

Nov. 29, 1938.

C. R. GEISEL

2,138,332

WRENCH

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Fig. 1.

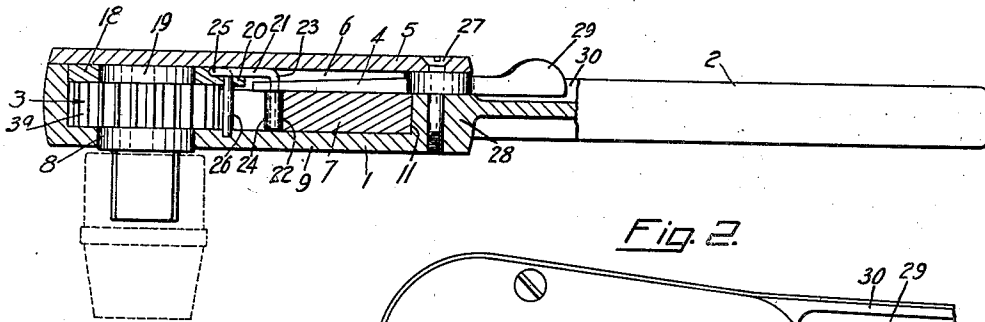


Fig. 2.

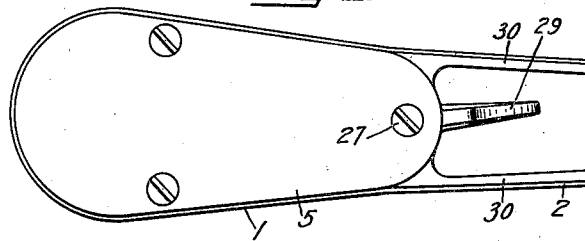


Fig. 3.

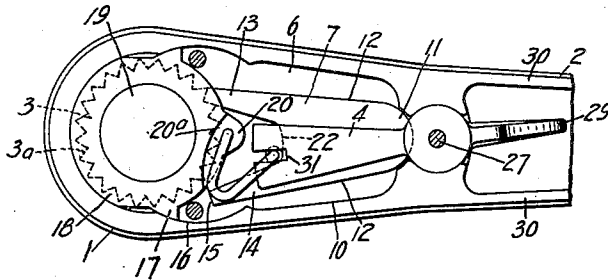


Fig. 5.

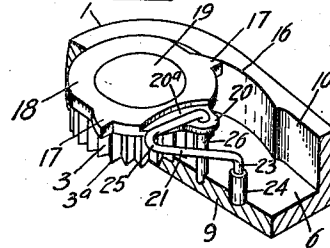


Fig. 4.

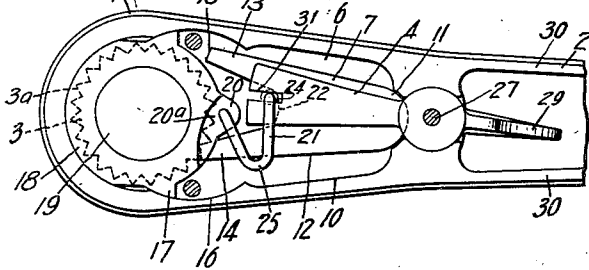
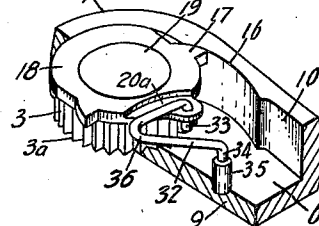
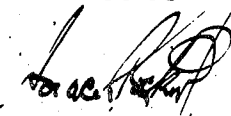


Fig. 6.



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2,138,332

WRENCH

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Application March 7, 1938, Serial No. 194,410

14 Claims. (Cl. 192—43.1)

This invention relates to wrenches and, as illustrated herein, relates more particularly to ratchet wrenches of the type wherein the rotation of the ratchet may be reversed at will.

