July 22, 1941. P. M. STEPHENS 2,250,400

WRENCH

Filed April 27, 1939 2 Sheets-Sheet 1

Fig. 1.

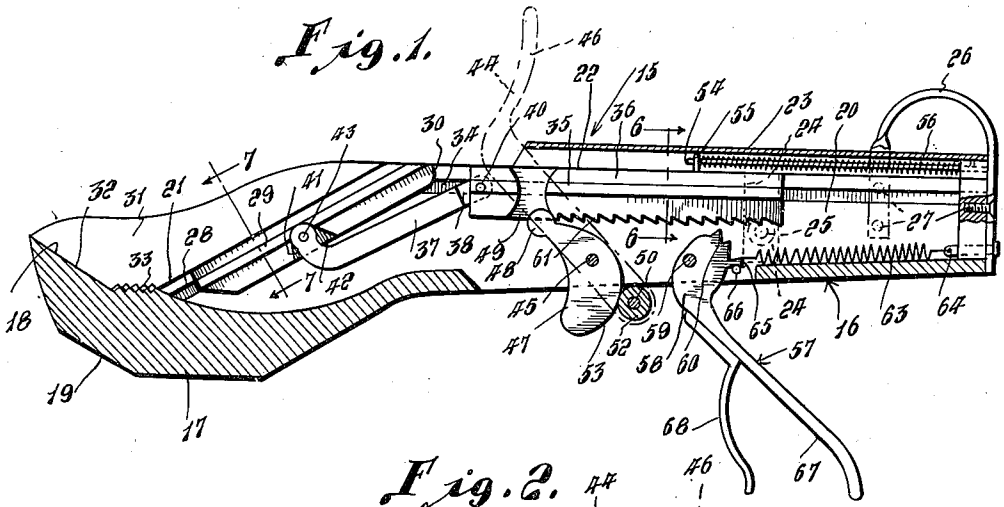


Fig. 2.

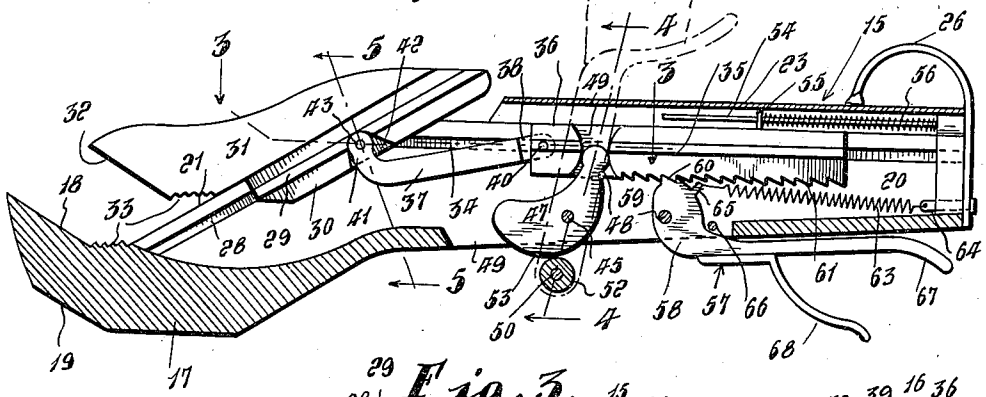


Fig. 3.

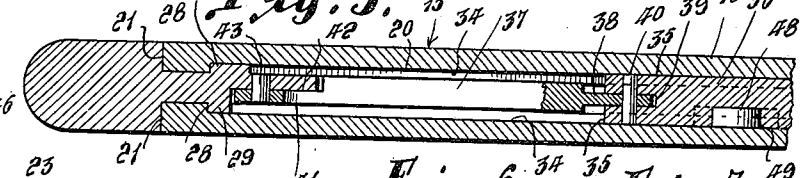


Fig. 4.

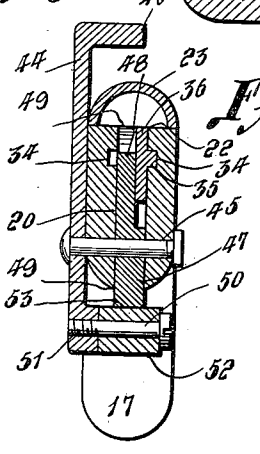


Fig. 5.

