July 15, 1958 L. L. JOHNSON 2,842,995

POWER OPERATED RATCHET WRENCH

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FIG. 1

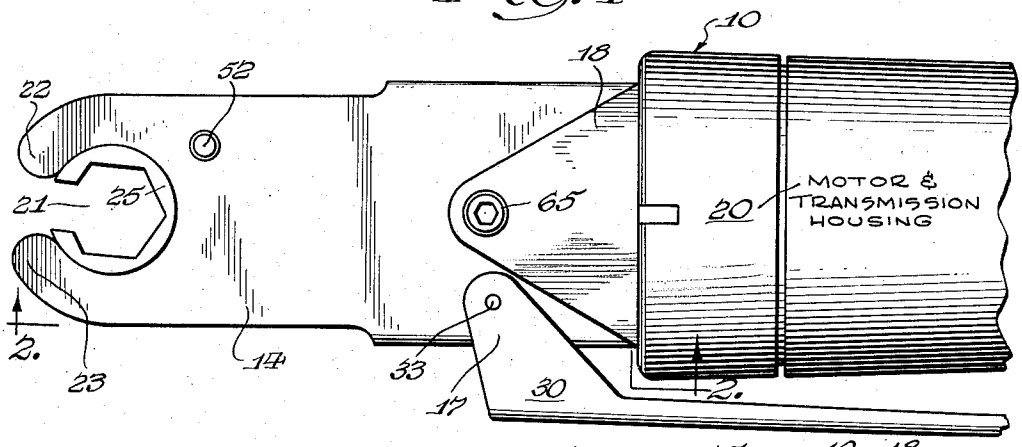


FIG. 2

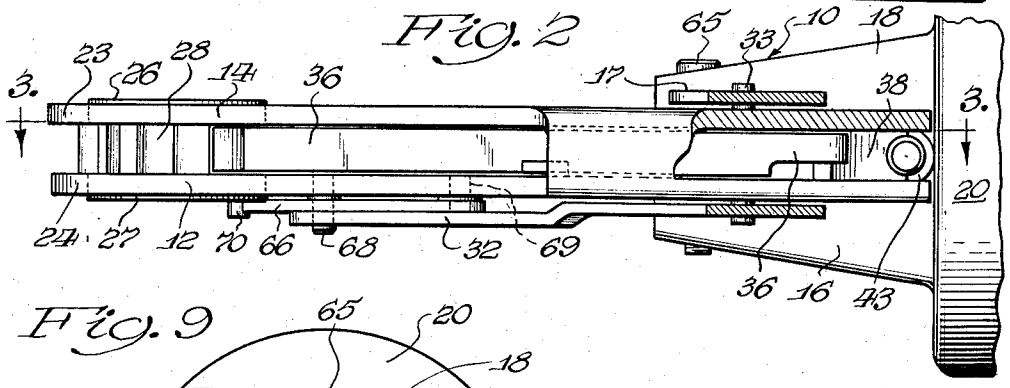


FIG. 9

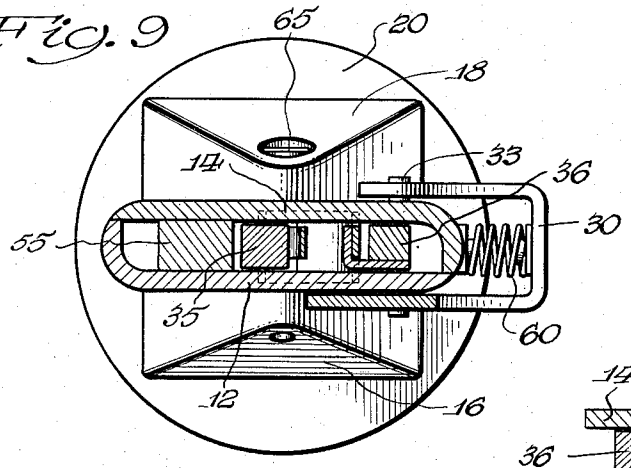


FIG. 8

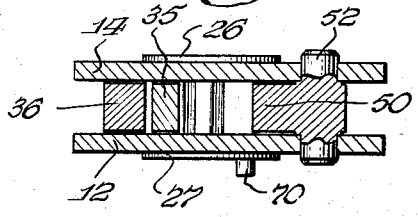
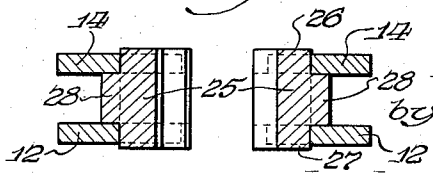