5 An object of my invention is to provide an improved ratchet wrench and more particularly to provide an improved ratchet actuating mechanism for such wrenches, which will have a very light ratcheting action while being positive and
10 free from jamming. A further object of my invention is to provide an improved spring for such wrenches which will be sufficiently strong to maintain the pawl in selected ratchet engaging position, while still providing the desired light
15 ratcheting action. A still further object of my invention is to provide improved means for pivoting the spring and for maintaining the spring pivot in a predetermined position relatively to the pawl and ratchet. Another object of my invention includes the provision of an improved structure having a small number of improved and simple parts, which are adapted to be inexpensively
20 manufactured and assembled and to operate over a long period with a minimum of wear. These and other objects and features of my improved construction will hereinafter more fully appear.

In the accompanying drawing, I have shown for the purposes of illustration, two embodiments which my invention may assume in practice.

30 In the drawing:

Figure 1 is a view in side elevation, partially in longitudinal section, of a wrench constructed in accordance with the above mentioned improvements;

35 Fig. 2 is a top plan view of the wrench, the handle being broken away;

Fig. 3 is a view similar to Fig. 2, with the cover plate removed to facilitate illustration, the parts being disposed for rotation of the ratchet in one
40 direction;

Fig. 4 is a view similar to Fig. 3, but showing the parts disposed for rotation in the opposite direction;

45 Fig. 5 is a perspective view showing the connection of the spring to the pivoting member, certain of the parts being omitted and others being broken away to facilitate illustration, and

Fig. 6 is a view similar to Fig. 5, illustrating a modified form of spring.

50 In the illustrative construction, there is shown a wrench body generally indicated at 1 and having a handle 2. The wrench body carries a rotatable ratchet member 3 having a downwardly extending portion which is adapted to engage
55 with a wrench socket, or other suitable work piece,

indicated in dotted lines in Figure 1. The rotatable ratchet member 3 is adapted to be rotated in opposite directions depending upon the position of adjustment of a swinging controlling member 4 carried on the top of the wrench body 5 and below a cover plate 5.

It will be noted that the body 1 is provided with a chamber 6 arranged to receive in one end the rotatable ratchet member 3 and, in the other end, to receive a cooperating oscillating pawl 7. 10 As illustrated herein, an end of the chamber 6 is rounded and of larger diameter. The ratchet 3, which is mounted in this end, has a reduced bearing portion 8 beneath the ratchet teeth 3a and is rotatably mounted in the bottom portion 15 9 of the chamber. The chamber 6 is also provided with side walls 10 which converge from the end in which the ratchet 3 is mounted toward the opposite end of the chamber in which the pawl 7 has its bearing. The bearing surface for 20 the pawl is also arcuate and receives the rounded end 11 of the pawl 7. The pawl 7 is also provided with converging side walls 12 and is smaller than the portion of the chamber in which it is located. The pawl 7 is thus free to be moved from adjacency to either side wall of the chamber 6 about 25 its end 11 until it approaches the other side wall of the chamber, i. e. to be adjusted for reverse operation in either the position shown in Fig. 3 or the position shown in Fig. 4. As illustrated 30 herein, the pawl 7 is provided with a pair of spaced diverging arms 13 and 14, the end of each arm being provided with a square end 15 so that these arms may selectively cooperate with the teeth 3a of the ratchet 3 during ratcheting in 35 opposite directions as shown in Figures 3 and 4.

In accordance with the present invention, the side walls 10 of the chamber 6 are cut away to form arcuate recesses 16 adjacent to the rounded end of the chamber 6 in which the ratchet 3 is 40 mounted. These recesses 16 are arranged to receive laterally extending ears 17 formed on a washer or bearing member 18 and in which the upper reduced end 19 of the ratchet 3 is journaled, the diameter of this bearing member being 45 substantially the same as the diameter of the larger rounded end of the chamber 6. It is evident that these ears 17, in conjunction with the arcuate recesses 16, form a convenient and simple means for preventing rotation of the bearing 50 member 18 when the ratchet is rotated in reverse directions. Located between the ears 17 is a radially projecting portion 20 which is arranged, when in position, to be located in alignment with the axis of rotation of the ratchet 3 and 55

the axis of rotation of the pawl 7 and between these axes. A hole, having its center in alignment with the axis of the ratchet and the axis of rotation of the pawl, is also formed in the projecting portion 20 for purposes which will later be described and it will also be noted that the portion 20 is spaced from the cover 5 as hereinafter described.

