

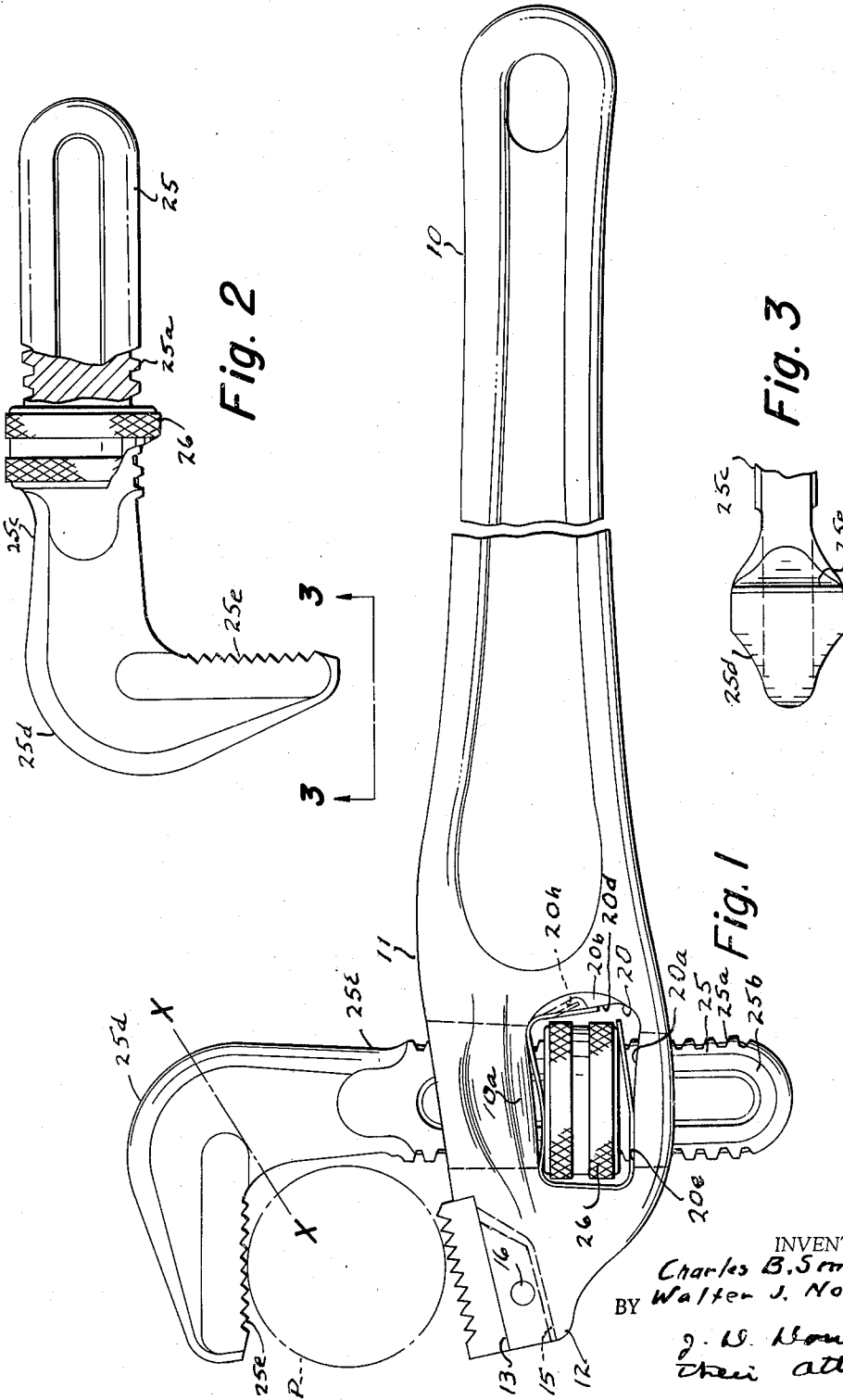
Oct. 12, 1965

C. B. SMALL ET AL  
SLIDING JAW WRENCH HAVING A NUT FULCRUM  
POSITIONED BY SPRING MEANS

3,211,030

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2 Sheets-Sheet 1



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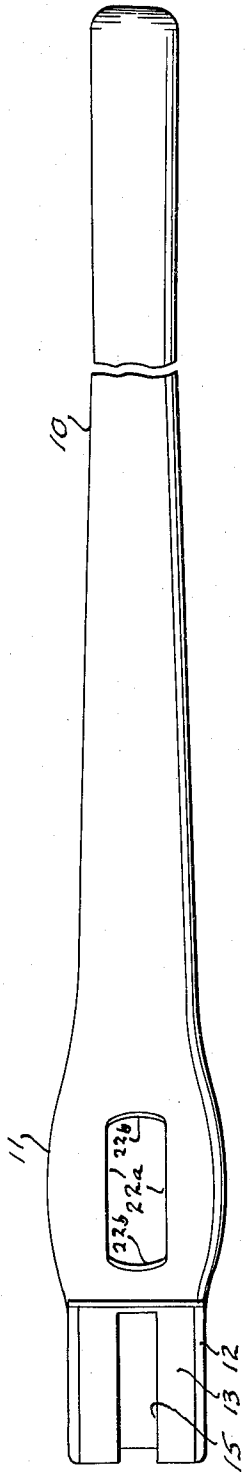


Fig. 4

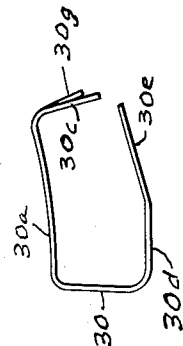


Fig. 5

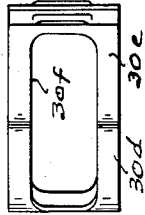


Fig. 6

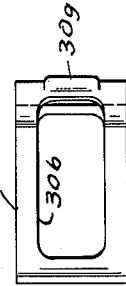


Fig. 7

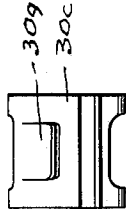


Fig. 8

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3,211,030

**SLIDING JAW WRENCH HAVING A NUT FULLY POSITIONED BY SPRING MEANS**

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4 Claims. (Cl. 81—101)

This invention relates to improvements in wrenches and more particularly to a pipe wrench having jaws, which open parallel to the axis of the handle, such as shown in United States Patents 1,052,313; 1,424,381, and 1,766,458.

Although there have been many pipe wrenches with end opening jaws, such as those listed above, there have been numerous deficiencies in such wrenches due to their design which resulted in inferior operation.

Among the problems of the prior art may be included the fact that the hook and heel jaws could not be brought as close together as was desirable, due to the fact that the shanks of the hook jaws were not threaded far enough toward the pipe engaging part of the jaw, thus limiting the range of sizes of articles which could be engaged. In addition, such a wrench should include a spring between the hook jaw and the wrench housing for holding the hook jaw in the proper position to enable the ratcheting action necessary to its operation. The prior devices had housings which limited the use of springs and were such that the spring did not achieve the most desirable positioning of the hook jaw. In addition, during the operation of the wrench, the action was such that the spring became distorted from its original conformation and either made it ineffective or caused it to break. Furthermore, the springs of the prior art were difficult to install and when the hook jaw was removed, they often fell out.