FIG. 7



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Fig. 3

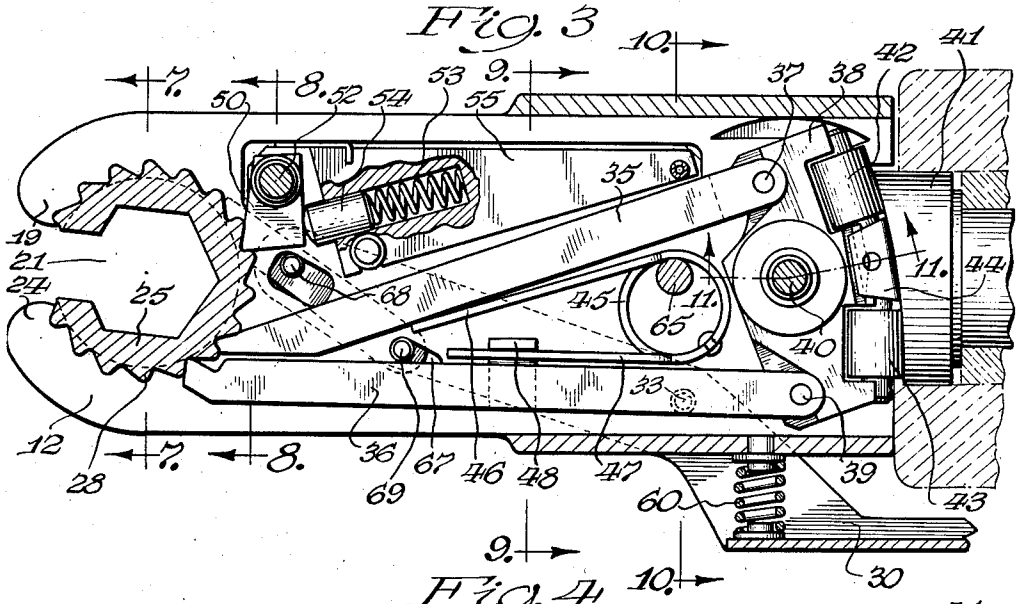


Fig. 4

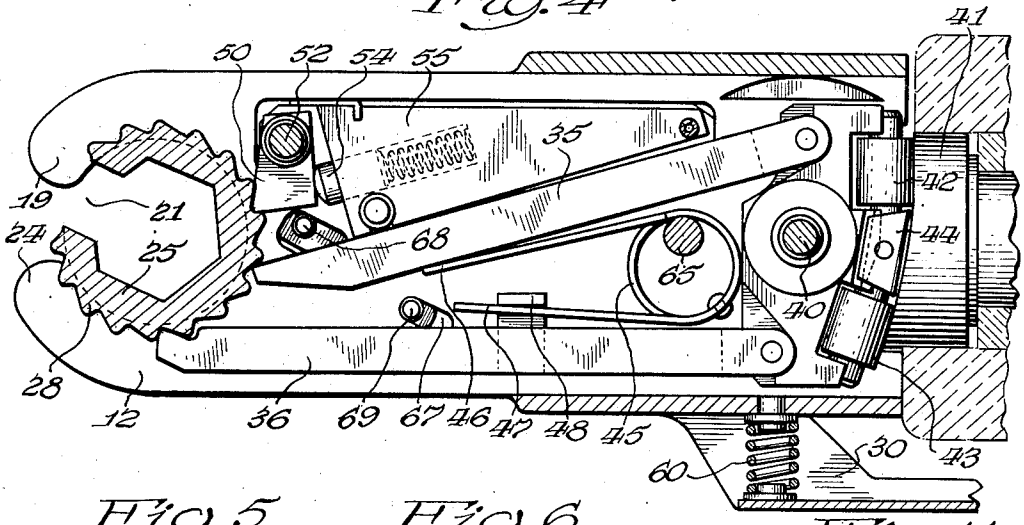


Fig. 5

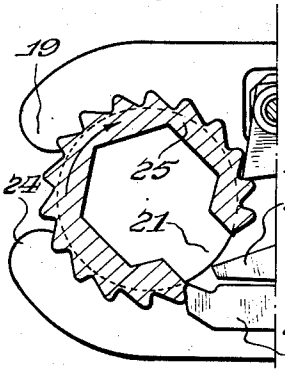


Fig. 6

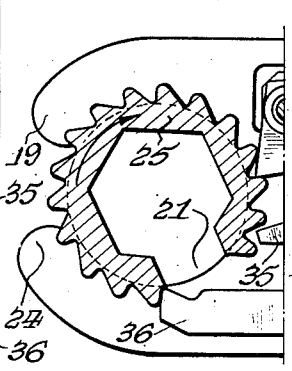
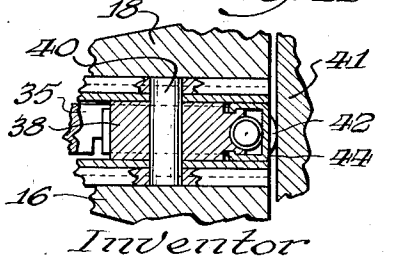


