G. GARROW.

RIFLING HEAD.

APPLICATION FILED DEC. 23, 1919.

1,396,187.

Patented Nov. 8, 1921.

2 SHEETS—SHEET 1.

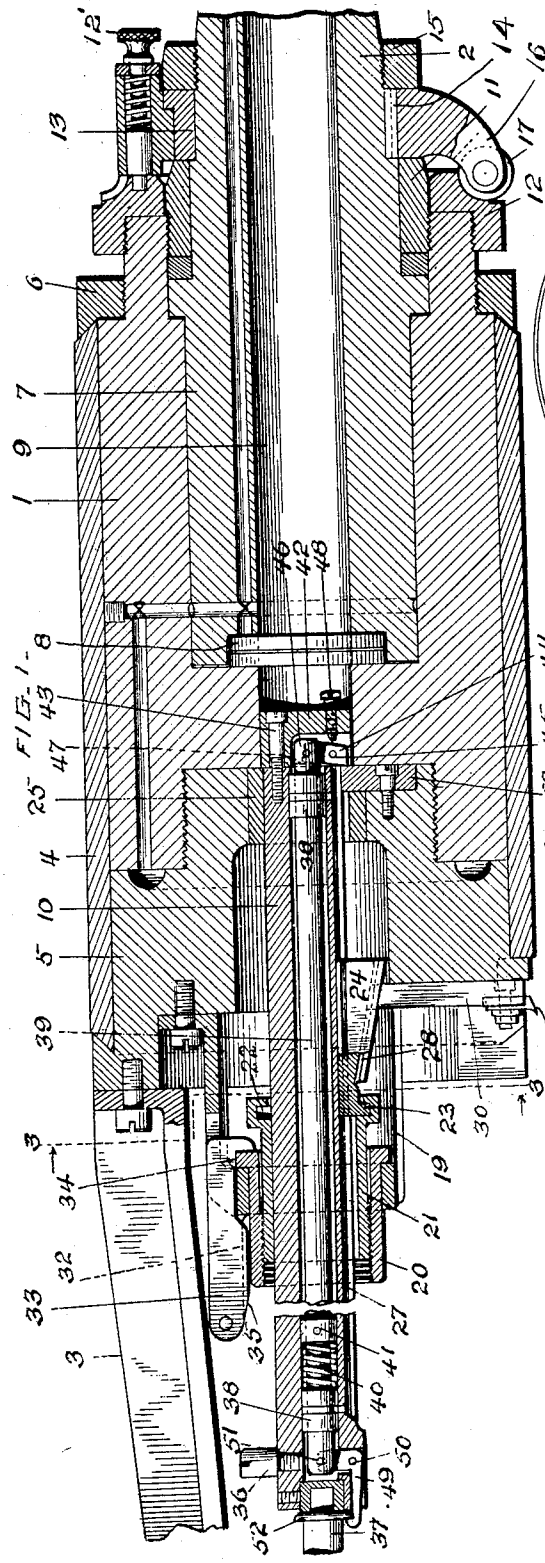


FIG. 1.

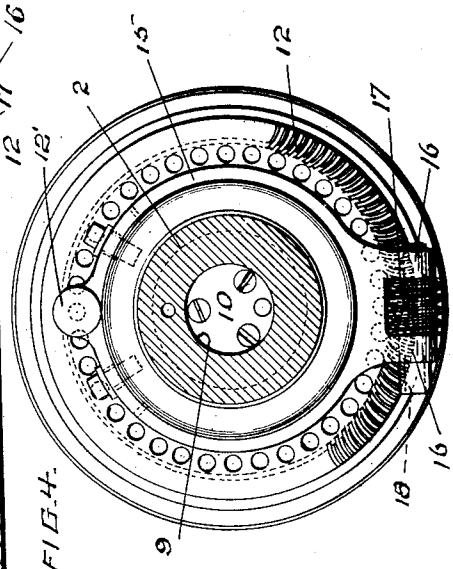


FIG. 4.