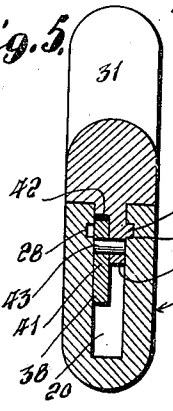


Fig. 6.

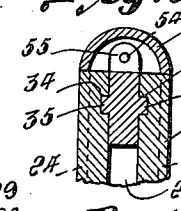
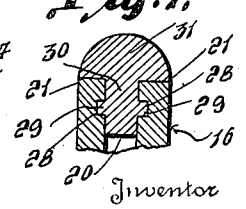


Fig. 7.



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Fig. 8.

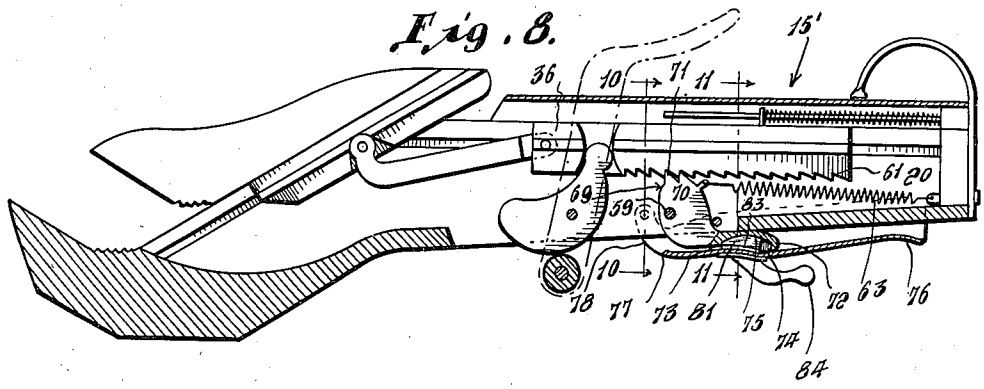


Fig. 9.

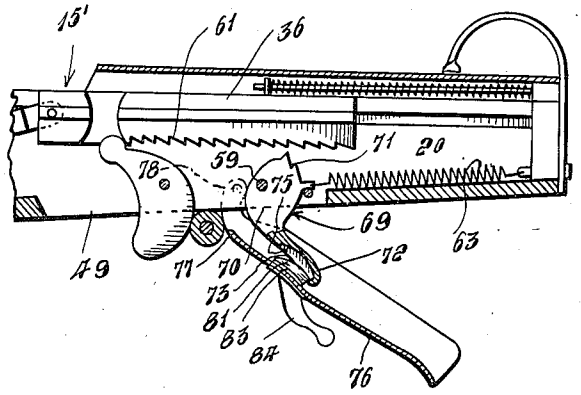


Fig. 10.

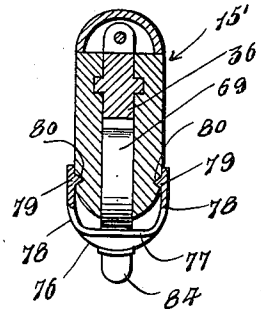


Fig. 11.

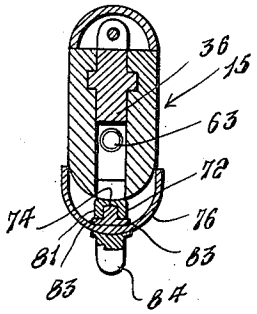
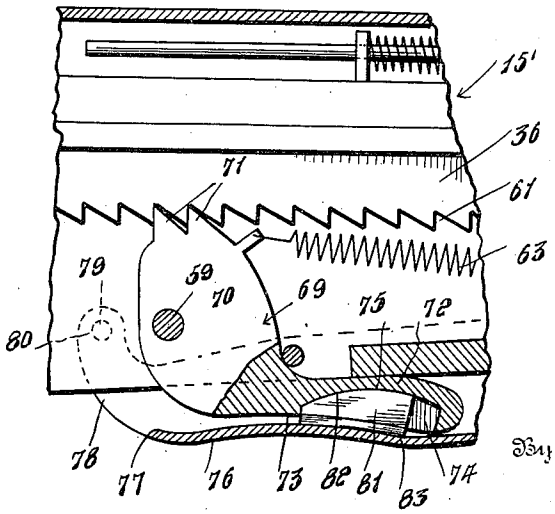


Fig. 12.