The illustrated wrench is provided with an improved spring 21 which is arranged to engage the pawl 7 between the arms 13 and 14 to hold the pawl in selected ratchet engaging position. As illustrated, the pawl 7 has a space or opening between the arms 13 and 14. This opening has an end wall 22 forming a cam face, which is illustrated herein as being arcuate, while the inner sides of the arms 13 and 14 diverge away from the ends of the wall or cam face 22. The spring 21 is provided with a substantially vertical end portion 23, which carries a roller 24 arranged to engage the cam face 22 and which is normally disposed in the corner between the arm 13 and the cam face 22 or between the arm 14 and the cam face 22. The spring 21 has a connecting portion 25 which is substantially V-shaped and connected to another substantially vertical end portion 26. The vertical end portions 23, 26 are substantially parallel and lie in substantially the same plane. The spring pressure exerted by the connecting portion 25 and, consequently, the pressure exerted by end portion 23 on the pawl is substantially even through the length of the contacting portions. The V-shaped connecting portion 25 extends laterally in a plane substantially normal to the plane of the portions 23, 26. This end portion 26 is arranged to be inserted through the hole formed in the projecting portion 20 of the bearing member 18 and into another hole formed in the lower or bottom portion 9 of the chamber 6. The spring 21 is thus pivotally mounted adjacent to the top and bottom of its substantially vertical end portion 26. The normal distance between the end portions 23 and 26 is substantially greater than the distance between the pivot hole formed on the projecting portion 20 and the cam face 22. It is necessary therefore, to place the spring 21 under compression as it is being inserted in position in the chamber 6. Thus, when the spring 21 is in position, it is under compression and holds the roll 24 against the cam face 22 adjacent to the junction thereof with one or the other of the pawl arms 13 or 14. In order to insure that the spring 21 will be free to move during ratcheting when the pawl 7 is in the position shown in Fig. 3, the projection 20 and a portion of the bearing member 18 is cut away to form a recess 20a. The V-shaped connecting portion 25 is of such length that it may be flexed without danger of breaking during ratcheting operations. It is to be noted that the V-shaped portion 25 of the spring 21 is substantially horizontal and that, when the spring is in position in the wrench, the top surface of this spring lies substantially in the plane of the top of the reduced portion 19 of the ratchet 3 and the top surface of the bearing member 18. When the cover 5 is placed in position, the spring 21 cannot be moved vertically, and thus the spring 21 is pivotally confined in the chamber 6.

The swinging and controlling member 4, as previously stated, is carried on the top of the wrench body. It is to be noted that the swinging controlling member 4 is pivoted to the wrench body by a screw 27 which extends through the

cover 5 and is threaded into an upstanding portion 28 formed adjacent to the bearing surface for the rounded end 11 of the pawl 7. The controlling member 4 is provided with an extended portion 29 which is arranged to be engaged by the operator to move the controlling member from the position shown in Fig. 3 to the position shown in Fig. 4. It is to be noted that this portion 29 is located between ribs 30 formed on the handle 2 of the wrench so that the portion 29 is protected from accidental movement. The other end of the swinging controlling member 4 is provided with a slot 31 into which fits the upper end of the substantially vertical end portion 23 of the spring 21. Thus, when it is desired to reverse the operation of the pawl, the controlling member 4 is swung from the position shown in Fig. 3 to the position shown in Fig. 4, and moves the end portion 23 and the roller 24 across the cam face 22 to move the pawl into its reverse position.