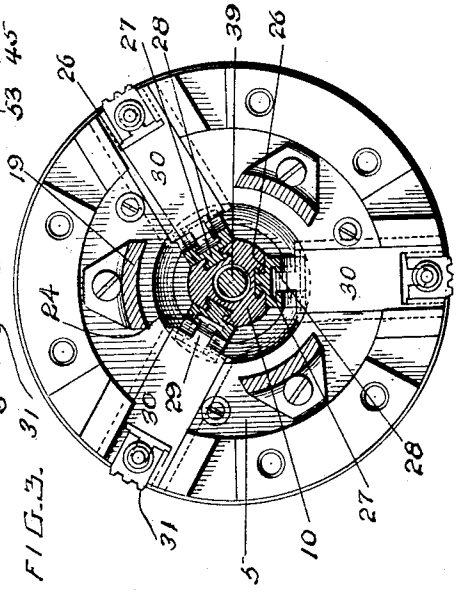


FIG. 3.

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2 SHEETS—SHEET 2.

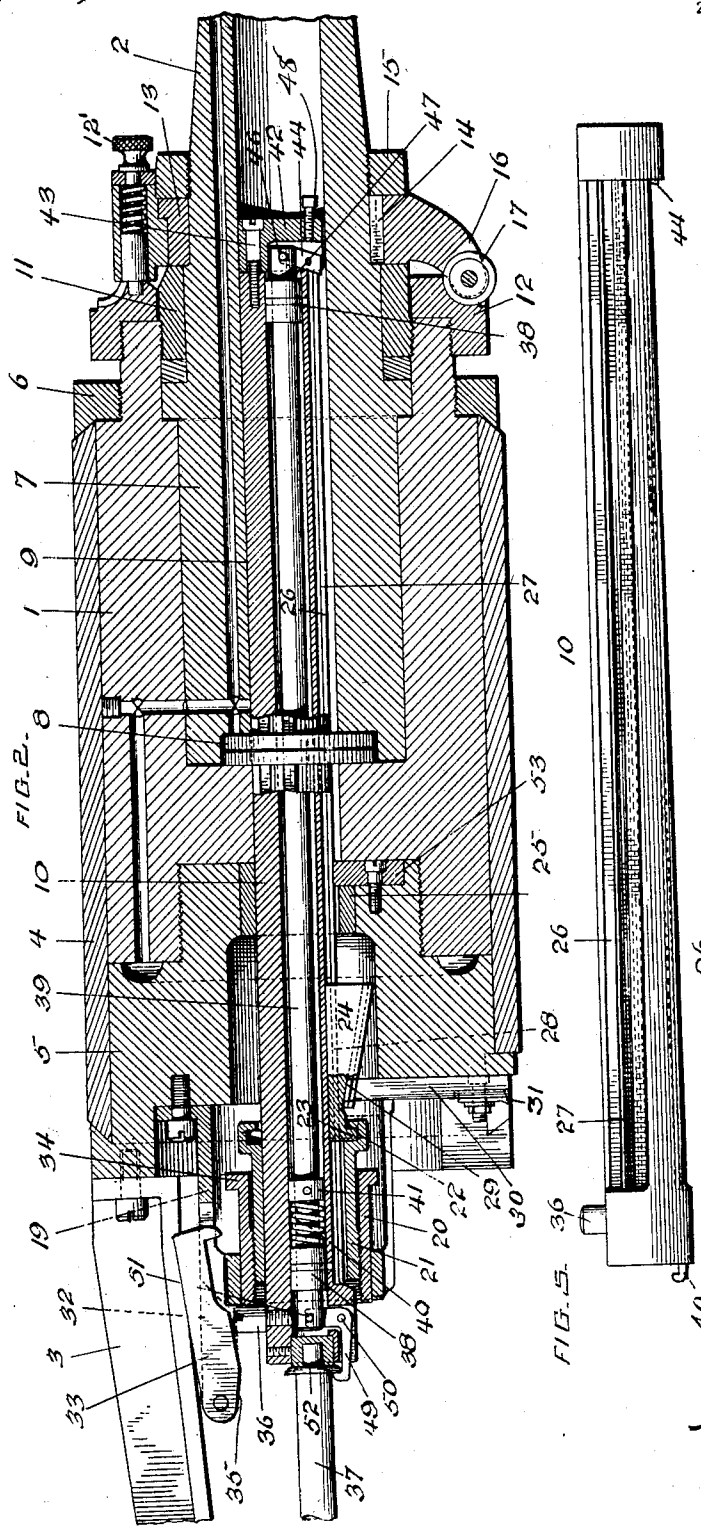


FIG. 2.

