Dec. 30, 1941. J. C. CURTIS 2,268,243

RATCHET AND PAWL MECHANISM

Filed Aug. 2, 1940

Fig. 1.

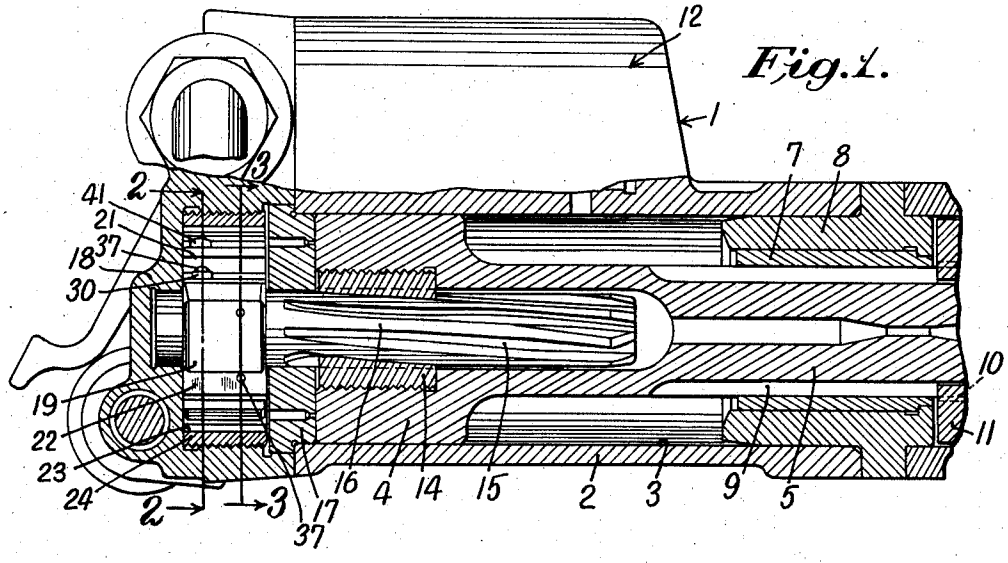

Fig. 2.

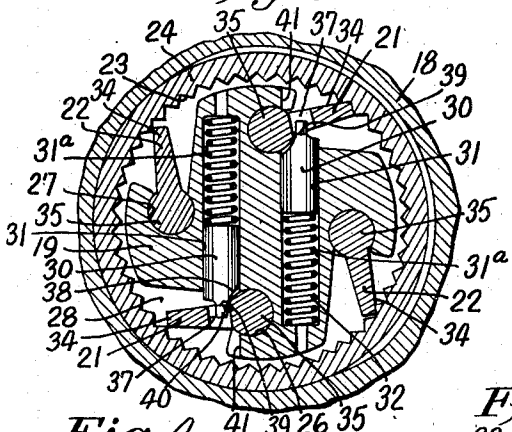

Fig. 3.

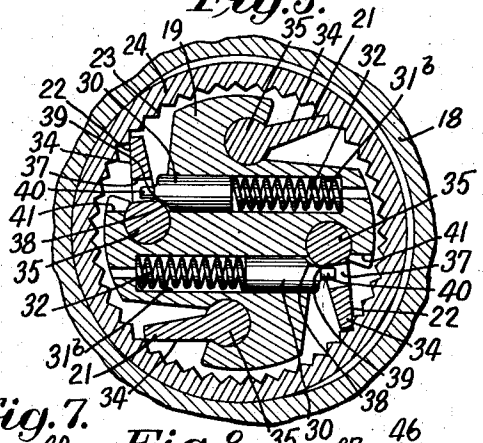

Fig. 4.

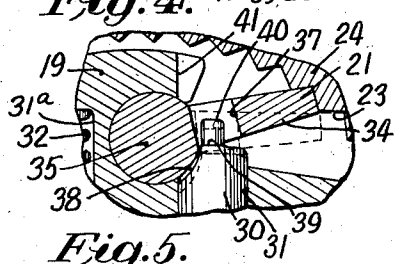

Fig. 5.

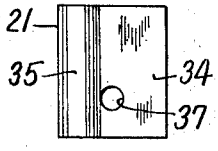

Fig. 6.

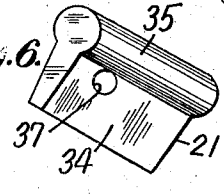

Fig. 7.

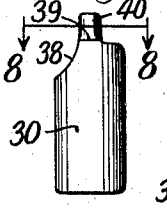

Fig. 8.

Fig. 10.

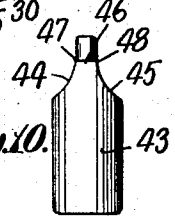

Fig. 9.

