means actuatable upon each reciprocation of said reciprocating means for imparting a step by step rotation to said coupling member for advancing said coupling block along the threads of said coupling member a predetermined distance in a depth direction away from said casing.

9. An automatic thread chasing tool comprising a casing, a cutter block slidably mounted in said casing, means for reciprocating said cutter block, a threaded coupling member connecting said reciprocating means and cutter block, means actuatable upon each reciprocation of said reciprocating means to impart a step by step rotation to said coupling member for advancing said cutter block along the threads of said coupling member a predetermined distance in a depth direction away from said casing and means for adjustably changing the length of each step of rotation of said coupling member.

10. An automatic thread chasing tool comprising a casing, a cutter block slidably mounted in said casing, a stop on said cutter block projecting through a slot in said casing, and an adjustable gauge plate on said casing co-actable with said stop.

11. An automatic thread chasing tool comprising a casing, a cutter block slidably mounted in said casing, means for reciprocating said cutter block, means actuatable upon reciprocation of said cutter block for advancing said cutter block a predetermined distance in a depth direction, a stop on said cutter block projecting through a slot in said casing, and an adjustable gauge plate coactable with said stop to limit the total depth movement of said cutter block.

In testimony whereof I affix my signature.

FREDERICK J. HEYBACH.