In the operation of this improved construction it will be evident that, with the controlling member 4 in either position thereof, the wrench will be free to ratchet in one direction. For example, referring now to Fig. 3, just as soon as the pawl end 15 clears the end of the next tooth 3a as a result of the movement of the wrench body and, while the other pawl end 15 moves toward a tooth 3a, and before it can engage therewith, the spring portion 23 and the roller 24 will snap the first pawl end 15 back into engagement with the next tooth. It will also be noted that the construction is such that the parts are returned automatically so as to be ready for further operation. Further, when the controlling member 4 is moved into its other position, the ratcheting direction will be reversed. More particularly, the roller 24 will then be moved to the position shown in Fig. 4 and held in that position where it will be noted that the parts will be operated in the manner above described during ratcheting.

As illustrated in Fig. 6 of the drawing, a spring member 32 for holding the pawl 7 in ratchet engaging position may be formed with a short depending leg 33 pivoted only in the bearing member 18. This spring member is provided with a substantially vertical depending portion 34 carrying a roller 35 arranged to engage the pawl 7 to hold the same in ratchet engaging position. A substantially V-shaped portion 36 connects the depending portions 33 and 34. The above described spring member 32 operates to hold the pawl 7 in selected ratchet engaging position in substantially the same manner that the preferred spring 21 operates. It is to be noted, however, that the spring member 32 is pivoted only in the bearing member 18 and does not extend downwardly into a hole formed in the bottom of the wrench body as in my preferred construction.

As a result of this improved construction, it will be evident that the ratcheting action will be very light but still extremely positive, the pawl ends 15, due to the action of the spring 21, cooperating with the teeth 3a of the ratchet 3 in a very effective manner and continuing to operate equally effectively irrespective of the position of the spring 21 or the controlling member 4. Further, the structure is such as to eliminate danger of the parts being disposed in a neutral position, the spring snapping from one corner to the other and having no tendency to remain in any intermediate position. Attention is also di-

rected to the fact that my improved construction so disposes the forces acting during operation of the wrench that a very strong and powerful wrench is produced despite the use of a comparatively light but strong ratcheting spring. This construction eliminates the use of a plurality of springs and is so constructed and disposed as to be adapted to long wear and service without breakage while getting the desired light yet positive action and which may be readily and conveniently reversed and replaced whenever desired.

While I have in this application specifically described two forms which my invention may assume in practice, it will be noted that my 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 wrench, a rotatable ratchet, ratchet positioning means including a bearing ring above said ratchet, a pawl for rotating the ratchet, and a spring pivotally mounted in said bearing ring and having a portion arranged to engage the pawl to hold the pawl in ratchet engaging position.

2. In a ratchet wrench, a body portion having a chamber therein, a rotatable ratchet mounted in said chamber, a bearing for said ratchet, a pawl in said chamber for rotating the ratchet, and a spring pivotally mounted in said bearing and having a portion arranged to engage the pawl in ratchet engaging position.

3. In a ratchet wrench, a body portion having a chamber therein, a rotatable ratchet having reduced top and bottom portions, said reduced bottom portion being journaled in the bottom of said chamber, a bearing for the reduced top portion of said ratchet, a pawl in said chamber for rotating the ratchet, and a spring pivotally mounted in said bearing and having a portion arranged to engage the pawl to hold the pawl in ratchet engaging position.

4. In a ratchet wrench, a body portion having a chamber therein, a rotatable ratchet having top and bottom portions, said bottom portion being journaled in the bottom of said chamber, a bearing for the top portion of said ratchet, a pawl in said chamber for rotating the ratchet, and a spring pivotally mounted in a hole formed in said bearing and extending into a hole formed in the bottom of said chamber, said spring also having a portion arranged to engage the pawl to hold the pawl in ratchet engaging position.

5. In a ratchet wrench, a rotatable ratchet, a bearing for said ratchet, a pawl for rotating the ratchet, a projection on said bearing, and a spring pivotally mounted in said projection and having a portion arranged to engage the pawl to hold the pawl in ratchet engaging position.

