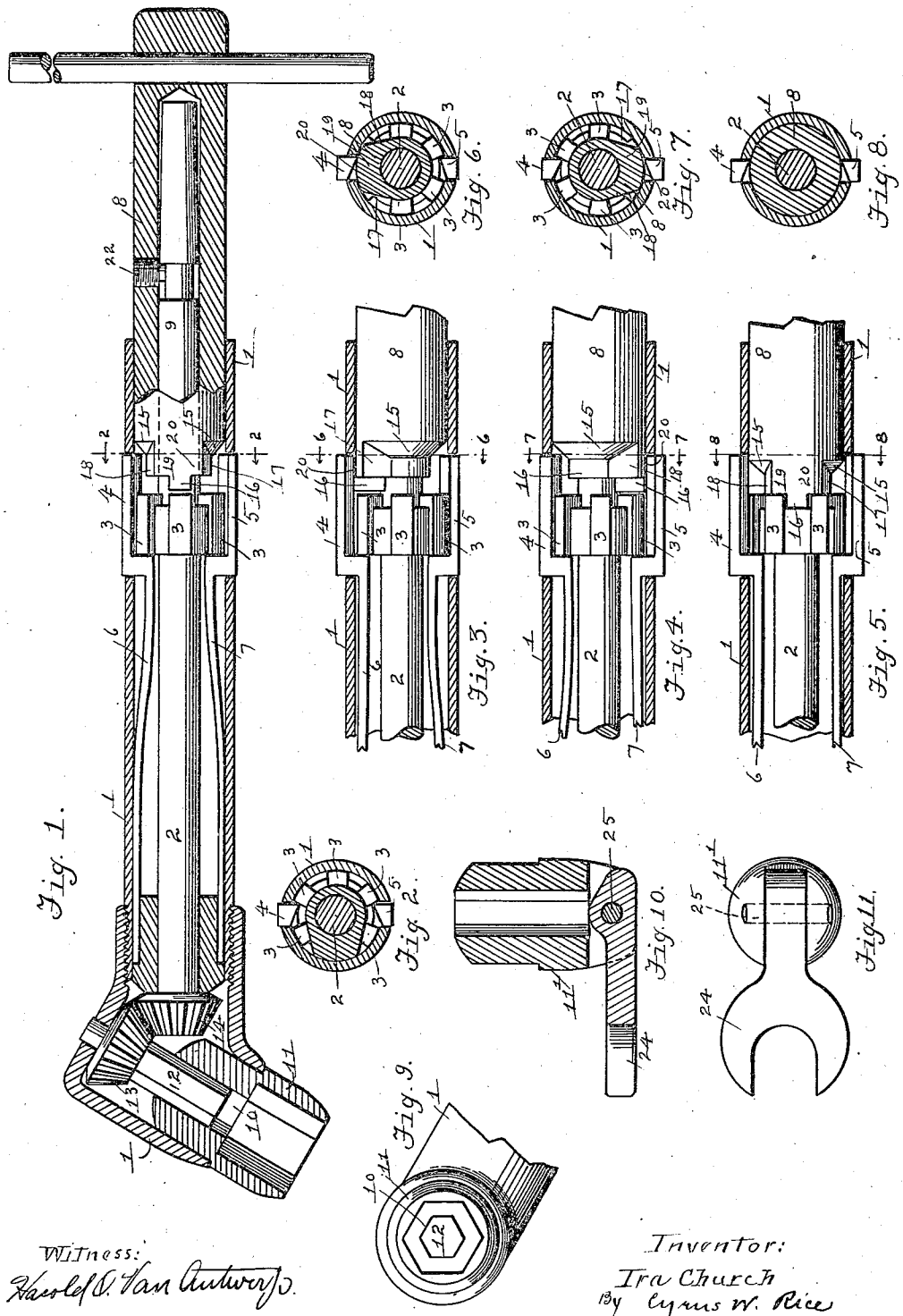
I. CHURCH.

RATCHET AND CLUTCH MECHANISM.

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1,352,354. Patented Sept. 7, 1920.



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RATCHET AND CLUTCH MECHANISM.

1,352,354. Specification of Letters Patent. Patented Sept. 7, 1920.

Application filed December 17, 1919. Serial No. 345,589.

To all whom it may concern:

Be it known that I, IRA CHURCH, a citizen of the United States, residing at Reed City, in the county of Osceola and State of Michigan, have invented new and useful Improvements in Ratchet and Clutch Mechanism, of which the following is a specification.

The present invention relates to ratchet and clutch mechanisms; and its object is to provide an improved mechanism whereby rotary movement may be transmitted from one rotatable element to another rotatable element by clutching action or by ratcheting action as may be desired; and further, to provide an improved wrench to which such mechanism may be applied; and further, to provide a wrench improved in other respects.

