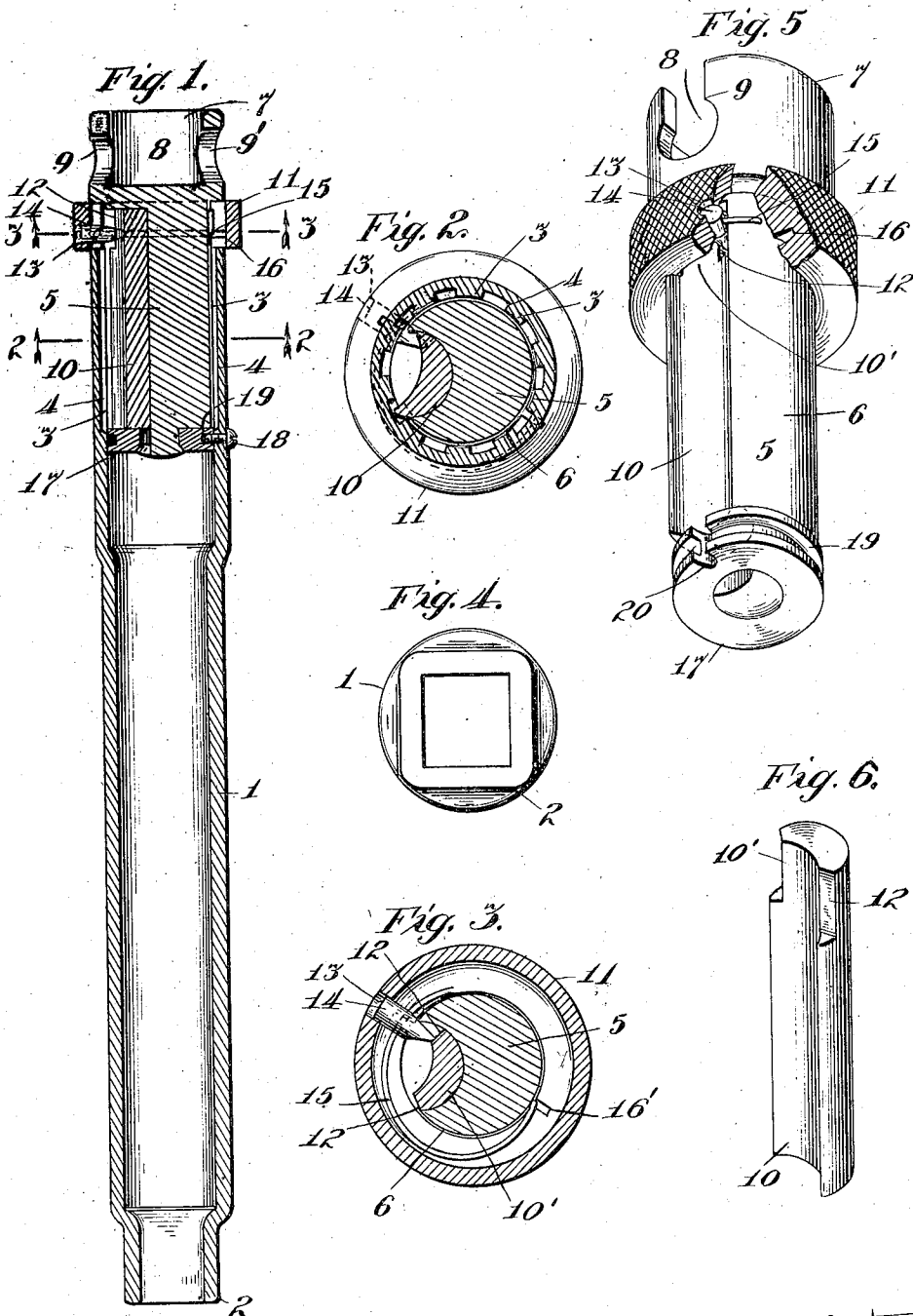


F. H. AYER.
 RATCHET DRIVING MECHANISM.
 APPLICATION FILED JUNE 10, 1912.

1,072,807.

Patented Sept. 9, 1913.



Witnesses
 Milton Lenoir
 Joyce M. Rutz

Inventor,
 Frederick N. Ayer,
 By *Offield & Co.* Attorneys.

UNITED STATES PATENT OFFICE.

FREDERICK H. AYER, OF CHICAGO HEIGHTS, ILLINOIS.

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Specification of Letters Patent.

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Application filed June 10, 1912. Serial No. 702,732.

