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2,707,412

OPEN-END RATCHETING PIPE WRENCH

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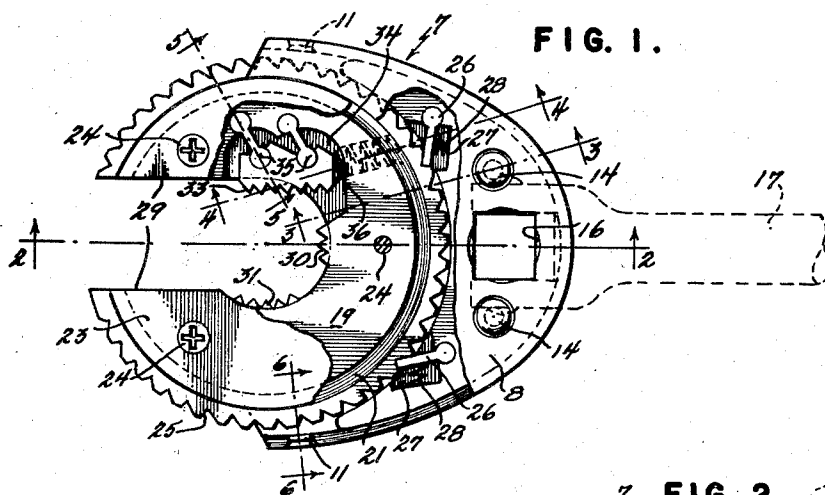


FIG. 1.

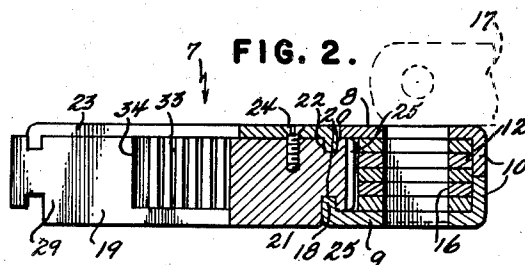


FIG. 2.

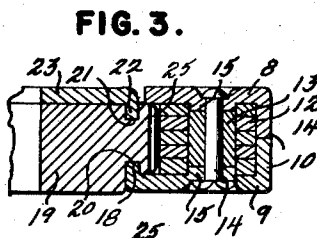


FIG. 3.

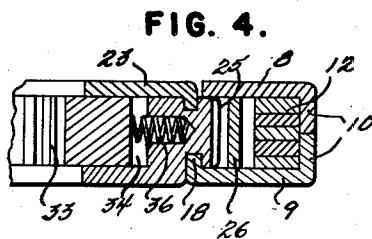


FIG. 4.

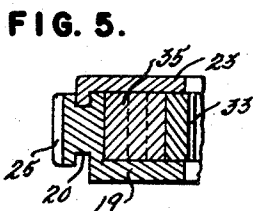


FIG. 5.

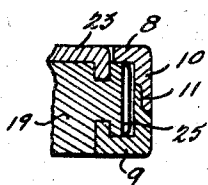


FIG. 6.

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OPEN-END RATCHETING PIPE WRENCH

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7 Claims. (Cl. 81—58.2)

This invention consists in new and useful improvements in an open-end ratchet-operated pipe wrench and relates more particularly to pipe wrenches having pawl and ratchet mechanism of the general type illustrated and described in the prior U. S. Patent to Herbert L. Fish, No. 2,578,687, dated December 18, 1951. Various wrenches of this type have been designed to facilitate use in difficult applications such as encircling tubing, conduit, cable, shafting and the like, in close quarters where wrenches of ordinary construction cannot be used, said prior patent being directed to wrenches of the socket type. The present invention relates to a wrench embodying a generally similar ratchet mechanism, with its attendant advantages, but comprises an open-end work gripping element, primarily designed for direct engagement with the periphery of sections of pipe, tubing and the like.

It is the primary object of the present invention to provide a ratchet-operated wrench having an improved head structure and work-turning element, adapted to effect a semi three-point contact in gripping pipe, casing and other cylindrical work.

Another object of the invention is to provide an improved work-turning element having an open jaw area and comprising at least one fixed jaw member and an opposed, spring loaded, gripping jaw member, mounted for movement through an arc which intersects the periphery of the work received by said jaw area.

Another object of the invention resides in the provision of a wrench head comprising a pair of stampings which when super-imposed, form the walls of a housing for the co-acting elements of the pawl and ratchet mechanism, thus simplifying construction and assembly of the wrench parts.

A further object of the invention is to provide in a wrench of this type, an improved hub and cover plate construction which is rotatably supported in the head just referred to, by a novel and improved arrangement, designed to simplify construction while affording a maximum of strength, durability and ease of operation.