Another problem included the fact that the design of the housing was such that limitations in its use were present, due to weakness of the housing at certain points where there should be increased strength.

The present invention contemplates an improved construction which enables a wrench to be made of the lighter metals, such as aluminum or magnesium, and one wherein the above deficiencies are largely eliminated.

The design of the spring for positioning the hook jaw is such that it not only retains itself in the housing when the hook jaw and nut are removed, but also holds the nut in position for engagement with the hook jaw when the hook jaw is removed. It also protects the housing against damage due to the rocking action of the hook jaw and nut. In addition, it exerts a friction on the nut which holds it against accidental turning, thus enabling the hook jaw to be maintained in a predetermined adjusted position relative to the heel jaw. It is also so designed that it does not become permanently distorted due to the pressure of the nut against the spring which is pressed against the walls of the housing when the wrench is used, since it has no sharp bends or bights.

Still other advantages of the invention and the invention itself will become more apparent from the following description of an embodiment thereof, which description is illustrated by the accompanying drawings and forms a part of this specification.

In the drawings:

FIG. 1 is a side elevational view of a wrench embodying the invention;

FIG. 2 is a view of the hook jaw removed from the housing, with the nut being shown in fragment on the hook jaw shank;

FIG. 3 is a fragmentary view of the end of the hook jaw from the line 3—3 of FIG. 2;

FIG. 4 is a plan view of the handle with the hook jaw removed; and

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FIGS. 5 to 8 inclusive are side, top, bottom and end views respectively of the hook jaw positioning spring.