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Patented July 22, 1941 2,250,400

UNITED STATES PATENT OFFICE

2,250,400

WRENCH

Paul M. Stephens, Ashland, Mo.

Application April 27, 1939, Serial No. 270,342

6 Claims. (Cl. 81—86)

This invention relates to an improved construction of wrench having novel means for opening the jaws and means for locking the jaws in a plurality of open positions.

More particularly, it is an aim of the invention to provide a wrench whereby opening and locking the jaws may be accomplished by the hand holding the tool leaving the other hand of the operator free for holding the work or for other purposes.

Still a further aim of the invention is to provide an improved construction of wrench including a trigger adapted to be operated with the fingers for opening the movable jaw, a locking member having a grip or lever portion adapted to be actuated by the thumb for locking the movable jaw in an open position, and spring means for normally retracting the locking member and for projecting the movable jaw toward a closed position.

Still another object of the invention is to provide a tool of the character described of simple construction, which will be efficient in operation, and which may be economically manufactured and sold.

Other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, which illustrate a preferred embodiment thereof, and wherein—

Figure 1 is a longitudinal central vertical sectional view, partly in elevation, of the wrench and showing the jaws in closed position,

Figure 2 is a similar view showing the jaws in an open position,

Figure 3 is a longitudinal horizontal sectional view taken substantially along the plane of the line 3—3 of Figure 2, on an enlarged scale,

Figures 4 and 5 are enlarged transverse sectional views taken substantially along the planes of the lines 4—4 and 5—5, respectively, of Figure 2,

Figures 6 and 7 are enlarged transverse sectional views taken substantially along the planes of the lines 6—6 and 7—7, respectively, of Figure 1,

Figure 8 is a view similar to Figure 1 illustrating a modified form of locking member,

Figure 9 is a fragmentary longitudinal central sectional view showing the modified form of locking dog in a released position,

Figures 10 and 11 are enlarged transverse sectional views taken substantially along the planes of the lines 10—10 and 11—11, respectively, of Figure 8, and

Figure 12 is an enlarged fragmentary longitudinal sectional view showing the modified locking member in a locked or engaged position.

Referring more particularly to the drawings, wherein like reference characters designate like or corresponding parts throughout the different views, 15 designates generally the wrench including an elongated handle portion, designated generally 16, which is provided with an offset enlargement 17, at one end thereof, forming a stationary jaw and having a gripping face 18 bowed obliquely to the longitudinal axis of the handle 16. Jaw 17, on its outer side is provided with a flat surface 19 adapted to be used for driving small nails and for other functions of a light hammer. The handle 16 is recessed throughout substantially its length, as indicated at 20. Recess 20 opens outwardly of the forward end of the handle which end is inclined, as seen at 21, relatively to the handle 16, in the opposite direction to the gripping surface 18. One edge of the handle 16 is provided with an opening 22 communicating with the recess 20 and extending substantially the length thereof. The opening 22 is closed, throughout a substantial portion of its length, by means of a cover 23, which is arcuately shaped in cross section and which extends from the rear end of the handle 16 to adjacent the inclined open end 21. Cover 23 is provided with a pair of strap portions 24 which are disposed in transverse grooves, not shown, in the opposite sides of the handle 16 and which are fastened thereto by means of fastenings 25 to detachably mount the cover 23 over the opening 22. A finger loop 26 is disposed over the cover 23, adjacent the rear end of the handle 16, and is detachably mounted relatively thereto by means of fastenings 27 to secure one of its ends to the rear end of the handle 16 and its opposite end to one side of the handle.

Handle 16, adjacent the edge 21, is provided with a pair of opposed inwardly opening grooves 28, disposed substantially parallel to the edge 21, to receive rails 29 which project outwardly from the sides of a restricted shank 30 of a jaw 31 to slidably mount jaw 31 in the handle 16. Jaw 31 is provided with an inclined gripping face 32 to coact with the gripping face 18 which abuts thereagainst when the jaws are in a closed position, as seen in Figure 1. The gripping faces 18 and 32 are provided with toothed or serrated gripping portions 33, at their inner ends, which are disposed obliquely to the outer portions of the faces 18 and 32. The cover 23 terminates short of the forward end of the opening 22 to

provide a space through which the shank portion 30 may move when the jaw 31 is opened, as seen in Figure 2.

