March 31, 1931. J. H. DODGE 1,798,194

REVERSIBLE RATCHET WRENCH

Filed July 27, 1929

Fig.1.

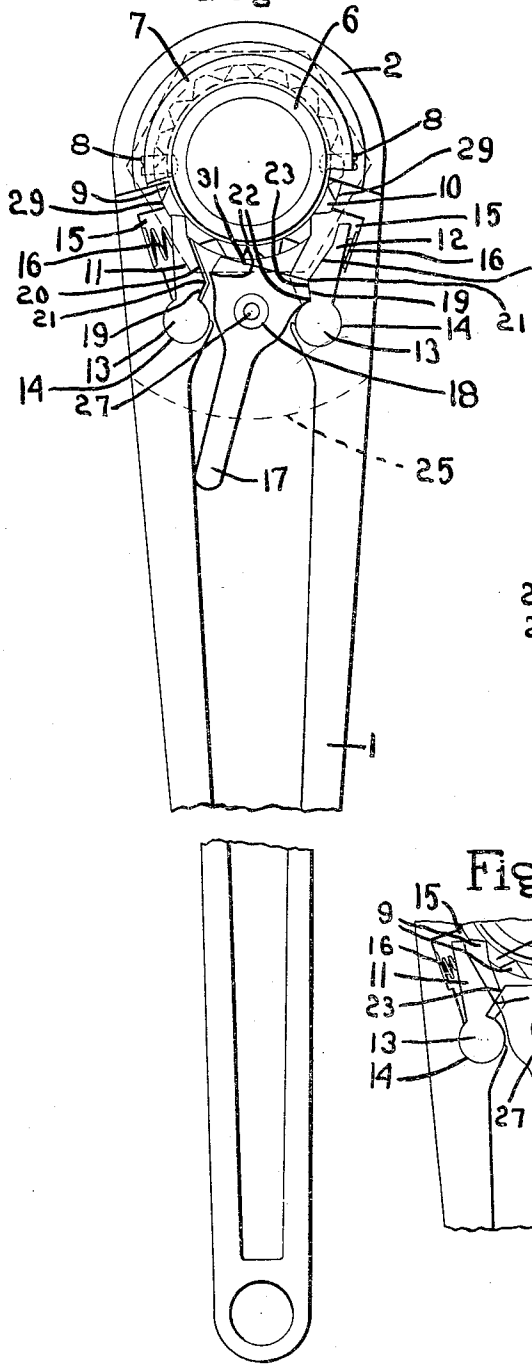


Fig.2.

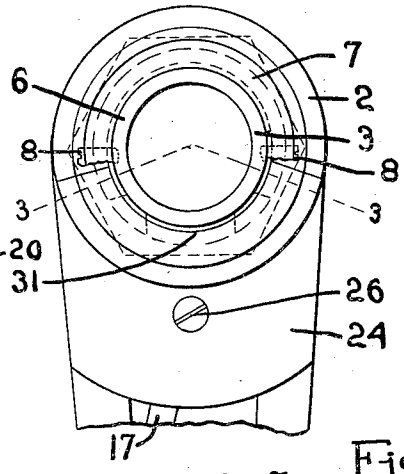


Fig.3.

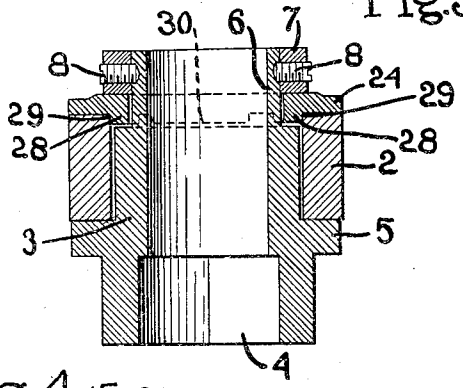


Fig.4.