Briefly, the invention contemplates a handle having at one end a stationary heel jaw and spaced from the end a hook jaw housing having a hook jaw receiving opening extending through the housing for the reception of the shank of a hook jaw. Windows in the side of the housing intersect said opening and are arranged for the reception of a hook jaw adjusting nut. A movable hook jaw has a threaded shank that is slidably and rockably disposed in hook jaw receiving opening and the adjusting nut, disposed in the windows, is threaded on the shank for adjusting the spacing of the hook jaw relative to the heel jaw. A spring is provided which surrounds the shank of the hook jaw and also surrounds the adjusting nut, to keep the hook jaw properly positioned in the opening. The spring holds the nut in position and it in turn holds the hook jaw properly positioned.

More specifically there is provided a handle 10 which is of generally I shaped cross-section. The handle gradually enlarges toward the left end, as viewed in the drawings, and merges with a hook jaw housing 11. Beyond the hook jaw housing there is a short extension 12, the upper side of which is formed with a seat 13 for a heel jaw. The heel jaw is provided with a tongue which extends into a groove 15, and is held in place on the seat by a pin 16.

The window openings 20 extend through the housing and each is of generally trapezoidal formation, except that the lower wall 20a is slightly curved upward. On the handle side, the wall of the opening is formed with a curved depression 20b which increases the clearance for operation of the nut by the fingers.

A hook jaw receiving opening 22 extends through the handle at right angles to and intersecting the window openings. As shown in FIG. 4, the side walls 22a of the hook jaw openings are straight and parallel, while the end walls 22b are curved transversely and wider apart at the top, being inclined toward each other toward the bottom, as shown by the dotted lines on FIG. 1.

A hook jaw is slidably journaled in the opening 22 and includes a shank 25 of generally rectangular cross section, the opposite edges of which are provided with threads 25a generally of the Acme type. The sides of the shank are provided with raised and polished bosses 25b, each of which extends around the side of the shank adjacent the threads and end, and provide good slidable bearing surfaces for the shank with the walls 22a of the housing.

At the end of the threads the shank is necked down at 25c and then gradually widens out and merges with the hook jaw end 25d which has the usual teeth 25e facing toward the teeth 14a on the heel jaw.

A nut 26 is threaded on the shank 25 of the hook jaw in the window 20 and may easily be engaged by the fingers for rotation and adjustment of the hook jaw relative to the heel jaw because of the fact that the housing 11, although generally thicker than the remainder of the wrench, is slightly thinner adjacent the window. At the same time the housing is provided with raised ribs 10a on opposite sides of the housing adjacent the upper sides of the window whereby, when it is laid down flat on a surface, the ribs prevent the nut from engaging with the surface, and its particular adjustment is not disturbed.

A hook jaw positioning spring is provided, the primary purpose of which is to hold the hook jaw with its shank tilted forward between the walls 22b and yet permit it to tilt backward within the limits of these walls.

Although the spring about to be described is particularly suitable for use in conjunction with wrenches of the particular character described, it is apparent that it is also useful in conjunction with conventional pipe wrenches of

the character as shown in FIGS. 1 to 7 inclusive of Patent No. 1,778,748 of October 2, 1930.

As best shown in FIGS. 5 to 8 inclusive, the spring includes a vertical end part 30 of generally rectangular formation which is designed to engage with the forward wall 20c of the window opening. It has an upper part 30a which, at its junction with the vertical end, extends at right angles from the end 30 and then curves upwardly progressively away from the end part. This portion of the spring is provided with a generally rectangular opening 30b through which the hook jaw shank extends. The end of the part 30a, remote from the part 30, engages with the upper right-hand corner of the walls defining the opening, which at this point is an obtuse angle. The intermediate part bows downwardly away from the upper wall of the opening. At the extremity the part 30a is joined with a downwardly extending part 30c, which engages with the end wall 20d of the opening. The bottom leg of the spring joins with the part 30 and has a part 30d extending at right angles to the part 30 and engaging with the wall 20e of the opening for a short distance and then bends up to 30e to provide an end part which engages with the bottom side of the nut 26 near its edge. It also has a window opening 30f for the passage of the shank 25 of the hook jaw.