6. In a ratchet wrench, a rotatable ratchet, a bearing for said ratchet, a pawl for rotating the ratchet, a projection on said bearing, and a spring pivotally mounted in said projection and having a portion arranged to engage the pawl to hold the pawl in ratchet engaging position, said projection having a recess arranged to receive a portion of the spring to permit pivotal movement of said spring.

7. In a ratchet wrench, a rotatable ratchet, a bearing for said ratchet, a pawl for rotating the ratchet, a spring having a portion arranged to engage the pawl to hold the pawl in ratchet engaging position, and a projection on said bear-

ing having a hole between the axis of rotation of the ratchet and the axis of rotation of the pawl and in which the spring is pivotally mounted.

8. In a ratchet wrench, a rotatable ratchet, a bearing for said ratchet, a pawl for rotating the ratchet, a spring having a portion arranged to engage the pawl to hold the pawl in ratchet engaging position, and a projection on said bearing having a hole between the axis of rotation of the ratchet and the axis of rotation of the pawl and in which the spring is pivotally mounted, said projection having a recess arranged to permit pivotal movement of the spring.

9. In a ratchet wrench, a body portion having a chamber therein, a rotatable ratchet in said chamber having top and bottom portions, said bottom portion being journaled in the bottom of said chamber, a bearing for the top portion of said chamber having means arranged to engage the walls of the chamber to hold the bearing against rotation, a pawl in said chamber for rotating the ratchet, and a spring pivotally mounted in said bearing and having a portion arranged to engage the pawl to hold the pawl in ratchet engaging position.

10. In a ratchet wrench, a body portion having a chamber therein, a rotatable ratchet in said chamber having top and bottom portions, said bottom portion being journaled in the bottom of said chamber, a bearing for the top portion having laterally extending ears arranged to engage the walls of the chamber to hold the bearing against rotation as the ratchet is rotated, a pawl in said chamber for rotating the ratchet, a spring having a portion arranged to engage the pawl to hold the pawl in ratchet engaging position, and a projection on said bearing having a hole therein arranged to receive a portion of said spring to permit pivotal movement of the spring.

11. In a ratchet wrench, a rotatable ratchet, a pawl for rotating the ratchet, and a spring having a depending portion to hold the pawl in ratchet engaging position, a second portion pivoted in said wrench between said ratchet and pawl, and a connecting portion extending laterally relative to the plane of the first two mentioned portions.

12. In a ratchet wrench, a rotatable ratchet, a pawl for rotating the ratchet, and a spring having a depending portion to hold the pawl in ratchet engaging position, a second portion pivoted in said wrench between said ratchet and pawl, and a laterally extending connecting portion between the first two mentioned portions, said connecting portion having spaced portions movable toward and away from each other during ratcheting.

13. In a ratchet wrench, a rotatable ratchet, a pawl for rotating the ratchet and a spring for holding the pawl in ratchet engaging position, said spring including a portion arranged to engage the pawl, a second portion pivoted in the wrench between the axis of rotation of the ratchet and the axis of rotation of the pawl, and a substantially V-shaped connecting portion between the first mentioned portions.

14. In a ratchet wrench, a body portion having a chamber therein, a ratchet rotatably mounted in said chamber and having top and bottom portions, said bottom portion being journaled in the bottom of said chamber, a bearing for the top portion having means engaging the walls of the chamber to prevent rotation of

the bearing as the ratchet is rotated, a pawl in said chamber for rotating the ratchet, a projection on said bearing disposed between the axis of rotation of the ratchet and the axis of rotation of the pawl, and a spring having a pair of substantially vertically extending portions, and a plurality of substantially horizontal relatively movable connecting portions, said spring having one substantially vertical portion arranged to engage the pawl to hold the pawl in ratchet engaging position and another substantially vertical portion arranged to be pivotally received by said projection.

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