FIG. 5.

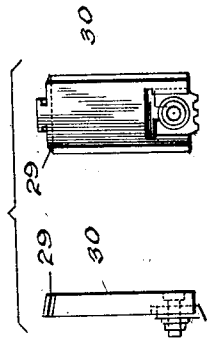


FIG. 7.

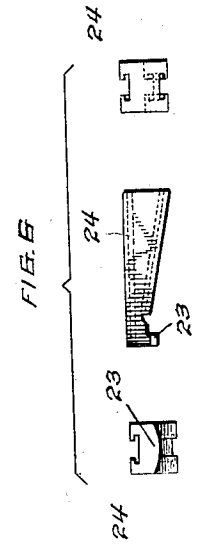


FIG. 6

Inventor,

Gustavus Garrow

UNITED STATES PATENT OFFICE.

GUSTAVUS GARROW, OF WATERVLIET, NEW YORK.

RIFLING-HEAD.

1,396,187. Specification of Letters Patent. Patented Nov. 8, 1921.

Application filed December 23, 1919. Serial No. 347,050.

To all whom it may concern:

Be it known that I, GUSTAVUS GARROW, a citizen of the United States, and a resident of Watervliet, county of Albany, State of New York, have invented an Improvement in Rifling-Heads, of which the following is a specification.

The invention described herein may be used by the Government, or any of its officers or employees in prosecution of work for the Government, or by any other person in the United States, without payment to me of any royalty thereon.

This invention relates to improvements in rifling heads with special reference to the type used in producing rifle grooves having a slight taper near the breech of the gun, said taper being in depth and not in width of grooves, though by a very slight modification of some of the parts of my disclosed construction it is possible to produce rifle grooves having a slight taper in width.

One of the objects is to provide positively acting, automatic means for properly withdrawing the cutting tool to prevent dragging during the return stroke of the head.

A further object is to provide positive automatic means for fully withdrawing the cam bar, forming part of the tool-operating mechanism, to the position it should assume in starting another cut, thereby avoiding damage to the head or gun.

Similar numerals indicate corresponding parts in all the figures of the drawings, in which:—

Figure 1 is a central longitudinal section through the rifling head, with the parts in their cutting positions, and at the moment of contact and engagement with the stop plug;

Fig. 2 is a longitudinal section of the head, upon completion of the taper cut, showing the cam bar in its relative position to the head after its contact with the stop-plug, the inclined cam blocks arrested, and the cutting tools withdrawn;

Fig. 3 is a section on line 3—3 of Fig. 1, looking in the direction of the arrows;

Fig. 4 is a rear end view of the head;

Fig. 5 is a detail elevation of the cam bar showing the flattened surfaces and T-slots occupied by the cam blocks;

Fig. 6 shows detail views of one of the cam blocks; and

Fig. 7 shows detail views of one of the tool slides.

The application of the improved construction to one form of rifling head is shown in the drawings; but slight changes as to minor details will provide for the use of the same on modified forms of heads, said changes being well within the scope of the claims.

Referring to the drawings, 1 indicates the body, 2 the driving shank, and 3 a forward guide arm of one form of rifling head.

The jacket 4 inclosing the body of the head is held in place by the under cut lip on the tool-head 5 at one end and by jacket head 6 at its other or rear end.

The drive head 7 extends into the body and is provided at its inner end with a thrust ball bearing 8, and a central bore 9, into which the rear end of a taper bar or cam member 10 telescopes when its movement with the rifling head is arrested, as will appear later.