To all whom it may concern:

Be it known that I, FREDERICK H. AYER, a citizen of the United States, residing at Chicago Heights, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Ratchet Driving Mechanism, of which the following is a specification.

This invention relates to improvements in ratchet wrenches and analogous tools, and it has for its object to provide an extremely simple tool shank embodying a reversible ratchet mechanism whereby the tool mounted upon one end of the shank may be propelled positively in either direction of rotation by an oscillatory movement of the opposite end of the shank.

The invention will be readily understood from the following description, reference being had to the accompanying drawings, in which—

Figure 1 is an axial sectional view of the device, taken in a plane which coincides with the spring actuated reversing stud; Fig. 2 is a cross sectional view, taken on the line 2—2 of Fig. 1; Fig. 3 is a similar cross sectional view, taken on line 3—3 of Fig. 1; Fig. 4 is a lower end view of the device; Fig. 5 is a perspective view of the head end of the device, with parts broken out; Fig. 6 is a detail perspective of the ratchet dog.

Referring to the drawing, 1 designates as a whole a tubular shank or shaft, the lower end 2 of which is suitably formed to positively engage the shank of any suitable tool to be operated or to directly engage a nut. The opposite end of the shank is provided internally with a series of ratchet ribs or projections 3 and intervening ratchet notches 4; these being preferably, and as shown, arranged to extend parallel with the axis of the shank and being made of substantial length, as indicated. In the preferred construction shown that part of the shank containing these ratchet ribs and notches is enlarged, but this is, of course, not essential.

Arranged to telescope chiefly within the upper end of the shank 1 is what I will term for convenience of description a driving head, designated as a whole 5 and shown separately in Fig. 5. This driving head comprises a solid cylindric portion 6 which fits easily inside the ratcheted part of the shank 1, is of a length slightly greater than the length of the ratchet ribs, and is provided at its outer end with an enlarged in-

tegral head 7, which is axially bored to provide a socket 8, and transversely pierced or apertured, as indicated at 9, 9'. The construction of the socketed head end of the driving head and of the lower or tool-engaging end of the shank 1 is old and common.

In one side of the body 6 of the driving head is formed a semi-cylindric groove of relatively large cross sectional size, arranged to extend parallel with the axis of the tool and of a length approximately coinciding with the length of the ratchet grooves and ribs. Within this groove is movably seated a rocker ratchet dog 10, which is crescent shaped in cross section and of such size that when one of its edges is within the edge of the groove in which it is seated its opposite edge will be projected outside the periphery of the driving head and into engagement with one of the grooves of the internal ratchet formed in the shank 1. The ratchet dog is symmetrical in cross section so that its relations may be exactly reversed by tilting it or rocking it one way or the other in its seat, and inasmuch as its maximum width about coincides with the width of the groove in which it is seated, it follows that when it is in intermediate position of adjustment the driving head may rotate freely in either direction without its ratchet dog engaging the shank.

In order to control the position of the ratchet dog 10 so that it may act as a yielding automatically engaging member, and may also be shifted to effect a reversal, the dog 10 is provided at its upper end with an extension 10' which extends inside of or underlies a reversing collar 11 mounted on the outside of the member 1 adjacent to the head portion thereof. The edges of the extension 10' of the ratchet dog are cut away to produce bearing faces 12 which extend parallel with the axis of the tool and whose faces lie in planes arranged at an obtuse angle with reference to each other. The reversing collar 11 is radially apertured, as indicated at 13, and within this aperture is mounted a reversing stud 14, the radially inner end of which engages one or the other of the bearing faces 12 of the ratchet dog for the purpose of holding the latter projected as to its opposite edge. A C-spring 15 is mounted in a suitable internal groove 16 formed within the reversing collar, one end of the spring being turned at right angles and engaged with a cross

groove or slot 16', see Fig. 3, so as to hold the spring from endwise displacement, and the other end of the spring being extended through a suitable aperture in the inner part of the reversing stud 14, as shown clearly in Fig. 3. The spring is so shaped as to press the reversing stud inward. When it is desired to reverse the driving direction of the ratchet mechanism it is only necessary to hold the shank from rotation and rotate the collar 11 so as to carry the reversing stud 14 from its position engaging one bearing face of the ratchet dog to a position in which it engages the opposite face.