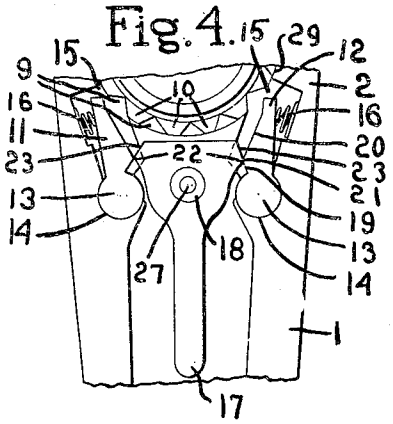
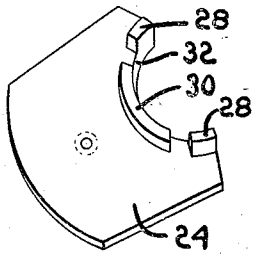


Fig.5.



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Attys.

Patented Mar. 31, 1931 1,798,194

UNITED STATES PATENT OFFICE

JOHN H. DODGE, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO LOUIS C. SMITH, OF NEWTON, MASSACHUSETTS; HARRY R. SINCLAIR AND JOHN H. DODGE, BOTH OF WORCESTER, MASSACHUSETTS, AS TRUSTEES

REVERSIBLE RATCHET WRENCH

Application filed July 27, 1929. Serial No. 381,430.

This invention relates to reversible ratchet wrenches and has for one of its objects to provide a novel construction by which when the wrench is reversed from a right hand wrench to a left hand wrench or vice versa, the active pawl will be thrown out of engagement with the socket member before the other pawl is permitted to come into engagement so that at no time can there be more than one pawl in locking engagement with the socket.

The two pawls are controlled or operated by a shipper lever as usual in reversible ratchet wrenches and another object of the invention is to provide a novel construction of shipper lever and pawl by which the active pawl is thrown out of engagement with the socket member during the first half of the swinging movement of the shipper lever and is held out of engagement during the final half of said movement while the inactive pawl will be held in inoperative position out of engagement with the socket member during the first half of the swinging movement of the shipper lever and will be allowed to move into engagement with the socket member only during the last half of such movement. As a result of this construction when the shipper lever is in a mid position both the pawls will be held out of engagement with the ratchet member.

Another object of the invention is to provide a novel construction of cover for the pawl and shipper lever and to improve generally reversible ratchet wrenches in various particulars all as will be more fully hereinafter set forth.

In order to give an understanding of the invention I have illustrated in the drawings a selected embodiment thereof which will now be described after which the novel features will be pointed out in the appended claims.

Fig. 1 is a view of a reversible ratchet wrench embodying my invention with a portion of the handle broken out and with the cover plate for the pawls and shipper lever removed;

Fig. 2 is a view of the head portion of the wrench with the cover plate in place;

Fig. 3 is a section on the line 3—3, Fig. 2;

Fig. 4 is a fragmentary view illustrating the position of the pawls when the shipper lever is in mid position;

Fig. 5 is a perspective view of the inside face of the cover plate.

The wrench comprises the usual handle member 1 which terminates at one end in a head 2 in which is rotatably mounted a socket member 3 having a square or flat-sided socket portion 4 to fit over the head of a bolt or over a nut.

This socket member is provided with the usual flange portion 5 to engage one side of the head 2 and is also provided with the neck portion 6 which extends through the head and on which is removably secured a retaining collar 7, said collar being held in place by the usual set screws 8.

The socket member is formed on its periphery with the notches 9 forming between them the teeth 10 and the head is provided with the usual pivoted pawls 11 and 12 which are adapted to engage in the notches 9 thereby providing a ratchet connection between the socket member and the head.

Each pawl is provided with a circular head 13 which fits in a correspondingly shaped recess or seat 14 formed in the wrench head 2, this construction providing a sturdy pivotal connection between the pawls and the wrench head which will stand up under severe usage. Each pawl operates in a recess 15 formed in the wrench head and is backed by a spring 16 which tends to throw it into operative position in engagement with the socket member.

The pawls are controlled by a shipper lever 17 which is pivotally mounted on a boss 18 formed on the wrench head, said shipper lever being adapted by its swinging movement from one extreme position to the other to throw one or the other of the pawls into inoperative position depending on whether the wrench is to be used as a left hand ratchet wrench or as a right hand ratchet wrench.

The parts thus far described, with the exception of the particular shape of the shipper lever 17 and pawls 11, 12 are or may be such as is commonly found in reversible ratchet wrenches.