An annular retaining ring 11 is threaded into the rear end of the body 1 to retain the drive head 7 in place and a worm wheel 12 threaded as shown to the outer surface of the rear end of the body, operates loosely over the retaining ring 11.

The head adjusting member 13 is keyed at 14 to the drive head and is held in place by nut 15 threaded on the drive head.

The adjusting member 13 is provided with ears 16 between which a worm 17 is mounted for engagement with the worm wheel 12. Operating the worm by key (not shown) in socket 18 in end of spindle of worm wheel will adjust the body 1 and the parts carried thereon, in relation to the drive head.

The drive head 7 having the shank 2 mounted in the driving bar (not shown) is operated in the usual manner to provide a spiral, longitudinal movement of the head through the gun to cut the rifling grooves, the body 1 carrying the tools, being adjusted about said head 7 into a position to cut the rifling groove or grooves paralleling those previously cut. The above is repeated until the bore of the gun is uniformly covered by the grooves. The head is locked in adjusted position preferably by a spring pressed bolt 12′ entering cavities provided in the worm wheel 12, as shown in Figs. 1, 2 and 4.

Threaded into the forward end of the body 1 is the tool head 5, and bolted to the front face of the tool head is a yoke 19, in which a tool-adjusting nut 20 is mounted for rotary and longitudinal movement.

The tool adjusting nut 20 has threaded therein a tool-adjusting sleeve 21, provided with an annular groove 22 in which the head 23 of the cam block 24 operates.

The cam bar 10 is mounted for longitudinal movement in the tool-adjusting sleeve 21 and in a bushing 25 in the tool head, said bar being throughout approximately its entire length provided with inclined flat surfaces 26, in this case three in number, said flat surfaces having T-slots 27 provided for the reception of properly formed lugs on the cam blocks 24.

The cam blocks 24 have inclined outer surfaces and are also provided with T-slots, 28, in which the heads 29 of the tool slides 30 operate when the blocks are moved longitudinally on the bar 10.

The flat surfaces 26 of the bar 10 gradually taper from the forward end back, and are adapted, when the bar is moved to the rear, to gradually force the cam blocks, tool slides and tools outwardly and cause the tools to cut a slightly deeper groove, thus producing the so-called taper groove type of rifling. It is, of course, understood that the bar 10 need not necessarily be tapered, but can be of uniform width throughout, thus producing a non-tapered groove, or spreading means (not shown) may be applied to produce gradually widening grooves in lieu of either a true or deepened groove.

The tool slides 30 are preferably three in number and are mounted for radial movement in dovetail slots formed in the front face of the tool head 5, said slides having mounted thereon the tools 31, secured by bolts which provide for their convenient replacement when worn.

The yoke 19 is provided with a forwardly extending arm 32 on which is pivoted a dog or latch 33 adapted to engage a flange 34 on the nut 20, to carry same forward and be disengaged therefrom by cam edge 35 on latch 33 coming in contact with stop 36, which allows the nut to discontinue its movement when it engages the stop 36.

The stop 36 is located at the forward end of bar 10 for engagement by the end of nut 20 and inner edge of latch 33 and cam 35, which lifts the latch and permits the further advance of the yoke without the nut and attached parts.

Stopping the nut 20 arrests the sleeve 21 and blocks 24; and the further advance of the yoke 19 and tool head 5 on which tool slides 30 are mounted, forces the heads 29 of the slides forward in the T-slots 28 in the blocks 24, and withdraws the tools. With the tools in the withdrawn position, the head is moved in its rear or non-cutting stroke.

Before the above tool retracting operation is performed, the taper bar 10 which projects in advance of the head a distance equal to the length of taper desired in the rifling grooves, is adapted to come into contact with a stop plug 37, so located as to stop the taper bar when the cutting tool reaches the portion of the groove at the beginning of the taper.

The taper bar is preferably hollow, and mounted therein for slight longitudinal movement in bearings 38, is a rod 39. A spring 40 encircling the rod between one of the bearings and a collar 41 tends to force the rod rearwardly in the bar.