Handle 16 is provided with a pair of opposed inwardly opening longitudinal grooves 34 in which are slidably mounted the rails 35 which project outwardly from the sides of a rack bar 36 which is thereby slidably mounted longitudinally in the handle 16. Referring to Figure 3, a link 37 is provided with a restricted end 38 which extends into the recess 39 in the forward end of the rack bar 36 and which is pivotally connected thereto by means of a pin 40 to thereby pivotally connect the link 37 to the rack bar 36. The opposite, restricted end 41 of the link 37 is disposed in a recess 42, in one side of the shank 30 and is pivotally connected to said shank by means of a pin 43 to thereby connect the movable jaw 31 to the rack bar 36.

A trigger element 44 is pivotally mounted on one side of the handle 16 by means of a headed bolt 45, which extends transversely therethrough, as best seen in Figure 4, and which is provided with a nut on its opposite end for maintaining it in position. At its opposite end, the trigger element 44 is provided with an angularly disposed laterally enlarged portion 46, disposed on the outer side of the cover 23. The bolt 45 also functions to pivotally mount a cam member 47, intermediate of its ends, which cam member is disposed in the recess 20 and is provided with a knob 48 at one end thereof which extends into the recess 49 in one side of the rack bar 36, and adjacent its forward end. The opposite, arcuately shaped end of the cam member 47 projects outwardly through the slot 49 in the opposite edge of the handle 16. The trigger element 44, at the end adjacent its pivot, is provided with a headed pin 50 having a threaded shank engaging a threaded bore 51 in trigger element 44, as best seen in Figure 4. A roller 52 is rotably mounted on the shank of the pin 50 and engages the arcuately shaped cam edge 53 of the member 47 so that when the finger portion 46 of the trigger element 44 is swung rearwardly the roller 52 will be moved forwardly relatively to the handle 16 to move the cam member 47, from the position, as seen in Figure 1, to the position, as seen in Figure 2, to thereby retract the rack bar 36 and open the jaw 31.

A rod 54 is mounted in the rear end of the handle 16 and extends forwardly through the rear portion of the recess 20. An apertured lug 55 projects from one edge of the rack bar 36 and loosely engages the rod 54. An expansion coil spring 56 is mounted on rod 54 with one end thereof abutting against the rear end of the handle 16 and with its opposite end abutting against the lug 55 to urge the rack bar 36 forwardly for closing the jaw 31. A locking dog, designated generally 57, includes a head portion 58 which is pivotally mounted in the recess 20 by means of a pin 59. Head 58 is provided with teeth 60 in its inner rounded edge which mesh with teeth 61 in one edge of the rack bar 36, when the dog 57 is in a projected position, as seen in Figure 2. A contractile coil spring 63 is secured at one end to a pin 64 mounted in the rear end of the handle 16 and at its opposite end to a lug 65 on the head 58 for normally urging the dog 57 to a retracted position out of engagement with the teeth 61 of the rack bar 36. A stop 66 extends through the handle 16 for engaging the lug 65 to limit its movement toward a retracted position. Dog 57 is provided with a shank portion which extends through the slot 49 and which is elongated to form a gripping portion or lever 67 having an arcuately shaped outwardly projecting thumb guard 68 on its outer side.