Fig. 11



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FIG. 12

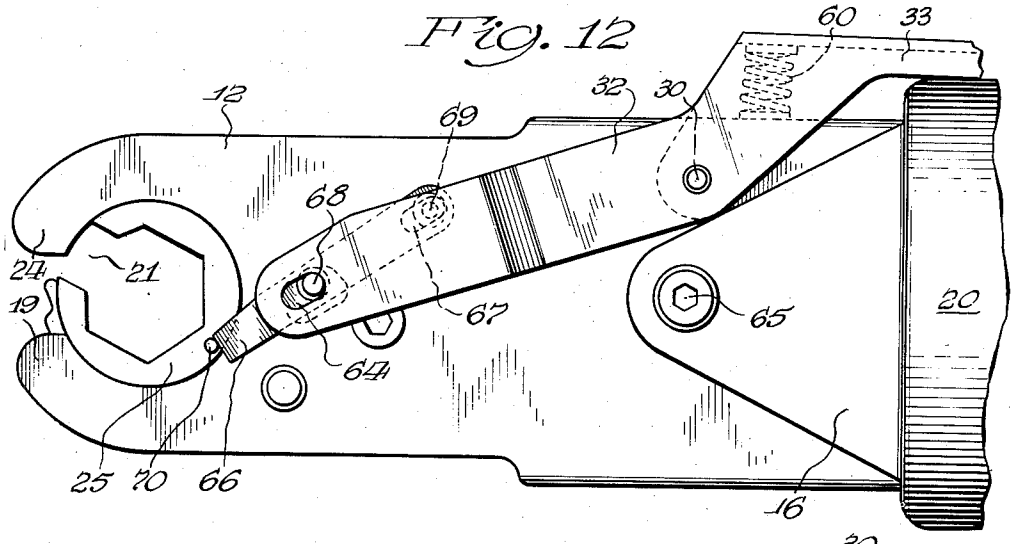


FIG. 13

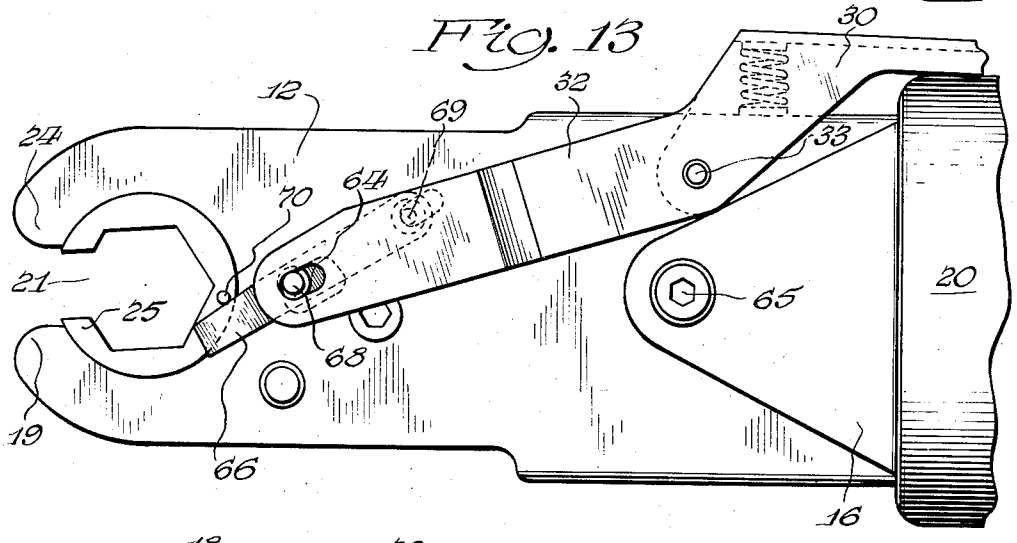
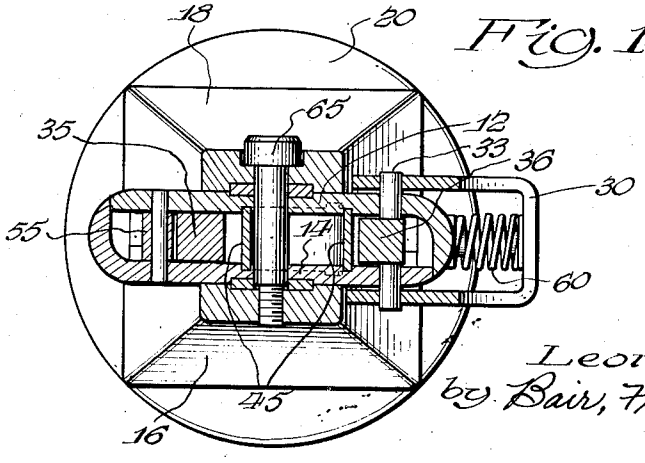


FIG. 10



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POWER OPERATED RATCHET WRENCH

Leonard L. Johnson, Chicago, Ill., assignor, by mesne assignments, to The Aro Equipment Corporation, Bryan, Ohio, a corporation of Ohio

Application October 15, 1956, Serial No. 615,870

11 Claims. (Cl. 81—61)

This invention relates generally to wrenches, and more particularly, to improvements in power driven ratchet wrenches of the type adapted for setting or removing bolts, nuts, or the like.

Priorly known power driven ratchet wrenches fall within two general classes. A wrench of the first general class usually embodies a socket at one end of the wrench which is rotated by a power actuated single pawl positioned for engaging a series of ratchet teeth disposed around the marginal periphery of the socket. Conventionally, the single pawl is reciprocated in a substantially rectilinear path by means of a double lobe rotary cam on a power driven spindle. One of the most serious limitations with power wrenches of this class is that necessarily such wrenches must be of the closed end type and consequently cannot be moved laterally into engagement with the member to be turned, in the manner of the so-called open-end wrench.

In the other general class of wrenches known in the prior art, an entrance opening is provided at a side of the rotatable socket to overcome the above described deficiency. Conventionally, in open-end wrenches of this type, the socket is rotated by a pair of spaced apart pawls reciprocally actuated in push-pull fashion by a double-lobed rotary cam. Thus, both pawls are in simultaneous push-pull contact with two of the ratchet teeth during the half cycle rise of the cam and are returned to their starting positions during the half cycle drop of the cam. The disadvantages inherent in this type of construction are many. For example, during the half cycle when both pawls are being returned to their starting positions, no work function is performed. Further, this action produces an intermittent ratchet action, rather than a continuous one, with a theoretical maximum of power transmission of only 50 percent. Still further, and as a consequence of the above, the ratchet speed is seriously limited by the return time of the push-pull pawls since no work function is performed during this interval.