Pivotally mounted in cap 42, secured by screw 43 to the rear end of the taper bar, is a rocker arm or lever 44 pivoted on pin 45 and provided with a bifurcated end in engagement with pin 46 mounted across a slot 47 in the rear end of the trip rod 39. A stop screw 48 limits the movement of the lever 44.

At the forward end of the rod 39 a bell-crank lever 49 is pivoted at 50 and is in engagement with pin 51 in the end of rod 39, and is adapted for engagement with the head 52 of the stop plug 37.

When the taper bar 10 comes in contact with the stop plug the bar stops and by bell-crank lever 49 becomes connected with the plug in such a manner that when the head starts to the rear the bar 10 will be held by the plug and not permitted to go back with the head, or parts connected thereto.

The rearward movement of the head with the bar held stationary, will continue until plate 53 mounted in the tool head, comes in contact with lever 44 which will trip the bell-crank 49 and release its hold on the plug and permit the taper bar to move with the head in its further rearward movement.

The operation is as follows: The head as shown in Fig. 1 with the taper bar protruding in advance of the head and dog 33 in engagement with nut 20 which has been adjusted to move the tools into the proper cutting position, is forced in a well known manner through the gun from the muzzle toward the breech and the grooves or the first cut of the grooves made at a uniform depth until the tools reach the point at which the taper in the groove is to begin or from which point the groove is to be made gradually deeper.

When the tools reach the point above referred to, the taper bar comes in contact with the stop plug 37 and stops, the bell-crank lever engaging the head of same.

With the taper bar stationary, the other parts of the head, including the nut 20, sleeve 21, tool adjusting blocks 24 and tool slides 30 continue their forward cutting movement, with the result that the blocks 24 are carried along the gradual incline of the taper bar, which feeds the tool slides and tools outwardly and the grooves are cut gradually deeper.

The stop 36 is so located that, immediately

after the tools finish the cut, the latch 33 will ride up on the rounded upper surface of the stop thus releasing its hold on the nut 20 and permitting it to stop when it comes in contact with the stop 36.

The stopping of the nut arrests the sleeve 21 and blocks 24. The other parts of the head will continue a short distance before being reversed, which will carry the heads of the tool slides 30 forward in the T-slots of blocks 24 and withdraw the tools well back away from the work.

From the above position the reverse movement of the head begins. The taper bar being anchored to stop plug 37 remains stationary and the remainder of the parts including the yoke, nut, sleeve and blocks slide back on the taper bar. This movement will bring the blocks to the lowermost or most depressed portion of the taper bar, whereupon plate 53 will come in contact with lever 44, which will trip the bell crank 49, release the taper bar from the plug and permit the withdrawal of the head with the parts in a position requiring the longitudinal adjustment of the nut and sleeve within the yoke and slight rotary adjustment of the nut in the sleeve when the head will be in position for the next cut.

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

1. A reciprocable rifling head carrying radially movable tool-supporting slides; mechanism for progressively advancing said slides in the course of the forward travel of the head, including a cam member telescopically carried by said head, and means for arresting movement of said cam member at a predetermined point in the forward movement of said head; and means for locking said cam member to said arresting means prior to, and for a period after, the commencement of the rearward movement of the head.

2. A reciprocable rifling head carrying radially tool-supporting slides, and mechanism for progressively advancing said slides in the course of the forward travel of the head, including a cam member telescopically carried by said head, and coöperating slide advancing means slidably supported on said cam member.

3. A reciprocable rifling head carrying radially movable tool-suporting slides, and mechanism for progressively advancing said slides in the course of the forward movement of the head, including a cam member telescopically carried by said head, and coöperating slide-advancing means slidably supported on said cam member and including cam members slidably connected with said tool-supporting slides.

4. A reciprocable rifling head carrying radially movable tool-supporting slides, and mechanism for progressively advancing said slides in the course of the forward movement of the head, including a cam member telescopically carried by said head, coöperating slide advancing means slidably supported on said cam member, and means for coupling said coöperating slide-advancing means to said head during part of the forward travel of the latter.