From the foregoing it will be seen that the handle portion 16 can be grasped by the operator so that the little finger of the hand holding the wrench 15, will extend through the loop 26 with the thumb engaging the lever 67 and the index finger engaging the portion 46 of the trigger element 44. Assuming the parts to be in the position, as seen in Figure 1, the operator pulls rearwardly and inwardly on the portion 46 to rock the trigger member 44 to thereby open the jaw 31, in the manner as heretofore described, until the opening of the jaws is slightly greater than that desired. The thumb is then drawn inwardly to swing the lever 47 toward the handle 16 to move the locking dog 47, from the position, as seen in Figure 1, to the position, as seen in Figure 2, to cause the teeth 60 to mesh with the teeth 61 to lock the rack bar 36 in a retracted position. In order to fully project the dog 57 the bar 36 is moved slightly forward and it is for this reason that the jaw 31 is initially opened to a slightly greater extent than desired to compensate for the slight return movement which occurs in locking the rack bar 36. After the rack bar 36 has been locked in a retracted position, the trigger 44 may be released. To reset the jaws at a more open position, the portion 46 of trigger 44 is again engaged and moved until the roller 52 engages the cam member 47 after which the dog 57 is released and retracted by its spring 63 so that the rack bar 36 may be further retracted to further open the jaw 31 after which it may again be locked by compressing the lever 67, as heretofore explained. To fully release the jaw 31, it is only necessary to release the pressure on the lever 47 so that the spring 43 may retract the head 58 to move the teeth 60 out of engagement with the teeth 61 thereby permitting the spring 56 to expand and project rack bar 36 to move the jaw 31 to a closed position through the link connection 37. Thumb guard 68 prevents the thumb from sliding too far forward on lever 67 and aids in initially moving lever 67 outwardly to release dog 57.

It is to be understood that the wrench 15 may be made in a variety of sizes and that the size that is illustrated in Figures 1 to 7 is of the large heavy duty type.

Where the wrench is made in a smaller size, for lighter work, the construction and arrangement of the parts is the same except that the locking dog is modified, as illustrated in Figures 8 to 12, showing the modified form of locking dog adapted to be used on small sized wrenches such as the wrench, designated generally 15'. The locking dog 69 of the wrench 15' includes a head 70 corresponding to the head 58 and pivotally mounted by the pin 59 in the recess 20. The head 70 is provided with teeth 71 corresponding to the teeth 60 for engaging the teeth 61 of the rack bar 36. The dog 69 is normally held in a retracted position by means of a spring 63, similarly to the dog 57. Instead of an elongated shank portion which forms a lever or handle, as in the dog 57, dog 69 is provided with a relatively short shank 72 which extends outwardly through the slotted opening 49. The outer surface 73 of the shank 72 is arcuately shaped, as best seen in Figure 12, and is provided with a longitudinal recess 74 having an inwardly bowed bottom por-

tion 75. A grip or lever member 76 is arcuately shaped in cross section to fit around the handle 16, as best seen in Figure 11, and is provided with a bifurcated forward end 77, as best seen in Figure 10. The arcuately shaped arms 78 of the bifurcated end 77 are provided with inwardly projecting tapered prongs 79, adjacent their free ends, for engaging recesses 80 in the sides of the handle 16 to thereby pivotally mount the lever 76 relatively to the handle 16. As seen in Figure 9, the lever 76 is pivotally mounted on the handle 16 forwardly of the dog 69. A block 81 is secured to the inner side of the lever 76 and is provided with an arcuately shaped outer edge 82 and with shoulders 83 which project outwardly from its sides.

It will be obvious that the operation of the trigger 44 of the wrench 15' is identical with the operation of the trigger of the wrench 15 for retracting the bar 36 and the movable jaw 31 which is likewise projected by the expansion spring 56. To retain the jaw 31 in a retracted position, the lever or grip 76 is moved inwardly toward the handle 16 causing the block 81 to move into the recess 74 and the shoulders 83 to engage the arcuately shaped surface 73 to combine with the cam surfaces 75 and 82 in swinging the dog 69 from a retracted position, as seen in Figure 9, to a projected position, as seen in Figure 8. The block 81 functions as a guide with the recess 74 to insure proper contact between the dog 69 and lever 76. When the lever 76 is released the spring 63 will retract dog 69 and thereby rock the lever 76 outwardly. It will be noted, as seen in Figure 12, that the recess 74 is substantially longer than the block 81 to provide for the sliding movement of the lever 76 relatively to the dog 69, during the pivotal movement of these parts. The lever or grip member 76 is provided on its outer side and intermediate of its ends with the thumb guard 84 for the same function as the thumb guard 68 of the wrench 15.

Various modifications and changes are contemplated and may obviously be resorted to and the right is reserved to make such variations in the invention as do not depart from the spirit and scope thereof as hereinafter defined by the appended claims.