Accordingly, it is an object of this invention to provide an improved power driven ratchet wrench. More specifically, it is an object of this invention to provide improved and more efficient means for actuating a ratchet wrench socket from a rotary power source.

It is another object of this invention to provide a continuously operative power drive for a ratchet wrench socket member.

It is still another object of this invention to provide an improved high speed, high torque power driven ratchet wrench.

It is a further object of this invention to provide a power driven ratchet wrench which is portable and relatively light weight, but which is capable of substantially increased power output over prior power wrenches of comparable size.

It is a still further object of this invention to provide a sturdy, dependable, and economical power tool adapted for use with normally inaccessible flange bolts, nuts and fittings as well as for general use on tubing installations.

These and other objects are realized in a specific illustrative embodiment of the invention wherein two pawls are caused to act individually upon the ratchet in a double-push manner rather than in the push-pull fashion of prior art double pawl devices. In accordance with one feature of this invention high speed, high torque drive for a power wrench is provided by a single lobe, open face barrel cam on a spindle driven by a suitable rotor. A rocker is caused to reciprocate about its axis by a pair of cam following roller bearings secured to the rocker and adapted for rolling contact with the face of the barrel cam.

In accordance with a further feature of this invention a pawl is pivotally mounted on the rocker at each side of its axis such that the reciprocating motion of the rocker causes the pawls to be alternately urged forward into positive contact with the ratchet to rotate the latter in a continuous and highly efficient manner. It is another feature that the two contact points of the push-pull pawls are separated sufficiently to enable the power driven ratchet wrench to be of the open end type to permit direct placement upon and removal from tubing, nuts and the like. It is a still further feature of this invention that the ratchet may be automatically aligned in response to a manually operated control.

The above and other features of novelty which characterize the invention are pointed out with particularity in the claims appended to and forming a part of this specification. For a better understanding of this invention, its advantages and specific objects attained by its use reference is had to the accompanying drawing and descriptive material in which is shown and described an illustrative embodiment of the invention.

In the drawing:

Figure 1 is a fragmentary plan view of a power operated ratchet wrench embodying features of this invention;

Figure 2 is a fragmentary view partly in section taken substantially as shown on line **2—2** of Figure 1;

Figure 3 is a section taken substantially as shown on line **3—3** of Figure 2 showing the action of the pawls during one-half cycle of operation;

Figure 4 is a section of the power ratchet wrench as shown in Figure 3 showing the position of the pawls during the other half cycles of operation;

Figures 5 and 6 illustrate the driving action of the pawls when the open end of the ratchet is adjacent thereto;

Figure 7 is a cross section of the ratchet taken substantially as shown on line **7—7** of Figure 3;

Figure 8 is a cross section taken substantially as shown on line **8—8** of Figure 3;

Figure 9 is a cross section taken substantially as shown on line **9—9** of Figure 3;

Figure 10 is a cross section taken substantially as shown on line **10—10** of Figure 3;

Figure 11 is a cross section taken substantially as shown on line **11—11** of Figure 3; and

Figures 12 and 13 are plan views of a power ratchet wrench showing the ratchet alignment feature of the invention.

Referring now to the drawing, and more particularly to Figures 1 and 2 thereof, there is shown a specific illustrative power operated ratchet wrench embodying the invention. The ratchet wrench, generally designated as **10**, comprises a pair of side plates **12** and **14** disposed in parallel spaced apart relation and supported by side wall members **16** and **18** attached to a motor and transmission housing **20**.

The front ends of side plates **12** and **14** are each formed with an annular ratchet receiving opening. These openings advantageously communicate with gaps defined by the jaws **22** and **23** of side plate **14** and the jaws **24**

and 19 of side plate 12. A ratchet member 25 having a polygonal opening formed therein for receiving nuts and the like is held in slidable relation between side plates 12 and 14 by means of hubs 26 and 27 extending from each side of the ratchet member through the annular openings of the side plates. Ratchet member 25 is provided with a plurality of teeth 28 which extend around its marginal periphery between side plates 12 and 14.

Advantageously, ratchet wrench 10 also is provided with a lever 30 having a pair of bifurcated side members 17 and 32 straddling the side plates and pivoted thereon at pivot 33. As explained in greater detail below lever 30 is adapted to enable ratchet member 25 to be aligned between side plates 12 and 14.

Side plates 12 and 14 also house therebetween means for automatically rotating ratchet member 25 when rotary power is supplied from a suitable motor and transmission assembly in housing 20. The details of the motor and transmission assembly have not been shown as they do not form a part of this invention but it will be appreciated by those skilled in the art that such motor and transmission assembly may comprise any suitable means for supplying a rotary drive, as for example, a conventional vane type air motor coupled with a suitable transmission.