As stated above one feature of the present

invention relates to the construction of the shipper lever 17 and pawls by which during the initial movement of the shipper lever from either extreme position the active pawl will be moved into inoperative position out of engagement with the ratchet member while the inactive pawl is retained in its inoperative position, and during the final swinging movement of said shipper lever the formerly inactive pawl is allowed to move into operative engagement with the socket member while the formerly active pawl is retained in its inoperative position.

Each pawl is formed on its inner face with the forwardly and outwardly inclined face 19 which terminates at a high point 21 where it meets another inclined face 20. The face 19 inclines forwardly away from the pivot end and outwardly relative to the longitudinal median line of the pawl. The face 20 is inclined from the high point 21 away from the pivotal point of the pawl and toward the longitudinal median line thereof. The shipper lever 17 is provided on each side with the protuberance 22 and the outer face 23 of the protuberance, that is, the face of the protuberance away from the axis of the pawl, forms a pawl-retaining surface, which co-operates with the incline surface 19 on the pawl to retain the pawl in its inoperative position, as shown in connection with the pawl 12 in Fig. 1. The pawl-engaging face 23 inclines from the apex 22 of the protuberance in a direction toward the longitudinal median line of the shipper.

The protuberances 22 on the shipper lever have such relation to the surfaces 19, 20 and apices 21 of the pawls that when the shipper is in one extreme position as shown in Fig. 1 the protuberance 22 on one side of the shipper lever will be on the socket side of the apex 21 of the corresponding pawl while the protuberance 22 on the other side of said lever will be on the pivot side of the apex 21 of the corresponding pawl and the surface 19 of the latter pawl will be engaged by the corresponding pawl-retaining surface 23 of the shipper lever.

One pawl, therefore, will be positively held out of engagement with the socket member by the corresponding pawl-retaining surface 23 of the shipper lever while the other pawl will be free to be moved into operative position in engagement with the socket member by its spring 16. As the shipper is moved from either extreme position into a central position as shown in Fig. 4, one of the protuberances 22 will engage the surface 20 of the active pawl (which in Fig. 1 is the pawl 11) and by such engagement the pawl will be thrown backwardly into an inoperative position out of engagement with the socket member. During this swinging movement of the shipper lever the pawl-retaining surface 23 which is in engagement with the inactive pawl will merely move over the surface 19 of the pawl. These surfaces are so disposed that they approximate the periphery of a circle struck from the center of movement of the shipper lever and as a result during the movement of the shipper lever from the position shown in Fig. 1 to that shown in Fig. 4 the pawl-retaining surface 23 will slide over the surface 19 of the pawl while at the same time retaining the pawl in its inoperative position.

When the shipper lever reaches the central position shown in Fig. 4 both pawls are held out of engagement with the socket member and as the shipper lever is swung from the central position to the other extreme position illustrated by dotted lines Fig. 1 the pawl 12 will be allowed to move into engagement with the socket member while the pawl 11 will be held out of engagement by the corresponding pawl-retaining surface 23 which is moving into engagement with the surface 19 of the pawl 11.

From what has been said above it will be seen that during the initial movement of the shipper lever from one extreme position to the other the active pawl will be thrown out of engagement with the socket member while the inactive member will be retained in its inoperative position and during the final movement of the shipper lever the previously inactive pawl will be allowed to move into operative position while the other pawl is held in its inoperative position. There is, therefore, never any opportunity for the socket member to become locked to the wrench handle by reason of both pawls being in engagement with the socket member at the same time. It will also be noted that when the shipper 17 is in either extreme position one pawl-engaging face 23 lies flatly against the shipper-engaging face 19 of the corresponding pawl. When either pawl is retracted the spring 16 of the retracted pawl is compressed and the pressure of the spring against the pawl maintains the faces 19 and 23 firmly in engagement and by reason of this fact each pawl when retracted acts to hold the shipper in one of its extreme positions and it is necessary to apply some force to the shipper to start swinging from its initial position toward its central position. This is an advantage because when the shipper is in either extreme position said shipper will be yieldingly held in such extreme position thus reducing very greatly the danger that the shipper may be accidentally moved into its central position. Moreover, when the shipper is in the central position shown in Fig. 4, it is in an unstable condition, and will not retain this position as at this time the apices of the protuberances are in engagement with the pointed high points of the pawls and since at this time there is only a point-to-

point contact the shipper will be in an unstable condition.

