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SLIDABLE JAW FACE, SLIDABLE OUTER JAW WRENCH

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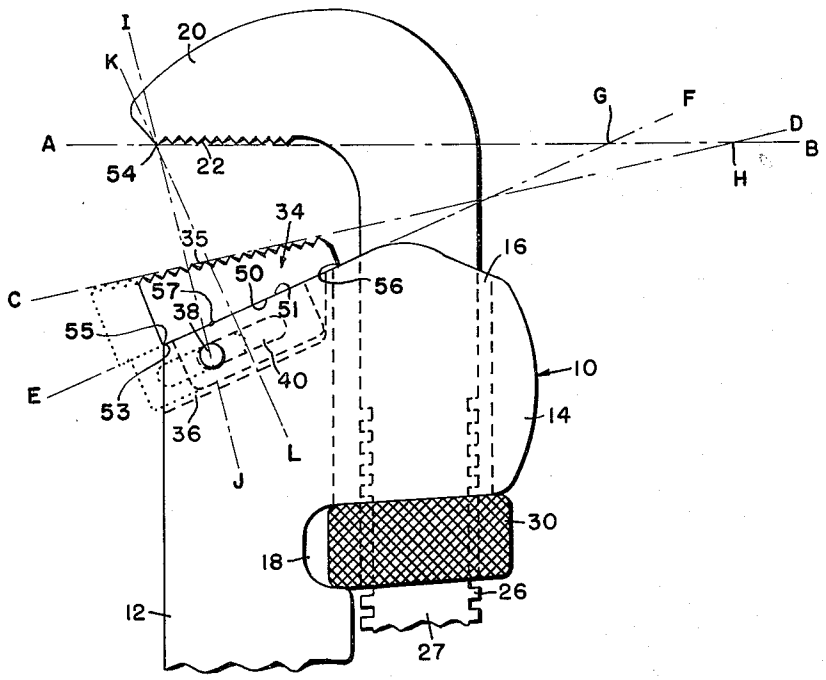

FIG. 1

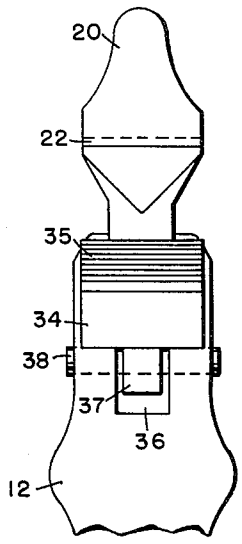

FIG. 3

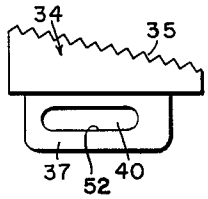

FIG. 4

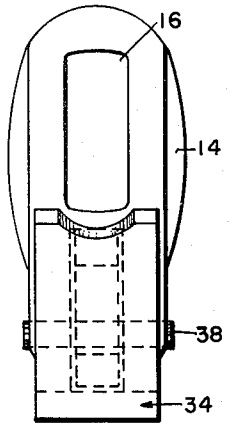

FIG. 2

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SLIDABLE JAW FACE, SLIDABLE OUTER JAW WRENCH

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2 Claims. (Cl. 81—179)

This invention relates to a new and improved wrench having at least one slidably-mounted jaw, and more particularly relates to a new and improved pipe wrench having a slidable heel jaw.

Up to the present time there have been proposed and used a wide variety of adjustable pipe wrenches. One of the most common prior types of pipe wrench comprises a handle having a stationary so-called "heel jaw" at one end, an adjustable so-called "hook jaw," comprising an inverted L-shaped element, extending through a lateral extension of, or separate housing on, the handle and a knurled nut associated therewith threadedly to engage a threaded lower portion of the hook jaw extension and thereby to adjust the spacing of the cooperating jaws.