In accordance with features of this invention the power drive for ratchet member 25 is supplied by a double push reciprocating pawl assembly adapted to convert the rotary drive of the motor to a substantially rectilinear push-push drive for teeth 28 of ratchet member 25. As shown more clearly in Figures 3 and 4 of the drawing the ratchet drive assembly comprises a pair of relatively straight, elongated pawls 35 and 36, each having tapered ends adapted to be placed into driving engagement with teeth 28 of ratchet member 25. Pawl 35 at its other end is pivoted by means of dowel pin 37 to one side of a cam following rocker 38. The other end of pawl 36 is pivoted by means of dowel pin 39 to the other side of rocker 38 such that when the rocker is caused to oscillate about a pivot pin 40, pawls 35 and 36 are driven in a reciprocating manner to alternately engage teeth 28, and therefore drive ratchet member 25. As shown in Figures 3 and 4, the rotation of ratchet member 25 is in a clockwise direction between side plates 12 and 14.

Cam following rocker 38 is caused to oscillate about pivot pin 40 by a single lobe rotary cam 41 rotated by a suitable motor and transmission assembly in housing 20. The rotary motion of cam 41 is applied to cam following rocker 38 by means of a pair of rollers 42 and 43 journalled in rocker 38 so as to be freely rotatable therein and positioned to engage the rotating face of single lobe rotary cam 41. A roller retainer 44 is fastened to rocker 38 between rollers 42 and 43 to provide a bearing for the inner ends of the rollers. The rollers are fitted within shaped recession rocker 38 such that the ends of the rocker serve as bearings for the outer axes of rollers 42 and 43.

Thus, it will be appreciated that when single lobe rotary cam 42 is rotated, rollers 42 and 43 in engagement with the face of the cam, will be rotated to oscillate rocker 38 about its pivot 40 at a speed corresponding to the rotary speed of cam 41. Pawls 35 and 36 are reciprocated by the oscillation of rocker 38 to advance ratchet member 25 in a rotary manner between side plates 12 and 14.

Advantageously, an annular spring member 45 having a pair of elongated legs 46 and 47 is fixedly secured between pawls 35 and 36. Leg 46 of spring member 45 is urged against pawl 35 to apply upward bias thereto and leg 47 of spring member 45 is seated in a groove in spring holder 48 attached to pawl 36 to apply an upwardly urged spring bias thereto. In this manner the tapered ends of pawls 35 and 36 are urged into engagement with teeth 28 of ratchet member 25. Annular spring member 45 advantageously is held in position between side plates 12 and 14 by a threaded bolt 65 extending through side wall members 16 and 18.

In accordance with another aspect of this invention ratchet member 25 is prevented from reversing its direction of operation, as a result of pawl friction, or for any other reason, by means of an antirotation pawl 50 disposed in operative relation with teeth 28 of ratchet member 25 by means of pivot 52. Antirotation pawl 50 is urged into engagement with teeth 28 by means of a coil spring 53 and a spring follower 54 disposed in a spacer block 55 located between the side plates and above pawl 35. In the operation of the ratchet wrench, antirotation pawl 50 is cammed out of engagement with the teeth 28 during the driven portion of the cycle of the ratchet member 25, that is, when the ratchet member is being rotated by the action of reciprocating pawls 35 and 36, and is returned into engagement with teeth 28 of ratchet socket 25 by the action of spring 53 and spring follower 54 to prevent the ratchet member from being rotated in the reverse direction during the nondriven portions of the cycle.

It will be appreciated that during one half cycle of operation of ratchet member 25, the end of which is shown in Figure 3, cam following rocker 38 is rocked about its pivot 40 in a counterclockwise direction to cause pawl 35 to engage a tooth 28 of ratchet member 25 and advance the latter an amount equal to one ratchet tooth station. During this half cycle, pawl 36 has been retracted, by the action of cam following rocker 38, from the tooth with which it previously was in engagement to engage the tooth directly adjacent to the tooth engaged by pawl 35, also an amount equal to one tooth station. During the next half cycle of operation, the end of which is shown in Figure 4, cam following rocket 38 is rotated in the clockwise direction about its pivot 40 to cause pawl 36 to advance ratchet member 25 an amount equal to one tooth station. At this time pawl 35 has been retracted by the action of rocker 38 to engage the tooth 28 spaced an amount equal to two teeth from the tooth with which it previously was in engagement. This latter result arises from the action of spring leg 46 which urges pawl 35 through two tooth spacings during the retraction of pawl 35. Thus the continuous oscillation of rocker 38 about pivot 40 and the consequent reciprocating drive given to pawls 35 and 36 causes ratchet member 25 to be advanced at a speed determined by the rate of rotation of cam 41 and at an amount equivalent to two tooth stations per cycle.

Ratchet member 25 is driven by single pawl action rather than by double pawl action when either of pawls 35 and 36 enters the slot 21 between the teeth of ratchet member 25. Accordingly, the ratchet member 25 is advanced one tooth station during each cam cycle rather than two tooth stations per cycle as described above. In accordance with an aspect of this invention, the gap and pawl arrangement is constructed so that at least one of the pawls is driving the ratchet member 25 during each cam cycle. This is illustrated most clearly in Figures 5 and 6 of the drawing.

When the slot 21 of ratchet member 25 reaches the position shown in Figure 5, only pawl 36 provides drive for the socket during a complete cycle of cam 41 and rocker 38. Figure 5, which corresponds to the pawl positions shown in Figure 3, shows pawl 35 in its retracted position. No drive is provided for ratchet socket 25 by pawl 35 during this half cycle of operation.