I claim as my invention:

1. In a wrench, an elongated recessed handle having an offset enlargement at one end thereof forming a stationary jaw, the face of said jaw being disposed at an oblique angle relatively to the longitudinal axis of said handle, said handle having an obliquely disposed opening at its forward end, a movable jaw slidably mounted in said opening for coacting with said fixed jaw, a trigger member pivotally connected to said handle and disposed on the outer side thereof, means connecting said trigger member and said movable jaw for opening the movable jaw when the trigger member is retracted, said means including a rack bar, guide means for slidably mounting said rack bar in said handle, a link pivotally connected to said rack bar and to the movable jaw, a cam member, pivotally mounted intermediate of its ends in said handle, having one end connected to said rack bar, the opposite end of said cam member being provided with a rounded cam portion for engaging a portion of said trigger for retracting the rack bar when the trigger is retracted to open said movable jaw.

2. In a wrench, an elongated recessed handle having an offset enlargement at one end thereof forming a stationary jaw, the face of said jaw being disposed at an oblique angle relatively to the longitudinal axis of said handle, said handle having an obliquely disposed opening at its forward end, a movable jaw slidably mounted in said opening for coacting with said fixed jaw, a trigger member pivotally connected to said handle and disposed on the outer side thereof, means connecting said trigger member and said movable jaw for opening the movable jaw when the trigger member is retracted, said means including a rack bar, guide means for slidably mounting said rack bar in said handle, a link pivotally connected to said rack bar and to the movable jaw, a cam member, pivotally mounted intermediate of its ends in said handle, having one end connected to said rack bar, the opposite end of said cam member being provided with a rounded cam portion for engaging a portion of said trigger for retracting the rack bar when the trigger is retracted to open said movable jaw, a locking dog pivotally mounted in said handle and provided with a lever projecting outwardly therefrom and movable inwardly relatively to the handle, said locking dog having teeth for engaging the teeth of said rack bar to retain the movable jaw in a plurality of adjusted positions, and spring means for normally retracting said locking dog out of engagement with the rack bar.

3. In a wrench, an elongated recessed handle having an oblique opening in one end thereof, said end being provided with an offset enlargement forming a stationary jaw, a movable jaw mounted in said oblique opening and provided with a shank portion extending into the opening and having side rails, said handle being provided with obliquely disposed grooves opening inwardly thereof for receiving the rails for slidably mounting the movable jab, a rack bar having outwardly projecting side rails, said handle being provided with longitudinal inwardly opening grooves to receive the rails of said rack bar for slidably mounting the bar relatively to the handle, a link pivotally connected to the movable jaw and to one end of said rack bar, said rack bar having a recess adjacent said end, a cam member, pivotally mounted in said handle, intermediate of its ends, a knob at one end extending into the recess of said rack bar, the opposite end of said member projecting outwardly of said handle and being provided with a rounded cam edge, a trigger, pivotally mounted intermediate of its ends on the outer side of said handle and having a lug on one end thereof for engaging said cam surface to rock said member to retract the rack bar when the opposite end of said trigger is retracted, a locking dog pivotally mounted in said handle and having a lever portion projecting outwardly therefrom, said lever portion being movable to move the locking dog into engagement with the rack bar to lock it in a plurality of retracted positions for retaining the movable jaw in a plurality of open positions, spring means for normally projecting the rack bar to close the movable jaw, and spring means for normally retracting the locking dog out of engagement with the rack bar.

4. A tool as in claim 3 comprising a thumb guard mounted on the outerside of the lever portion of said locking dog having a curved outwardly projecting portion for engaging over the thumb of an operator for retaining the hand of

the operator in proper position relatively to the tool.

5. A tool as in claim 3, one edge of said handle being open, and an arcuately shaped cover detachably mounted thereover, said cover including a loop portion for receiving the little finger of an operator.

6. A tool as in claim 3, the lever portion of said locking dog being provided with an arcuately shaped outer edge provided with a recess having an arcuately shaped bottom portion, a grip element having a bifurcated end pivotally connected to the handle, forwardly of said dog, said grip portion being arcuately shaped in cross section, and a cam block disposed on the inner side of said grip portion for engaging said groove for moving the locking dog into engagement with the rack bar when the gripping portion is moved inwardly of the tool handle.

PAUL M. STEPHENS.