A still further object of the invention is to provide a ratchet-operated wrench having a head structure of substantially crescent shape, the concave portion thereof forming an arcuate mouth adapted to receive the periphery of the ratchet-supporting hub and wherein the housing for the head is provided adjacent said mouth, with an arcuate, supporting and guiding trackway for the rotatable hub.

With the above and other objects in view which will appear as the description proceeds, the invention consists in the novel features hereinafter set forth, illustrated in the accompanying drawings and more particularly pointed out in the appended claims.

Referring to the drawings in which numerals of like character designate similar parts throughout the several views:

Figure 1 is a top plan view of the wrench comprising the present invention, with certain parts broken away or in section, to illustrate the construction and assembly of the device;

Figure 2 is a transverse sectional view, taken on line 2—2 of Figure 1, illustrating the relationship of the head and hub;

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Figure 3 is a fragmentary sectional view taken on the line 3—3 of Figure 1, showing the means for connecting the housing stampings;

Figure 4 is a sectional view taken on line 4—4 of Figure 1, showing the spring-loaded gripping jaw of the wrench;

Figure 5 is a sectional view taken on line 5—5 of Figure 1, showing the gripping jaw pivot; and

Figure 6 is a sectional view taken on line 6—6 of Figure 1, showing the index fingers designed to orient the stampings during assembly of the housing.

In the drawings, the wrench head is generally designated by the numeral 7, and as shown in Figure 2, consists of a pair of superimposed stampings 8 and 9, substantially in the shape of an oval crescent, in plan profile, as seen in Figure 1. Each of the stampings 8 and 9, is provided on its convex edge with a right-angularly directed flange 10 which, when the stampings are assembled, jointly form the side wall of a housing. The proper assembly of the stampings is facilitated by the provision of a pair of complementary and interengaging index fingers 11, formed in the adjacent flanges 10 of respective stampings, as seen in Figures 1 and 6. These fingers are arranged to seek cooperative engagement in orienting the stampings during assembly.

Within the housing formed by the stampings 8 and 9, there is provided a spacer-block 12, consisting of a series of metal laminations, shaped to fit closely within the confines of the housing and of a similar plan profile.

The laminations of the spacer-block 12 are transversely drilled at suitable spaced points and provided with bushings 13 for receiving connecting pins or rivets 14 which pass through and secure the stampings 8 and 9. As best seen in Figure 3, the main web of each stamping is formed with openings to receive the rivets 14 and the defining edges of the openings are dimpled as at 15. The opposed dimples of respective stampings extend inwardly of the housing and are received by the corresponding ends of the bushing passageways in the laminations 12, the bushings 13 being of such a length that the opposite end faces of the same are engaged by the inner extremities of respective dimples 15, when the stampings are secured together by the rivets 14.

The central portion of the head 7 is provided with a squared opening 16 which extends through the stampings 8 and 9 and the spacer-block 12, for receiving the squared end of an operating tool or handle shown in dotted lines at 17 in Figure 1. This arrangement is substantially the same as that shown in said prior Patent No. 2,578,687.

The concave side of the crescent-shaped head 7 is semi-circular in contour, to rotatably receive the hub or work turning element of the wrench as will later be described, and the arcuate edge of the lower stamping 9, projects slightly beyond the corresponding edge of the upper stamping 8, as shown in Figure 3, the periphery of the hub being interposed between the extended arcuate edges of the stampings. This projecting edge is bounded by an upstanding arcuate flange 18 which defines in part, the semi-circular opening in the head for receiving the circular hub 19.

The hub 19 is provided with an arcuate groove 20 on its lower side, to slidably receive the complementary flange 18 on the stamping 9 and a similar groove 21 on the upper side of the hub 19, receives an turned complementary flange 22 which bounds a retaining plate 23, mounted on the hub 19 by means of hold-down screws 24. As will be described, this plate holds the movable jaw in place on the hub.

A series of peripheral ratchet teeth 25 bound the hub 19 and co-act with a pair of pawls 26 which are pivotally mounted in suitable recesses 27, formed in the concave face of the block 12, adjacent the periphery of the

hub 19. These pawls are normally urged into engagement with the teeth 25 on the hub 19, by means of springs 28, the pitch of the teeth being such as to clear the pawls upon relative rotation of the hub and head in one direction and to operatively engage the pawls when relative rotation occurs in the opposite direction.

The hub 19 and cover plate 23 are correspondingly slotted as at 29, from one side of the periphery, to accommodate a pipe or conduit to be engaged, said slot terminating in an arcuate inner extremity or jaw area as shown in Figure 1. Two fixed jaw members 30 and 31 are formed integral with the hub and their teeth project into the jaw area of the slot 29, respectively from the central portion and one side of the arcuate terminus of the slot 29. A movable gripping jaw 33, having similarly projecting teeth, is located on the side of the jaw area opposite the fixed jaw 31. This gripping jaw is disposed in a suitable recess 34 in the arcuate face of the hub 19 and is movably supported by a pair of spaced jaw pivots 35, respectively connected to the jaw member 33 and the adjacent wall of the recess 34, to permit a semi-rotational movement of the jaw, into and out of the jaw area of slot 29. The movable jaw and its pivots are maintained in place in their enclosing recess by means of the cover plate 23 as will be seen from Figures 2 and 4.