5. A reciprocable rifling head carrying radially movable tool-supporting slides, and mechanism for progressively advancing said slides in the course of the forward movement of the head, including a cam member telescopically carried by said head, coöperating slide-advancing means slidably supported on said cam member, means for coupling said slide-advancing means to said head during part of the forward travel of the latter, means for arresting movement of said cam member at a predetermined point in the forward movement of the head, and means for thereafter arresting movement of said coöperating slide-advancing means.

6. A reciprocable rifling head carrying radially movable tool-supporting slides, and mechanism for progressively advancing said slides in the course of the forward travel of the head, including a cam member telescopically carried by said head, coöperating slide-advancing means slidably carried by said cam member, means for coupling said cooperating slide-advancing means to said head during part of the forward travel of the latter, means for arresting movement of said cam member at a predetermined point in the forward movement of the head, and common means for successively disengaging said coupling means from said coöperating slide-advancing means and arresting movement of the latter.

7. A reciprocable rifling head carrying radially movable tool-supporting slides, and mechanism for progressively advancing said slides in the course of the forward movement of the head, including a cam member telescopically carried by said head, coöperating slide-advancing means slidably carried by said cam member, means for coupling said coöperating slide advancing means to said head during part of the forward travel of the latter, means for arresting movement of said cam member at a predetermined point in the forward movement of the head, a stop carried by said cam member and disposed in the path of the movement of said coupling means and said coöperating slide-advancing means for successively disengaging said coupling means from said slide-actuating means and arresting movement of the latter.

8. A reciprocable rifling head carrying radially movable tool-supporting slides, and mechanism for progressively advancing said slides in the course of the forward movement of the head, including a cam member

telescopically carried by said head and provided with longitudinally extending, inclined cam grooves, and coöperating slide-advancing means slidably carried by said cam member and including cam blocks slidable in said cam grooves and slidably engaging said tool-supporting slides.

9. A reciprocable rifling head carrying radially movable tool-supporting slides, and mechanism for progressively advancing said slides in the course of the forward movement of the head, including a cam member telescopically carried by said head, and cooperating slide advancing means slidably supported on said cam member and including members having inclined cam grooves slidably engaged by said tool-supporting slides.

10. A reciprocable rifling head carrying radially movable tool-supporting slides, and mechanism for progressively advancing said slides in the course of the forward movement of the head, including a cam member telescopically carried by said head, and coöperating slide-advancing means comprising a nut slidably carried by said head, a sleeve threaded into said nut, and cam blocks slidable on said cam member and secured to said sleeve and slidably engaging said tool supporting slides.

11. A reciprocable rifling head carrying radially movable tool-supporting slides; mechanism for progressively advancing said slides in the course of the forward movement of the head, including a cam member telescopically carried by said head, and means for arresting movement of said cam member at a predetermined point in the forward travel of said head; a member for locking said cam member to said arresting means prior to, and for a period after, the commencement of the rearward movement of the head; and coöperating means carried by said cam member and said head for releasing said locking member at a predetermined point in the rearward movement of the head.

12. A reciprocable rifing head carrying radially movable tool-supporting slides; mechanism for progressively advancing said slides in the course of the forward movement of the head, including a cam member telescopically carried by said head, and means for arresting movement of said cam member at a predetermined point in the forward travel of said head; a member carried by said cam member for locking the latter to said arresting means prior to, and for a period after, the commencement of the rearward movement of the head; and mechanism for releasing said locking member, at a predetermined point in the rearward movement of the head, including a pivoted rocker carried by said cam member, and a member carried by said head for moving said rocker.

13. A reciprocable rifling head carrying radially movable tool supporting slides, mechanism for progressively advancing said slides in the course of the forward movement of the head, including a cam member telescopically carried by said head, and means for arresting movement of said cam member at a predetermined point in the forward travel of said head; a pivoted member carried by said cam member for locking said cam member to said arresting means prior to and for a period after, the commencement of the rearward movement of the head; a rod slidably carried by said cam member; a rocker pivoted to said cam member for moving said rod to release said locking member; and a member carried by said head for tripping said rocker.

GUSTAVUS GARROW.