Figure 6, which corresponds to the pawl positions shown in Figure 4, shows the following half cycle in which pawl 36 is in its operating position and pawl 35 is in its retracted position. At this time ratchet member 25 is advanced by the driving action provided by pawl 36. Also, at this time, pawl 35 is retracted the normal spacing of two tooth stations to engage the tooth of ratchet member 25 adjacent slot 21. Consequently dur-

ing the next half cycle of operation of rocker **38**, the ratchet member **25** will be advanced an amount equal to the spacing of one tooth station and pawl **36** will be positioned in tooth slot **21**. Pawl **36** provides no driving action during the following half cycle, but thereafter the pawls act in a double push manner to drive the ratchet socket in accordance with the normal sequence. It is only during the time when either of the pawls is in the tooth gap that one or the other of the pawls is driving the ratchet member in a single push fashion which results in the advance of ratchet member **25** of only one tooth per cycle.

It will be understood that during the double push action of pawls **35** and **36**, the antirotation pawl **50** is not required. This results from the positive forward drive given ratchet member **25** by one pawl at the time the other pawl is being urged into its new position by its associated spring. But during the above-described single push mode of operation, the antirotation pawl functions in its normal manner to prevent reverse rotation of the ratchet member.

Figures 12 and 13 illustrate the manner in which ratchet member **25** is rotated to position slot **21** in alignment with the open end of the ratchet assembly as defined by the jaws **19** and **24** of side plate **12** and jaws **22** and **23** of side plate **14**. Hand lever **30** is pivoted at pivot **33** and normally is urged outwardly from the motor and transmission housing **20** by means of a coil spring **60** disposed between the ratchet drive assembly and the inner surface of lever **30**. A cross member **32** is rigidly attached to or integrally formed with lever **30** so as to be pivoted therewith about pivot **33**. Cross member **32** has an elongated slot **64** formed at one end thereof adjacent ratchet member **25** and an elongated operating member **66** is provided with a pin **68** raised outwardly therefrom and seated within slot **64**. An elongated slot **67** is formed in side plate **12** and a pin **69**, which extends inwardly from operating member **66**, is positioned through slot **67** and beyond the inner surface of side plate **12**. Operating member **66** is pivoted at pin **69** such that when lever **30** is moved towards housing **20** against the force of spring **60**, the resultant movement of cross member **32** causes the outer end of operating member **66** to be moved about its pivot **69**, over the ratchet member **25** in the path of travel of pin **70** extending outwardly from ratchet member **25**.

It will be appreciated that during the operation of the ratchet wrench it frequently will be desirable that slot **21** of the ratchet socket **25** be aligned with the open end of the ratchet assembly as defined by the jaws **19** and **24** of side plate **12** and jaws **22** and **23** of side plate **14**. The manual alignment lever **30** is provided to facilitate the bringing about of this alignment in a quick and efficient manner.

As shown in Figures 12 and 13 ratchet member **25** is placed in the ratchet assembly such that the path of travel of pin **70** thereon lies within the operating range of member **66**. When alignment of slot **21** is desired, lever **30** is depressed, as by grasping motor housing **20** with the palm of the hand and pulling lever **30** theretowards by the fingers. Movement of lever **30** causes cross member **32** to be pivoted upwardly about pin **33**. Operating member **66** also is pivoted about pin **69** into the path of ratchet pin **70**.

When ratchet pin **70**, during rotation of the ratchet in the counter-clockwise direction as shown in Figures 12 and 13, comes around to the operating member **66**, it engages the end of the operating member and forces the operating member to move relative to side member **12** and in a path substantially linear with slot **67**. This causes pin **69** to engage pawl **36** with the result that the spring bias provided by spring **47** through holder **48** is overcome and pawl **36** is held out of engagement with teeth **28** of ratchet member **25**. As ratchet member **25** cannot be rotated by pawl **35** without the companion action of pawl **36**, the ratchet member remains stationary. This action is so timed as to occur while slot **21** in ratchet member **25** is aligned with the opening between the jaws of the wrench.

Operating member **66** advantageously may be inclined along the surface adapted to come into contact with pin **70** to provide a clearance. Thus during the alignment action, the ratchet pin **70** is moved from the end of the operating member **66** to the inclined surface as shown in Figure 13. Lever **30** then may be released to retract operating member **66** for further operation of the ratchet wrench.

It will be understood by those skilled in the art that modifications may be made in the construction and arrangement of the parts of the above described power operated ratchet wrench without departing from the real purpose and spirit of the invention and that it is intended to cover by the appended claims any modified forms of structures, circuits or use of equivalents which reasonably may be included within their scope.