Inventor:
John C. Curtis.
by
Louis A. Maxson
Atty.

Patented Dec. 30, 1941

2,268,243

UNITED STATES PATENT OFFICE

2,268,243

RATCHET AND PAWL MECHANISM

John C. Curtis, Claremont, N. H., assignor to Sullivan Machinery Company, a corporation of Massachusetts

Application August 2, 1940, Serial No. 349,507

2 Claims. (Cl. 74—577)

This invention relates to ratchet and pawl mechanisms and more particularly to ratchet and pawl mechanisms of the type adapted especially for use in hammer rock drills.

It is an object of this invention to provide an improved ratchet and pawl mechanism. Another object is to provide in a ratchet and pawl mechanism of the type adapted for use in hammer rock drills, improved means for locking the pawls against inadvertent release with respect to the pawl carrier. Still another object is to provide an improved ratchet and pawl mechanism in which the pawls are locked against inadvertent release from the pawl carrier irrespective of their supported position but may be released when desired. It is still another object to provide a ratchet and pawl mechanism having improved means for continuously urging the pawls into engagement with the ratchet and for locking the pawls against inadvertent release from the pawl carrier. Another object is to provide in a ratchet and pawl mechanism an improved spring pressed plunger engaging a pawl at points closely adjacent to the axis of the plunger for urging the pawl into engagement with the ratchet, said plunger having formed thereon means for locking the pawl against inadvertent release from the pawl carrier. Still another object is to provide an improved spring pressed plunger for a ratchet and pawl mechanism movable to different positions for presenting different portions to the pawl for wear. Other objects and advantages of the invention will, however, hereinafter more fully appear.

In the accompanying drawing there are shown for purposes of illustration two forms which the invention may assume in practice.

In this drawing:

Fig. 1 is a view mainly in longitudinal vertical section, but with parts in elevation, showing a hammer rock drill in which an illustrative embodiment of the invention is incorporated.

Fig. 2 is an enlarged cross sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is an enlarged cross sectional view taken on line 3—3 of Fig. 1.

Fig. 4 is an enlarged sectional view of a portion of the ratchet and pawl mechanism as shown in Fig. 2.

Fig. 5 is a side elevational view of one of the pawls.

Fig. 6 is a perspective view of the pawl shown in Fig. 5.

Fig. 7 is a side elevational view of one of the spring pressed plungers.

Fig. 8 is a view taken on the plane of the line 8—8 of Fig. 7.

Fig. 9 is a side elevational view of the plunger shown in Fig. 7 turned through 90°.

Fig. 10 is a side elevational view of a modified form of spring pressed plunger.

In this illustrative embodiment of the invention there is shown a hammer type rock drill, generally designated 1, having a cylinder 2 that is provided with a bore 3 within which a piston 4 is reciprocably contained. Formed on the forward end of the piston is an elongated striking bar 5 of reduced cross section that is reciprocably guided in a bushing 7 mounted in a front cylinder head 8 for delivering impact blows to the shank of a drill steel. Formed in the striking bar are straight grooves 9 slidingly interlocked with straight keys 10 on a chuck member 11 for transmitting rotary motion of the piston to the drill steel in the usual manner. Reciprocations of the hammer piston are effected by pressure fluid distributed to the cylinder bore under the control of distributing mechanism generally designated 12 which is not fully illustrated as it is unnecessary to the disclosure of the invention. Fixed within the piston is a rifle nut 14 having spiral keys which are slidingly interlocked with spiral grooves 15 formed on a rifle bar 16 that is mounted for rotation within a rear cylinder head 17 and a rear head block 18. Formed integrally with the rifle bar 16 adjacent its rear end is a pawl carrier 19 which carries two pairs of pawls 21, 21 and 22, 22. The pawls are symmetrical in end elevation and in outline in side elevation and cooperate with teeth 23 of a ratchet ring 24 which is threaded within the rear head block 18. The pawls 21 and 22 are suitably pivotally supported in sockets 26 and 27 respectively in the pawl carrier 19, these sockets being generally cylindrical and opening into spaces 28 formed by the cutting away of the periphery of the pawl carrier. The spaces 28 are so formed as to permit the pawls to swing outwardly a sufficient distance to engage fully the ratchet teeth 23, but to restrain them from excessive outward movement. To maintain the pawls in yielding engagement with the ratchet teeth 23, pawl-engaging plungers 30 are provided, these plungers being disposed in bores 31 extending chordally of the pawl carrier and being pressed yieldingly against the inner surfaces of the pawls by springs 32. Two of the bores, 31*a*, 31*a*, are herein arranged to the rear of the median transverse plane of the pawl carrier; the other two, 31*b*, 31*b*, are arranged forwardly of that plane. The bores 31*a*, 31*a* are

parallel to each other, as are the bores **31***b*, **31***b*; and the bores **31***a*, **31***a* are perpendicular to lines parallel to the bores **31***b*, **31***b*.

