



May 22, 1945.

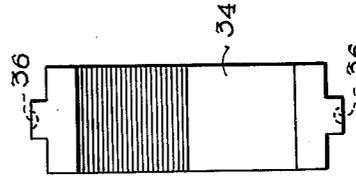
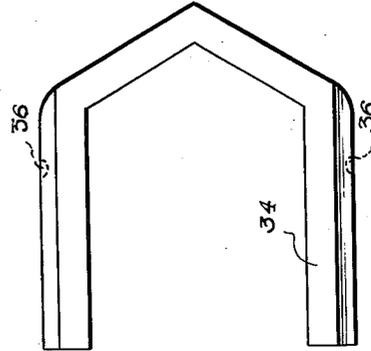
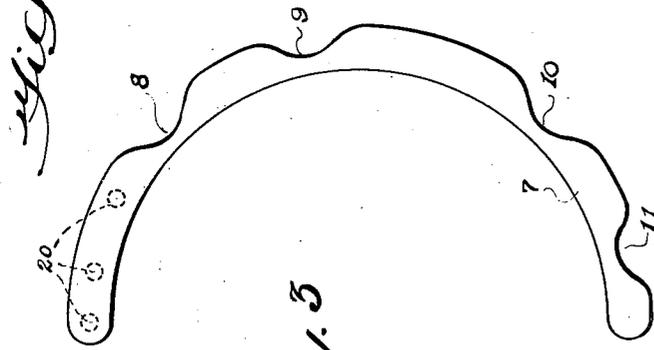
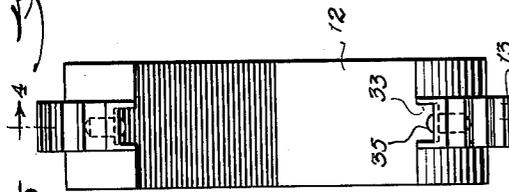
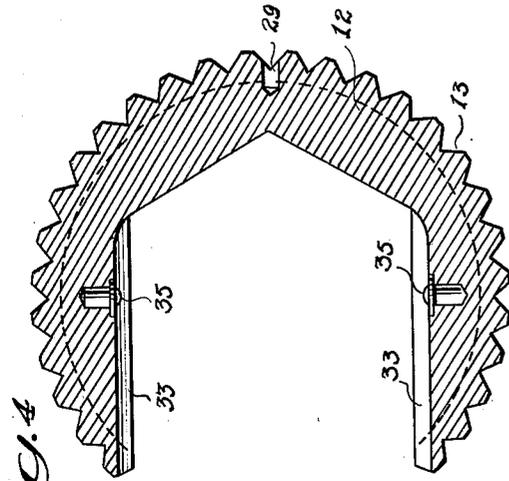
J. E. CRONAN

2,376,575

RATCHET WRENCH

Filed Oct. 24, 1942

2 Sheets-Sheet 2



Inventor  
JAMES E. CRONAN

334 *J. Minder*

Attorney

# UNITED STATES PATENT OFFICE

2,376,575

## RATCHET WRENCH

James E. Cronan, Howell, Mich.

Application October 24, 1942, Serial No. 463.153

4 Claims. (Cl. 192—43.2)

This invention relates to wrenches and has for its object to provide an improved type wrench which will ratchet in either direction, which has a neutral locking position and which can be made to coast freely from any position.

Another object is to provide a ratchet wrench having jaws which can be readily and quickly converted to any one of a variety of sizes in order to accommodate the heads of various bolts or nuts.

In some assembly operations which have confronted applicant it is necessary for the wrench to be removable from the nut or bolt head in a certain angular position. In one particular case this wrench reduced the assembly time from thirty minutes to five minutes. The angle was such that two sets of ratchet pins were necessary. It is therefore another object of the invention to provide a ratchet wrench having forward, reverse, neutral or coasting settings and locked position so as to make wrench into solid head type and also having two sets of ratchet pins, one on either side of the wrench center line in order to accommodate more difficult requirements such as above noted.