What is claimed is:

1. An open end power operated ratchet wrench comprising a pair of elongated relatively thin side plates positioned in spaced parallel relation, said side plates having a pair of spaced apart jaws at one end thereof defining a substantially annular opening, a ratchet member positioned between said pair of side plates and in said opening, said ratchet member having a plurality of teeth spaced around its peripheral circumference and including a gap between said teeth approximately equal to the spacing between said jaws, a rotary cam positioned adjacent the other end of said side plates, said rotary cam having a single lobe at one face thereof, double push reciprocating pawl means operatively associated with said ratchet member and said rotary cam for converting the rotary motion of said cam into a double push translatory drive for said teeth for rotating said ratchet member between said side plates, said reciprocating pawl means comprising a rocker pivotally positioned adjacent the face of said rotary cam, a pair of cam following rollers secured to said rocker and adapted to be in rolling contact with the face of said rotary cam whereby rotation of said cam causes said rocker to oscillate about its pivot, a first elongated pawl pivotally attached to one side of said rocker at one end thereof and adapted to engage the teeth of said ratchet member at the other end thereof, a second elongated pawl pivotally attached to the other side of said rocker at one end thereof and adapted to engage the teeth of said ratchet member at the other end thereof, whereby oscillation of said rocker causes said pawls to alternately advance the ratchet member, spring means for biasing said first pawl against the ratchet teeth, and spring means for biasing said second pawl against the ratchet teeth.

2. An open end power operated ratchet wrench comprising a pair of elongated relatively thin side plates positioned in spaced parallel relation, said side plates having a pair of spaced apart jaws at one end thereof defining a substantially annular opening, a ratchet member positioned between said pair of side plates and in said opening, said ratchet member having a plurality of teeth spaced around its peripheral circumference and including a gap between said teeth approximately equal to the spacing between said jaws, a rotary cam positioned adjacent the other end of said side plates, said rotary cam having a single lobe at one face thereof, double push reciprocating pawl means operatively associated with said ratchet member and said rotary cam for converting the rotary motion of said cam into a double push translatory drive for said teeth for rotating said ratchet member between said side plates, said reciprocating pawl means comprising a rocker pivotally positioned adjacent the face of said rotary cam, a pair of cam following rollers secured to said rocker and adapted to be in rolling contact with the face of said rotary cam whereby rotation of said cam

causes said rocker to oscillate about its pivot, a first elongated pawl pivotally attached to one side of said rocker at one end thereof and adapted to engage the teeth of said ratchet member at the other end thereof, a second elongated pawl pivotally attached to the other side of said rocker at one end thereof and adapted to engage the teeth of said ratchet member at the other end thereof, whereby oscillation of said rocker causes said pawls to alternately advance the ratchet member, spring means for biasing said first pawl against the ratchet teeth, spring means for biasing said second pawl against the ratchet teeth and detent means for preventing reverse rotation of said ratchet members, said detent means including a third pawl adapted to engage the ratchet teeth pivotally positioned between said side plates and spring means for biasing said third pawl against the ratchet teeth.

3. An open end power operated ratchet wrench comprising a pair of elongated relatively thin side plates positioned in spaced parallel relation, said side plates having a pair of spaced apart jaws at one end thereof defining a substantially annular opening, a ratchet member positioned between said pair of side plates and in said opening, said ratchet member having a plurality of teeth spaced around its peripheral circumference and including a gap between said teeth approximately equal to the spacing between said jaws, a rotary cam positioned adjacent the other end of said side plates, said rotary cam having a single lobe at one face thereof, double push reciprocating pawl means operatively associated with said ratchet member and said rotary cam for converting the rotary motion of said cam into a double push translatory drive for said teeth for rotating said ratchet member between said side plates, said reciprocating pawl means comprising a rocker pivotally positioned adjacent the face of said rotary cam, a pair of cam following rollers secured to said rocker and adapted to be in rolling contact with the face of said rotary cam whereby rotation of said cam causes said rocker to oscillate about its pivot, a first elongated pawl pivotally attached to one side of said rocker at one end thereof and adapted to engage the teeth of said ratchet member at the other end thereof, a second elongated pawl pivotally attached to the other side of said rocker at one end thereof and adapted to engage the teeth of said ratchet member at the other end thereof, whereby oscillation of said rocker causes said pawls to alternately advance the ratchet member, spring means for biasing said first pawl against the ratchet teeth, spring means for biasing said second pawl against the ratchet teeth, detent means for preventing reverse rotation of said ratchet members, said detent means including a third pawl adapted to engage the ratchet teeth pivotally positioned between said side plates and spring means for biasing said third pawl against the ratchet teeth, and means for manually aligning the gap in said ratchet member with the space between the jaws of said side plates.

4. An open end power operated ratchet wrench in accordance with claim 3 wherein said last named means includes a pin projecting from said ratchet member, a pivoted member adapted to be placed in the path of travel of said pin whereby the engagement of said pin and said member causes the gap in said ratchet member to be aligned between said jaws and an elongated handle pivotally attached to said side plates and adapted to be operated manually for actuating said pivoted member.

5. A power operated ratchet wrench comprising a pair of side plates positioned in spaced parallel relation and having at one end thereof a substantially annular opening, a ratchet member positioned between said pair of side plates and in said opening, said ratchet member having a plurality of teeth spaced around its peripheral circumference, a rotary cam positioned adjacent the other end of said side plates, and double push reciprocating pawl means operatively associated with said ratchet member and said rotary cam for converting the rotary motion of said cam into a doublepush translatory drive for said teeth for rotating said ratchet member between said side plates, said reciprocating pawl means comprising a rocker pivotally positioned adjacent the face of said rotary cam, a pair of cam following rollers secured to said rocker and adapted to be in rolling contact with the face of said rotary cam whereby rotation of said cam causes said rocker to oscillate about its pivot, a first elongated pawl pivotally attached to one point on said rocker at one end thereof and adapted to engage the teeth of said ratchet member at the other end thereof, and a second elongated pawl pivotally attached to a different point on said rocker at one end thereof and adapted to engage the teeth of said ratchet member at the other end thereof, whereby oscillation of said rocker causes said pawls to alternately advance the ratchet member.