The shape of the pawls and the manner of mounting them forms an exceedingly sturdy construction which will withstand heavy strain. It will be noted that the compression strain to which each pawl is subjected when it is in operative position is in the direction of its length and the notches 9 are so formed that the crushing strain which comes on each tooth 10 is in a direction toward the base of the tooth.

The wrench head is provided with a removable cover plate 24 which overlies and covers the pawls 11 and 12 and shipper lever 17, the end of the shipper lever projecting beyond the cover plate to permit it to be operated. In Fig. 1 the cover plate is removed but the dotted line 25 indicates the outer edge of said plate. This cover plate is retained in position by a screw 26 which is screw threaded into the aperture 27 formed in the boss 18. The cover plate is formed on its inner face with two ribs 28 which engage the portions 29 of the socket-receiving opening in the head and it is also provided with another rib 30 which is situated between the edge 31 of the shipper member and the neck of the socket. These ribs 28 and 30 assist in holding the cover plate in position and serve to take the strain off from the screw 26.

When the wrench is being used the neck portion of the socket member is likely to engage the convexly-curved wall 32 of the cover plate with a force tending to displace the cover plate. Without the presence of the ribs 28 and 30 such force will be resisted only by the retaining screw 26 but with the construction herein shown this force is resisted by the ribs 28 and 30 and thus the screw 26 is relieved from any undue strain.

I claim:

1. A ratchet wrench comprising a handle having a head, a toothed socket member rotatively mounted in said head, a pair of opposed spring-pressed pawls pivoted in the head and adapted to engage the toothed portion of the socket member, each pawl having on its inner face a shipper-engaging surface which inclines forwardly from the pivoted end of the pawl and outwardly with relation to the longitudinal axis of the pawl, said shipper-engaging surface terminating in a high portion, a shipper member pivoted between the pawls and having on each side a protuberance, the face of each protuberance that is on the opposite side of the apex of the protuberance from the pivotal axis of the shipper lever constituting a pawl-retaining surface and inclining from said apex toward the longitudinal axis of the shipper in one direction and the surface on the other side of said apex inclining toward the longitudinal axis of the shipper in the opposite direction, the pivotal point of the shipper having such relation to the pivotal point of the pawls and the protuberances on the shipper having such relation to the high portions of the pawls that when the shipper is in central position the apices of the two protuberances engage the high portions of both pawls and thus hold both pawls in inoperative position out of engagement with the socket member while when the shipper is in either extreme position one pawl-retaining surface thereon lies flatly against the shipper-engaging surface of the corresponding pawl and holds it in inoperative position while the other pawl is permitted to assume an operative position in engagement with said socket member.

2. A ratchet wrench comprising a head, a toothed socket member rotatably mounted in said head, a pair of opposed spring-pressed pawls pivotally mounted in the head and adapted to engage the toothed portion of the socket member, each pawl having on its inner face the two inclined surfaces 19, 20 which meet in the high portion 21, the inclined surface 19 constituting a shipper-engaging surface and inclining forwardly from the pivoted end of the pawl and outwardly with relation to the longitudinal axis of the pawl and the inclined surface 20 inclining forwardly from the high portion and inwardly with relation to the longitudinal axis of the pawl, a shipper member pivoted between the pawls and having on each side a protuberance 22, the face 23 of each protuberance beyond the apex thereof inclining from said apex toward the longitudinal axis of the shipper and constituting a pawl-engaging face, and the position of said protuberance with relation to the pivotal point of the shipper and the inclined surfaces on the pawls being such that when the shipper is in central position the points of both protuberances engage the high portions of both pawls and hold both pawls out of operative engagement with the socket member, while when the shipper is in either extreme position the pawl-engaging face of one protuberance lies flatly against the shipper-engaging face of the corresponding pawl and holds it in inoperative position while the other pawl is free to assume an operative position under the influence of its spring.

In testimony whereof, I have signed my name to this specification.

JOHN H. DODGE.