Other objects and advantages will hereinafter become more fully apparent as reference is had to the accompanying drawings in which my invention is illustrated and in which

Figure 1 is a top or bottom elevation of my improved wrench,

Figure 2 is a vertical section taken along the line 2—2 of Figure 1,

Figure 3 is a top or bottom elevation of the control cam,

Figure 4 is a transverse longitudinal section of the jaws of the wrench taken along the line 4—4 of Figure 5,

Figure 5 is an end elevation of the jaws looking to the right in Figure 4,

Figures 6 and 7 are elevational views taken 90° apart of the locking pin, and

Figures 8 and 9 are elevational views taken at the side and end respectively of an insert for the jaws of Figures 4 and 5.

More particularly, 1 indicates the main wrench body which consists of a handle 2 and an integral arm or jaws 3 describing the arc of a circle having a total length substantially greater than 180°. The handle 2 has a plurality of openings 4 there-through by which a handle extension (not shown) may be bolted thereto. The jaws 3 have a recess 5 formed on the arc of a circle of greater radius than that of the inside surface 6 of the jaws 3. In this recess 5 a cam 7 slidably fits. The cam

7 is individually illustrated in Figure 5 and is provided with four camming depressions 8, 9, 10 and 11.

The ratchet member 12, separately illustrated in Figures 4 and 5, has an exterior surface serrated at 13 and formed on the arc of a circle having a radius slightly less than that of the inside surface 6 of the jaws 3. A notch 29 is provided centrally of the exterior surface for latching purposes. The inside of the member 13 is possibly best described as being the shape of a hexagon with two adjacent sides removed. The member is then capable of application to a bolt head or nut to engage either two or four sides thereof depending upon whether the bolt head or nut is square or hexagonal.

The cam 7 is assembled in the groove 5 and the ratchet member is then placed in the jaws 3 with the serrations being adjacent the surface 6, as illustrated in Figure 1. In order to maintain these three members in assembly I provide two retaining plates 15 which are secured to the member 1 by screws 16. One of the retaining plates has a curved slot 17 centrally thereof through which a pin 18 projects. This pin is anchored at one end to the cam 7 and at its other end to a finger button 19 so that the cam may be shifted in its groove 5 to the extent of the length of said slot 17. The cam has three dents or dimples 20 near one end thereof to receive a spring pressed ball mounted in the member 3, not clearly shown but similar to the balls 35 carried by the member 12. The cam is thus restrained in one of three selected positions.

Engaging the teeth or serrations 13 of the ratchet member are four pawls 22, 23, 24 and 25 arranged in pairs at opposite sides of the center line of the wrench with the members composing each pair set substantially at 90° from each other. These pawls are carried by the main member 1 and are each urged inwardly thereof by a spring 26 held in place by a screw 27. Transversely of each pawl 22, 23, 24 and 25 is a pin 28 which engages the outside or cam surface of the cam 7. When the cam 7 is set at its central position with the retaining ball in the central one of the dents 20 the pins 28 each ride upwardly on their respective cams 8, 9, 10 or 11 and the ratchet member 12 is freely rotatable. When the cam 7 is pushed by the button 19 in clockwise direction to the position shown in Fig. 1 the pins 28 ride downwardly on the camming surfaces 8 and 10 so that the two pawls 23 and 25 travel into the path of a serration 13. Thereupon if the wrench is in engagement with a bolt head and the handle 2 is moved

downwardly, as viewed in Figure 1, the bolt head will be turned and as the handle 2 is reversed in direction the cam 7 will remain in position with respect to the member 1, the ratchet member 12 will retain its position on the bolt head and the pawls 23 and 25 will be moved to retracted position against their respective springs 26 thus offering no substantial resistance to the relative movement of the members 1 and 12.