6. A power operated ratchet wrench comprising a pair of side plates positioned in spaced parallel relation and having at one end thereof a substantially annular opening, a ratchet member positioned between said pair of side plates and in said opening, said ratchet member having a plurality of teeth spaced around its peripheral circumference, rotary cam means positioned adjacent the other end of said side plates, a rocker pivotally secured between said side plates in operative association with said rotary cam means whereby said rocker is oscillated about its pivot at a rate dependent upon the rotary speed of said cam means, and a pair of elongated pawl means pivotally secured to different points on said rocker and adapted to engage the teeth of said ratchet member whereby the rotary motion of said cam means is converted by said rocker and pawl means into a double push translatory drive for said teeth for rotating said ratchet member between said side plates.

7. An open end power operated ratchet wrench comprising a pair of elongated relatively thin side plates positioned in spaced parallel relation and having a pair of spaced apart jaws at one end thereof defining a substantially annular opening, a ratchet member positioned between said pair of side plates and in said opening, said ratchet member having a plurality of teeth spaced around its peripheral circumference and including a gap between said teeth approximately equal to the spacing between said jaws, a rotary cam positioned adjacent the other end of said side plates, double push reciprocating pawl means operatively associated with said ratchet member and said rotary cam for converting the rotary motion of said cam into a double push translatory drive for said teeth for rotating said ratchet member between said side plates, and means for aligning the gap in said ratchet member with the space between the jaws of said side plates including a pin projecting from said ratchet member, a pivoted lever adapted to be actuated into the path of travel of said pin whereby engagement of said pin and said lever causes said pawl means to be disengaged from said ratchet member to terminate rotation of the latter, and an elongated handle pivotally attached to said side plates and adapted to be operated manually for actuating said lever.

8. A power operated ratchet wrench comprising a ratchet member having a plurality of teeth spaced around its peripheral circumference, a rotary cam positioned remote from said ratchet member, and double push reciprocating pawl means operatively associated with said ratchet member and said rotary cam for converting the rotary motion of said cam into a double push translatory drive for said teeth to rotate said ratchet member, said reciprocating pawl means comprising a rocker pivotally positioned adjacent the face of said rotary cam, a pair of cam following rollers secured to said rocker and adapted to be in rolling contact with the face of said rotary cam whereby rotation of said cam causes said rocker to oscillate about its pivot, a first elongated pawl pivotally attached to one point on said rocker at one end thereof and adapted to engage the teeth of said ratchet member at

the other end thereof, and a second elongated pawl pivotally attached to a different point on said rocker at one end thereof and adapted to engage the teeth of said ratchet member at the other end thereof, whereby oscillation of said rocker causes said pawls to alternately advance the ratchet member.

9. A power operated ratchet wrench comprising a ratchet member having a plurality of teeth spaced around its peripheral circumference, a rotary cam positioned remote from said ratchet member, and double push reciprocating pawl means operatively associated with said ratchet member and said rotary cam for converting the rotary motion of said cam into a double push translatory drive for said teeth to rotate said ratchet member, said reciprocating pawl means comprising a rocker pivotally positioned adjacent the face of said rotary cam and responsive to the operation thereof whereby rotation of said cam causes said rocker to oscillate about its pivot, a first elongated pawl pivotally attached to one point on said rocker at one end thereof and adapted to engage the teeth of said ratchet member at the other end thereof, a second elongated pawl pivotally attached to a different point on said rocker at one end thereof and adapted to engage the teeth of said ratchet member at the other end thereof, whereby oscillation of said rocker causes said pawls to alternately advance the ratchet member, means for biasing said first pawl against the ratchet teeth, means for biasing said second pawl against the ratchet teeth and detent means for preventing reverse rotation of said ratchet member.

10. An open end power operated ratchet wrench comprising a ratchet member having a plurality of teeth spaced around its peripheral circumference and including a gap between said teeth, support means for said ratchet member, said means having an annular opening formed therewithin for rotatably supporting said ratchet member, rotary drive means remotely positioned from said ratchet member, double push reciprocating pawl means operatively associated with said ratchet member and said rotary drive means adapted to convert the rotary motion of said drive means into a double push translatory drive for said teeth to thereby rotate said ratchet member in said opening, said reciprocating pawl means comprising a pivotally positioned rocker adapted to be oscillated about its pivot by the rotation of said rotary drive means, a first elongated pawl pivotally attached to one point on said rocker at one end thereof and adapted to engage the teeth of said ratchet member at the other end thereof, a second elongated pawl pivotally attached to a different point on said rocker at one end thereof and adapted to engage the teeth of said ratchet member at the other end thereof, whereby oscillation of said rocker causes said pawls to alternately advance the ratchet member, and detent means for preventing reverse rotation of said ratchet member.

11. An open end power operated ratchet wrench in accordance with claim 10 further comprising means for manually aligning the gap in said ratchet member in the opening formed in said support means including a pin projecting from said ratchet member, a pivoted lever adapted to engage said pin for causing said ratchet member to come to rest in its aligned position and an elongated handle pivotally attached to said support means and adapted to be operated manually for actuating said lever.

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