This and any other objects hereinafter appearing are attained by, and the invention finds preferable embodiment in, the structure hereinafter particularly described and illustrated by the accompanying drawings, in which:—

Figure 1 is an axial sectional view of a wrench to which the ratchet and clutch mechanism is applied;

Fig. 2 is a transverse sectional view of the same taken on a plane corresponding to line 2—2 of Fig. 1;

Figs. 3, 4 and 5 are axial sectional views of the middle portion of the same, showing the parts in different positions;

Figs. 6, 7 and 8 are transverse sectional views of the parts illustrated in Figs. 3, 4 and 5 respectively, taken on planes corresponding to lines 6—6, 7—7 and 8—8 in said respective views;

Fig. 9 is an end view of the work-engaging member of the wrench shown in Fig. 1;

Fig. 10 is an axial sectional view of a modified construction of the wrench's work-engaging member; and

Fig. 11 is an end view of the same.

In the embodiment of the invention chosen for illustration by the drawings and for detailed description in the body of this specification, my ratchet and clutch mechanism is shown applied to a wrench so that the work—as a nut or bolt—may be readily and very quickly turned, and when greater resistance to the action of the wrench is encountered, the parts may be so adjusted as to turn the work with more power; said wrench thus effecting the purposes attainable by the wrench described in my patent application, Ser. No. 282,417 filed March 13, 1919.

As shown by the drawings, a body member 1 carries various parts movable relatively thereto. Journaled in the body member is a rotatable first element 2 having circularly arranged teeth 3. Oppositely disposed pawls 4, 5, mounted on the body member by spring arms 6, 7 are adapted to engage the teeth in such manner that one pawl 4 holds the first element 2 against rotation in one direction only and the other pawl 5 holds said element against rotation in the other direction only. To effect this end the teeth-engaging portions of the pawls are oppositely inclined as seen in Figs. 2, 6, 7 and 8. A second element 8, coaxial with the first element 2, is rotatable in the body member 1, having preferably a bearing afforded by the inner surface of the body member and also a bearing on an extension 9 of the first element 2 as shown in Fig. 1. This second element 8 has also a longitudinal movement in said bearings toward and away from the first element 2.

In the illustrated application of my ratchet and clutch mechanism to a wrench, the socket 10 of the work-engaging member 11 non-turnably receives the hexagonal end of the spindle 12 rotatably mounted on the body member 1 and carrying a bevel gear 13. With this the bevel gear 14 of the first element 2 meshes, so that the rotation of said first element 2 may turn the nut or bolt held in the work-engaging member 11. When the second element 8 (which constitutes the outer portion of the wrench's handle) is in the position seen in Fig. 1, the pawls are both in operative engagement with the teeth 3 (as seen in Fig. 2), and therefore the wrench may be swung in either direction to loosen or tighten the nut or bolt to which its work-engaging member 11 has been applied. When the bolt or nut has been thus loosened it may be rapidly turned by the following adjustment of the parts and in the following manner:

The second element 8 is slid inwardly, carrying the portion 15 of said element into engagement with the outer ends of the pawls and moving them from operative engagement with the teeth 3, the said portion 15 being tapered to effect said moving of the

pawls. This sliding longitudinal movement of the second element 8 also carries the clutch member 16 at the inner end of said element into clutching engagement with the teeth (as seen in Fig. 5), whereupon the rotation of the second element in either direction will rapidly turn the nut or bolt. To effect the ratcheting operation of the wrench, the second element 8 is slid to the position shown in Fig. 1 and turned about a quarter way around, which movement causes one of the sides 17 or 18 of a second portion 19 of the second element 8 to engage and move one or the other of the pawls from operative engagement with the teeth, the periphery 20 of said second portion 19 now holding the moved pawl out of such engagement. To more readily effect this moving of the pawl, said sides 17, 18 of the second portion 19 of the second element 8 are preferably inclined in a plane transverse to said element's axis as particularly shown in Figs. 2, 6 and 7. Figs. 3 and 6 illustrate the position of the second portion 19 of the second element 8 whereby the pawl 4 only is held from operative engagement with the teeth, and Figs. 4 and 7 show the position of said second portion 19 whereby the other pawl 5 only is held from such engagement.

It will be seen that said ratcheting operation is a very useful feature; for, when the second element 8 is turned to the position shown in Figs. 3 and 6 or in Figs. 4 and 7 and held by hand in that position, the swinging of the body member 1 in the ordinary manner of operating a wrench will turn the nut or bolt in one direction only (in Figs. 3 and 6) and in the opposite direction only (in Figs. 4 and 7). A suitable stop 22 limits the longitudinal movement of the second element 8.