The driving head as a whole, while rotatably mounted in the end of the tubular shank, is held against endwise displacement or withdrawal from the shank conveniently by journaling upon the inner end of the driving head a disk 17, and securing the disk against endwise movement by a set screw 18 threaded through the side of the tubular shank and engaging a circumferential groove 19 in the edge of the disk. It is immaterial whether the disk rotate with the driving head and the point of the set screw traverses the groove in the disk, or the disk be journaled to rotate on the driving head and the set screw holds it rigid with the tubular shank, since either arrangement will secure the desired result of holding the driving head against withdrawal from the shank while permitting its free rotation.

The operation of the device will be obvious from the foregoing description to those skilled in the art. It will be understood that the ratchet dog yields and permits the driving head to be rotated backward so to speak to secure a new hold when the driving head is rotated in the direction to oscillate the dog and thrust the spring-pressed reversing stud radially outward, while the positive ratchet or dogging engagement occurs when the driving head is rotated in the opposite direction, so that the engagement of the internal rib with the edge of the dog tends to rock that edge radially outward. In such event, the bottom of the groove limits the rocking movement of the dog and the parts come to a dead lock and move together positively.

Among the important advantages of my construction are the following: The parts are extremely few in number and of very simple and easily machined form; the engaging edge of the dog and corresponding ribbon groove which it engages are relatively long, thus insuring a very large contact area with corresponding strength and durability; the manner in which the dog is seated in its groove distributes the driving force exerted through the dog over a large part of the area of the groove, thus insuring maximum strength and dispensing with the usual piv-

ots commonly used in connection with ratchet dogs; the manner of reversing the direction of action of the tool is in operation of the simplest nature, and the manner of assembling and disassembling the parts of the tool is one of extreme simplicity, since the driving head can be removed from the shank by simply withdrawing the set screw 18, and if it is desired to take the drive head elements apart it is only necessary to shift the reversing stud into an intermediate position relatively to the locking dog, then slide the reversing collar off from the driving head, a notch 20 being provided in the periphery of the disk 17 to permit the point of the reversing stud to pass through.

While I have herein shown and described a preferred embodiment of my invention, yet it will be understood that the details of construction may be somewhat modified without departing from the invention, and accordingly the appended claims are to be construed broadly, except in so far as their terms are specific.

I claim as my invention:

1. In ratchet driving mechanism, the combination of a shank member provided with an internal series of ratchet ribs and intervening grooves, a driving member within the shank member, a groove part-circular in cross section formed in the side of the driving member and extending lengthwise of the latter, a dogging pawl substantially crescent-shaped in cross section fitting within said groove and adapted to engage at either edge with the ribs and grooves of the internal ratchet, a pair of bearing faces formed upon said pawl, each bearing definite and similar relation to a corresponding acting edge of the pawl, an oscillatory reversing member movably mounted upon the exterior of the shank, and a spring-pressed reversing stud mounted in said reversing member and adapted to act upon either of said bearing faces.

2. In ratchet driving mechanism the combination of a tubular shank member adapted at one end to positively engage and actuate a part to be rotated and provided internally with a series of ratchet ribs and intervening grooves extending lengthwise of the shank, a driving head having a part fitted and telescoping within said internal ratchet portion of the shank, a groove having part-cylindric walls formed in one side of said driving head and extending parallel with the axis of the latter, a dogging pawl substantially crescent-shaped in cross section fitted within the groove of the driving head, the maximum cross sectional diameter of said dogging pawl being approximately equal to the maximum width of the groove, an extension formed upon one end of said dogging pawl provided with two symmetrically related bearing surfaces, each bearing defi-

5 nite relation to a corresponding acting edge of the pawl, a reversing collar surrounding that part of the driving head within which said pawl extension lies, and a spring-pressed reversing stud mounted to move radially within said reversing collar and impinging at its inner end against the extension of the pawl.

10 3. In ratchet driving mechanism, the combination of a shank member provided with an internal series of ratchet ribs and intervening grooves, a driving member within the shank member having a longitudinally extending groove parti-circular in cross section in one side thereof, a dogging pawl substantially crescent shaped in cross section fitting within said groove and adapted to engage at either edge with the ribs and grooves

of the internal ratchet, and a setting ring encircling said shank, said setting ring having an axial passageway and said shank having a circumferentially extending slot, a setting pin radially movable in said passageway and slot, a spring carried by said shank member and engaging with said pin to exert radial inward pull on said pin, said pin being adapted upon shifting of said setting ring to engage with either edge of said ratchet pawl to shift one edge inwardly away from the ratchet ribs and the other edge outwardly for operative association with said ribs. 20 25 30

FREDERICK H. AYER.

Witnesses:

EMILIE ROSE,
ALBERT H. GRAVES.