It will thus be seen that the spring has the parts 30, parts of 30a and 30d which engage with the walls of the opening, and, parts 30a and 30e which engage with the nut. The bowed down central portions of 30a enters into the hole in the nut alongside of the shank 25 of the hook jaw. The nut is normally held in the opening with the upper end substantially parallel to the upper wall of the opening and it in turn holds the shank of the hook jaw with the jaw in a forward position over the heel jaw which is in its proper position for engagement with a pipe. In the drawings the hook jaw is shown in the position it would be upon engagement with a pipe P.

On the leg 30c there is provided a tongue 30g which is struck from the tongue and which engages in a recess 20h in the wall 20d of the window opening to hold it in the opening. Due to the fact that the spring engages with the nut, the nut will not fall out of the opening, should the hook jaw be removed.

As previously stated, the housing may be made of an alloy of aluminum and the spring provides a hard steel seat for the nut which prevents the nut from gouging the housing when the hook jaw and nut are tilted as they do during the use of the device.

It will be appreciated by those versed in the art that during the operation of the device there is a rocking action of the hook jaw in the housing. When it rocks backward or to the right, as viewed in the figures, it allows the distance between the hook and heel jaw teeth 25e and 14a to increase and the teeth to ratchet over the article being turned. When it rocks to the left or forward, this distance decreases and causes the teeth to grip the article being turned.

The design of the spring as described is such that there are no sharp bends or bights which are flattened out permanently by the rocking of the nut and the pressure that is exerted by the nut on the spring which is pressed against the housing. Therefore, regardless of hard usage, the spring, although temporarily distorted, always turns to its original form, holding the hook jaw in its proper position. It will also be noted that the bend between the parts 30d and 30e of the spring is forward of the center of the hook jaw shank. This spring loads the hook jaw toward its forward position. Because there are no sharp bends there is less fatigue on the spring and it lasts longer.

As previously stated, the shank of the hook jaw is designed with a necked down part 25c adjacent the threaded portion. This permits the nut to be threaded further toward the jaw end of the hook jaw which can be drawn down until the teeth 25e are in close proximity to the heel jaw teeth 14a.

It will be noted that the conformation of the hook jaw is such that it is widest at the points  $x-x$ , which increases the strength materially.

Having thus described the invention in an embodiment thereof, it is appreciated that numerous and extensive departures may be made therefrom without departing from the spirit or scope of the invention as defined in the appended claims.

We claim:

1. A wrench having a handle with a heel jaw on the end of the handle and a hook jaw housing adjacent the heel jaw, said housing including a first opening through the housing and a hook jaw slidably disposed in said opening and a second opening extending transversely to and intersecting the first opening and a nut disposed on said shank in said second opening, the improvement which comprises means for positioning the nut in said opening and hence the hook jaw in its opening including a spring having a first portion in engagement with the wall of said second opening at one side of the nut, a second bowed portion extending over and toward the end of the nut and around the hook jaw shank and with part of the bowed portion extending into the space between the nut and the hook jaw shank and then upward and having a portion engaging with said wall at an opposite side of the nut and a third portion extending opposite to the nut on the end thereof opposite to the second portion and engaging with the wall and having a portion extending upward toward and into engagement with the opposite end of the nut adjacent the opposite side, said last portion holding the nut under spring tension and tilting the hook jaw shank in its opening with the teeth of the hook jaw over the heel jaw.

2. A device as described in claim 1, wherein said spring provides portions interposed between the nut and the wall of the window opening to protect the said wall against abrasion by the nut.

3. A pipe wrench including a handle with a hook jaw housing at one end and a heel jaw, said housing being formed to provide an opening for the shank of the hook jaw and a second window opening for the reception of an adjusting nut on the hook jaw, said window being defined by walls arranged generally in the form of a trapezoid and including wall portions which intersect the hook jaw channel and that diverge from each other toward the back edge of the hook jaw, the wall on the side toward the end of the hook jaw shank being slightly convex, a nut threaded on said shank, a spring for engagement with certain walls of the second opening comprising a first portion in close engagement with the forward walls and adjacent portions of the top and bottom walls and a top portion bowed downward and extending to the nut alongside said shank and having an end on the top portion which engages the intersection of the top and back wall, and a bottom portion which extends from the forward wall along and in contact with the bottom wall to a point intermediate the ends of the bottom wall and then extends upward into engagement with the bottom edge of said nut rearwardly of said shank.

4. A wrench as described in claim 3, wherein one of the walls defining the window opening is formed to provide a recess and said spring is provided with a projection extending into the recess to hold the spring in said window opening.

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