The double pivotal arrangement of the gripping jaw 33 is preferably such as to permit the jaw to operate through approximately 42°, with a rectilinear movement of approximately 1/8 inch. A loading spring 36 normally urges the jaw 33 into jaw area of the slot 29, to effect engagement with a pipe or tube located therein.

In operation a pipe or conduit is inserted through the mouth of slot 29, into three-point engagement with the jaws 30, 31 and 33. The angle of attack of the jaw pivots 35 sets up a reverse load for the jaw 33 which locks when torque is applied. The jaw 33 will not release and will then permit a continuation of ratcheting of the wrench by the manipulation of the handle of tool 17, the semi-circular mouth of the body 7 permitting the rotation of the ratchet portion, freely from the serrated circumference.

In a wrench such as above described the dimples 15 formed in the stampings 8 and 9, engage the blocks 12 carrying the pawls, and support the loads set up in the use of the wrench, through the webs of the stampings. The hub 19 is supported in all rotative positions through the complementary flange and groove construction shown and the jaw retaining plate 23 acts as a tension web, together with the ratchet, to resist the separating forces taken by the pawls and hub in the operation of the wrench on a pipe or other piece of work in the jaw area.

From the foregoing, it is believed that my invention may be readily understood by those skilled in the art without further description, it being borne in mind that numerous changes may be made in the details disclosed, without departing from the spirit of the invention as set forth in the following claims.

I claim:

1. A pipe wrench of the character described, comprising: a driving element; a work-engaging element rotatably supported by said driving element and adapted to be rotated thereby, said work-engaging element having a work-receiving slot terminating in a jaw area; at least one jaw member fixedly extending from said work-engaging element into said area; a gripping jaw member; a pair of links supporting said gripping jaw member on said work-engaging element adjacent said area for movement into the area; and spring means urging said gripping jaw member into said area.

2. A pipe wrench as set forth in claim 1 in which said jaw member has a series of teeth on one of its sides; said links are pivotally connected to the opposite side of the

gripping jaw member; and said spring presses against a third side of the gripping jaw member.

3. A pipe wrench as set forth in claim 2 in which said links are substantially parallel and of substantially equal length.

4. A pipe wrench as set forth in claim 3 in which said links have cylindrically curved ends; and in which said work-engaging element and said gripping jaw each has a pair of cylindrically curved sockets embracing the ends of the links.

5. A pipe wrench as set forth in claim 4 in which said work-engaging element has a body with a recess to house both said gripping jaw and said pair of links, said recess having a wall closing one end of each socket of said two pairs of sockets; and in which a cover is removably mounted on said body to cover the other end of each socket of said two pairs of sockets.

6. An open-end pipe wrench, comprising: a driving head having an open mouth, defined by an arcuate wall; a driven work turning element insertable in said mouth, said element having a peripheral surface corresponding to the arcuate wall of said mouth and adapted to lie contiguous thereto, in its inserted position; means connecting said driving head and driven element for relative rotary movement; a driving connection between said driving head and driven element; a work receiving slot in said driven element, terminating in a concentric jaw area; a fixed jaw member carried by said work turning element extending into said jaw area; a gripping jaw member; a pair of links supporting said gripping jaw member on said work turning element adjacent said area for movement thereinto; and resilient means urging said gripping jaw member into said area.

7. An open end pipe wrench, comprising: a pair of stampings, each including a web element and a flange at least partially circumscribing said web element, said stampings adapted to be superimposed with the end surfaces of said flanges in facewise engagement to form a housing; a spacer member mounted within said housing; each stamping having an opening mutually registering with the opening of the other stamping; a hub; guide means on one of said stampings for mounting said hub for rotative movement; means on the other stamping for holding the hub engaged with said guide means; an annular series of ratchet teeth formed about the periphery of said hub; at least one pawl mounted on said spacer member for pivotal movement; a spring element holding the pawl in engagement with said ratchet teeth, whereby the pawl engaged with the ratchet teeth rotatably drives said hub as the housing is rotated, said hub having a work-receiving slot formed therein terminating in a concentric jaw area; a fixed jaw member carried by said hub extending into said jaw area; a gripping jaw member; link means supporting said gripping jaw member on said head adjacent said area for movement thereinto; and resilient means urging said gripping jaw into said area for engagement with a workpiece as said hub is rotatably driven.

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