If the button 19 is moved to its third position the camming surfaces 9 and 11 will permit the other two pawls 22 and 24 to extend in the path of serrations 13, the pawls 23 and 25 being removed from contact therewith so that an upward movement of the handle 1, as viewed in Figure 1, will cause rotation of the bolt head by the ratchet member 12 but reverse movement of the handle 2 will result only in movement of the member 1.

When the ratchet member is positioned centrally of jaws 3 the notch 29 formed in the mid portion of the outer surface thereof, is in alignment with a plunger or pin 30 carried by the member 1 and urged by a spring 31. The plunger 30 is retained in retracted position by a set screw 32 and upon release, engages the slot 29 so that the ratchet member 12 turns with the handle 1 in either direction.

The two inner sides of the member 12 adjacent the missing sides of the hexagon are preferably provided with grooves 33 for the reception of tongues of hard metal inserts, one of which is illustrated at 34. These inserts each have at least three sides and where the jaws are in the form of four sides of a hexagon, as illustrated in Figure 1, they have four sides, the same number of sides as the ratchet member. A set of such inserts is provided of varying wall thickness so that any size bolt head or nut may be accommodated merely by a proper selection of insert.

The grooves 33 have a spring pressed ball 35 along their length for engagement with a dent or dimple 36 in the tongues of the inserts.

The invention is susceptible of variations and modifications and I desire to be extended protection within the scope of the appended claims.

What I claim is:

1. A ratchet wrench comprising a handle having arcuate jaws integral therewith, a ratchet member fitting into said jaws and rotatable with respect thereto, said jaws having an arcuate recess spaced from the surface thereof which receives said ratchet member and a cam member residing in said recess and slidable to a neutral intermediate position or to alternate extreme positions, cover plates secured to said jaws and maintaining said jaws, said cam and said ratchet member against disassembly while permitting relative rotative movement thereof, one of said cover plates being slotted, a pin secured to said cam at one end projecting through the slot and having a finger button mounted on its other end, and

two sets of pawls carried by said jaws, the sets being located on opposite sides of said handle, said ratchet member having ratchet teeth for engagement by said pawls, each of said pawls being spring pressed towards said ratchet member and the pawls of each set being angularly disposed with respect to each other, said cam when in one extreme position elevating one pawl of each set out of engagement with said ratchet member whereby said ratchet member may be rotated in one direction with respect to said jaws and when said cam is moved to its other position the other pawl of each set is elevated out of engagement with said ratchet member for rotation of said ratchet member in opposite direction.

2. A ratchet wrench comprising a handle having arcuate jaws integral therewith, a ratchet member fitting into said jaws and rotatable with respect thereto, said jaws having an arcuate recess spaced from the surface thereof which receives said ratchet member and a cam member residing in said recess and slidable to a neutral intermediate position or to alternate extreme positions, cover plates secured to said jaws and maintaining said jaws, said cam and said ratchet member against disassembly while permitting relative rotative movement thereof, one of said cover plates being slotted, a pin secured to said cam at one end projecting through said slot and having a finger button mounted on its other end, and two sets of pawls carried by said jaws, one of said sets residing on one side of the center-line of the wrench and the other set on the other side thereof, each pawl of each of said sets forming an angle of approximately 90° with the other pawl of the same set, said pawls each being spring pressed toward said ratchet member, said cam upon movement to one extreme position elevating one pawl of each of said sets out of engagement with said ratchet member, whereby said ratchet member may be rotated in one direction by the other pawls, said cam upon movement to its other extreme position elevating the other pawl of each of said sets out of engagement with said ratchet member whereby said ratchet member may be rotated in the opposite direction in said handle and said cam upon movement to neutral position maintaining all of said pawls out of engagement with said ratchet member for full rotation of said ratchet member in said jaws.

3. The combination as set forth in claim 2 together with means to lock said ratchet member with respect to said jaws when in central position.

4. The combination as set forth in claim 2 together with a plunger carried by said jaws and spring pressed toward said ratchet member, said ratchet member having a notch to receive said plunger, and a finger button for withdrawing said plunger from engagement with said notch.

JAMES E. CRONAN.