In Fig. 1, the work-engaging member 11 may be made detachable from the hexagonal end of the spindle 12. In Figs. 10 and 11 a modified construction is shown: The element 11^1 non-rotatably fits and is turnable with the spindle 12, and carries a work-engaging member 24 which has a swinging movement on an axis 25 transverse to the axis of the element 11^1. It will be seen that by means of this swingable work-engaging member, the wrench is adapted to engage work located in difficult positions.

The invention being intended to be pointed out in the claims, is not to be limited to or by details of construction of the particular embodiment thereof hereinbefore described or illustrated by the drawings.

I claim:

1. In mechanism of the character described; a first rotatable element having teeth; a pawl adapted to engage the teeth to hold said element against rotation in one direction only; a second element having a longitudinal movement and a rotary movement, and having a portion adapted to engage and move by the second element's longitudinal movement the pawl from operative engagement with the teeth, and having also a clutch member adapted to be moved by the longitudinal movement of the second element into clutching engagement with the teeth; a body member whereby said parts are carried.

2. In mechanism of the character described; a first rotatable element having teeth; a pawl adapted to engage the teeth to hold said element against rotation in one direction only; a second element having a longitudinal movement and a rotary movement, and having a tapered portion adapted to engage and move by the second element's longitudinal movement the pawl from operative engagement with the teeth, and having also a clutch member adapted to be moved by the longitudinal movement of the second element into clutching engagement with the teeth; a body member whereby said parts are carried.

3. In a mechanism of the character described; a first rotatable element having teeth; a pawl adapted to engage the teeth to hold said element against rotation in one direction only; a pawl adapted to engage the teeth to hold said element against rotation in the opposite direction only; a second element having a longitudinal movement and a rotary movement, and having a portion adapted to engage and move by the second element's longitudinal movement the pawls from operative engagement with the teeth, and having also a clutch member adapted to be moved by the longitudinal movement of the second element into clutching engagement with the teeth; a body member whereby said parts are carried.

4. In mechanism of the character described; a first rotatable element having teeth; a pawl adapted to engage the teeth to hold said element against rotation in one direction only; a pawl adapted to engage the teeth to hold said element against rotation in the opposite direction only; a second element having a longitudinal movement and a rotary movement, and having a tapered portion adapted to engage and move by the second element's longitudinal movement the pawls from operative engagement with the teeth, and having also a clutch member adapted to be moved by the longitudinal movement of the second element into clutching engagement with the teeth; a body member whereby said parts are carried.

5. In mechanism of the character described; a first rotatable element having teeth; a pawl adapted to engage the teeth to hold said element against rotation in one direction only; a pawl adapted to engage the teeth to hold said element against rotation

in the opposite direction only; a second element having a longitudinal movement and a rotary movement, and having a portion adapted to engage and move by the second element's longitudinal movement the pawls from operative engagement with the teeth, and having also a clutch member adapted to be moved by the longitudinal movement of the second element into clutching engagement with the teeth, and having also a second portion turnable by the second element's rotary movement into a position in which one or the other only of the pawls is held by said second portion from operative engagement with the teeth; a body member whereby said parts are carried.

6. In mechanism of the character described; a first rotatable element having teeth; a pawl adapted to engage the teeth to hold said element against rotation in one direction only; a pawl adapted to engage the teeth to hold said element against rotation in the opposite direction only; a second element having a longitudinal movement and a rotary movement, and having a portion adapted to engage and move by the second element's longitudinal movement the pawls from operative engagement with the teeth, and having also a clutch member adapted to be moved by the longitudinal movement of the second element into clutching engagement with the teeth, and having also a second portion having sides inclined in planes transverse to the second element's axis, said second portion being turnable by the second element's rotary movement to move and hold one or the other only of the pawls from operative engagement with the teeth; a body member whereby said parts are carried.

7. In mechanism of the character described; a first rotatable element having teeth; a pawl adapted to engage the teeth to hold said element against rotation in one direction only; a pawl adapted to engage the teeth to hold said element against rotation in the opposite direction only; a second element having a longitudinal movement and a rotary movement, and having a tapered portion adapted to engage and move by the second element's longitudinal movement the pawls from operative engagement with the teeth, and having also a clutch member adapted to be moved by the longitudinal movement of the second element into clutching engagement with the teeth, and having also a second portion having sides inclined in planes transverse to the second element's axis, said second portion being turnable by the second element's rotary movement to move and hold one or the other only of the pawls from operative engagement with the teeth; a body member whereby said parts are carried.

In testimony whereof I have hereunto set my hand at Grand Rapids, Michigan, this 6th day of December, 1919.

IRA CHURCH.