Each of the pawls comprises a blade portion **34** engageable with the teeth **23** of the ratchet and a pivot portion **35** pivotally seated in one of the sockets **26** and **27**. An opening **37** extends completely through the blade portion of each pawl at a point shown herein as positioned between the center and one end of the pawl and close to the pivot portion **35**. Since the pawls are symmetrical in shape they may be released from their sockets and turned end for end and be reinserted within other sockets to present other portions of the pawls for engagement with the ratchet teeth after the first pawl engaging portion becomes worn.

In order to impart to each pawl a substantially constant pressure throughout its full swing for urging it into engagement with the ratchet teeth, and in order to obtain contact between the plunger and the pawl at points which would prevent a binding of the plunger in its bore and which would increase the effective swinging force of the pawl, the plunger is cut away adjacent the pivot portion **35** of the pawl as at **38** to provide shoulders **39** on the plunger for engaging the blade of the pawl. The plunger is cut back at **38** a sufficient distance to prevent engagement of the plunger with the pawl, even when the plunger moves outwardly to force the pawl into full engagement with a ratchet tooth, at points between the engagement of the shoulders **39** with the pawl and the inner end of the pawl. The arrangement of the pawl and its plunger is such that when the pawl rides over the points of the ratchet teeth, the side of the pawl blade next to the plunger is at such an angle that there is only an engagement between the plunger and the pawl at the shoulders **39** along the edge where the plunger is cut back. Formed on each plunger at its end engaging the pawl is a reduced axial projection **40** extending within an opening **37** in a pawl for positively locking the pawl in position on the pawl carrier. In order that the plungers may be inserted into or removed from within their bores when the pawls are removed from the pawl carrier, there are provided grooves **41** in the pawl carrier in alinement with the inner walls of the plunger bores.

A modified form of plunger **43** is shown in Fig. 10, and is like the plunger **30** except that it is cut away at opposite sides, as at **44** and **45**, to provide shoulders **46** providing two edges **47** and **48**. When one of the edges becomes worn down the plunger may be rotated through 180° to bring the other edge into position for engaging a pawl.

From the foregoing description, it will be noted that there is provided an improved ratchet and pawl mechanism in which the effective force of the spring-pressed plungers for urging the pawls into engagement with the ratchet teeth is maintained uniform and is applied at points lying close to a plane including the axis of the plunger. It will further be noted that there is provided means for locking the pawls against accidental removal while permitting swinging movement of the pawls about their pivot axes on the pawl carrier. It will also be noted that the pawls are reversible to provide different portions which are subjected to wear for engaging the ratchet teeth, and that spring-pressed plungers are provided each having a plurality of pawl engaging portions selectively engageable with a pawl to distribute the wear. The structure is simple, of rugged construction, and well adapted for its intended purpose.

While there are in this application specifically described two forms which the invention may assume in practice, it will be understood that these forms of the same are shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a ratchet and pawl mechanism, in combination, relatively rotatable ratchet and pawl carrier elements, pawls pivotally mounted on said pawl carrier element and engageable with the teeth of said ratchet element, said pawls having generally cylindrical pivot portions and projecting blade portions, said blade portions engaging said ratchet teeth, and plungers mounted on said pawl carrier element and yieldingly pressed into engagement with said pawls for yieldingly urging the latter into engagement with the ratchet teeth, said plungers having reduced locking projections extending in the same direction as the axes of said plungers and said blade portions of said pawls having openings extending therethrough and within which said locking projections project, said plungers also having cut-away portions for limiting contact with said pawls to points lying in the case of each plunger and the pawl with which it is associated in a plane extending transversely of said pawl and in close parallelism with the axis of said plunger.

2. In a ratchet and pawl mechanism, in combination, relatively rotatable ratchet and pawl carrier elements, pawls pivotally mounted on said pawl carrier element and engageable with the teeth of said ratchet element, and plungers mounted on said pawl carrier element and respectively yieldingly pressed into engagement with said pawls between the ends of the latter for yieldingly urging said pawls into engagement with the ratchet teeth, said plungers having reduced locking projections extending lengthwise of the axes of said plungers and said pawls having openings extending therethrough and within which said locking projections project, the pivotal mountings for said pawls being so arranged that the faces of said pawls adjacent their associated plungers are spaced over 90° from the axes of said plungers in all positions of the pawls while engaging the ratchet teeth, and said plungers being cut away for limiting contact between each plunger and the associated pawl, during engagement of the latter with the ratchet teeth, to points lying in a plane extending transversely of said pawl and in close parallelism with the axis of said plunger.

JOHN C. CURTIS.