Such wrenches are widely used and, depending on their size and strength, are effective in gripping pipe. However, such wrenches, once adjusted as to jaw spacing, require further turning of the adjusting nut to alter the jaw spacing as use is required on a different sized pipe or fitting, e.g., in going from a pipe to the connected pipe elbow or other conventional fitting which typically is of a somewhat larger or smaller size.

The principal object of this invention is the provision of a novel wrench construction which avoids this difficulty and at the same time provides a unique self-tightening action.

A further object of the invention is to provide a new and improved pipe wrench.

These and other objects and advantages of the invention will more fully appear from the following description thereof.

Referring now to the accompanying drawing:

Fig. 1 is an elevational view, with parts broken away, of a pipe wrench embodying the invention;

Fig. 2 is a top view of the wrench shown in Fig. 1 with certain parts broken away for clarity;

Fig. 3 is a fragmentary front view of the wrench shown in Fig. 1; and

Fig. 4 is an elevational view of a slidable heel jaw of this invention.

It will be appreciated that a wrench of this invention comprises, in a broad sense, a pair of cooperating jaws, defining therebetween in most instances an angle greater than 0°, i.e., the outer or free ends of the jaw faces generally are equally spaced from or are further apart than the two opposite inner ends, means to adjust the jaws toward and away from each other and to apply turning pressure to an article disposed therebetween, at least one of the jaws being slidable with respect to the other. In general, the slidable jaw movement is at an angle with respect to the jaw face of the other jaw of substantially less than 45°; stated in another manner, the slidable movement of the slidable jaw is desirably at an angle of 0° or greater but less than 45° with respect to the other jaw. A preferred direction of slidable jaw movement is in a straight line, defining an outwardly diverging jaw face spacing, at an angle of about 5° to 30°, preferably

24°, with respect to the face of the stationary jaw; with such an angular direction of slide, a presently preferred slidable jaw face angle is about 12° with respect to the stationary jaw face, i.e., with jaws opening to the left 12° measured in a counterlockwise direction. Thus, it will be appreciated that the outwardly-opening angle between the flat slidable jaw face and the flat stationary jaw face desirably is about 0° to 20°, preferably 12°, although a larger angle also may be used if desired, e.g., up to 45°.

Referring now to the accompanying drawing, as shown in Fig. 1, a wrench **10** of this invention comprises a handle **12** of a suitable length dictated by the size of the article to be gripped and the proportions of the other wrench elements, a typical handle length for a wrench adapted to grip pipe of about ⅛ to ½ inch diameter being about six inches; a handle length of up to about 48 inches may be employed when a wrench adapted to grip pipe of a diameter of up to five inches or more in diameter is desired.

The handle **12** is provided at its upper end with a lateral or side extension **14** having a longitudinally extending opening **16** therethrough. Beneath the extension **14** is a transverse cut out portion **18** in the handle.

Operatively disposed in opening **16** is an inverted L-shaped hook jaw **20** provided with a horizontal jaw face **22** including parallel rows of pipe-gripping teeth and having threads **26** at its lower end, the free end or hook jaw leg **27** terminating at a point dictated by the size of the article to be engaged between the jaws of the wrench; a typical wrench of this invention would have a hook jaw with a lower end **27** terminating at about the point shown with the irregular line in Fig. 1.

Hook jaw **20** is movable via the threads **26** on end **27** in engagement with a knurled, internally-threaded cylindrical nut **30** disposed about the threads **26** and engaged longitudinally via cutout portion **18** in handle **12**. Thus, it will be appreciated that turning of nut **30** raises or lowers hook jaw **20** and thereby moves jaw face **22**.

Situated at the upper end of handle **12** is a slidable heel jaw **34** provided with a jaw face **35** including parallel rows of pipe gripping teeth. Jaw **34** is freely movable as a unit at an angle, e.g., of about 24° (jaw face moving at an angle of about 12°) below the horizontal in a central recessed portion **36** of the upper portion of the handle **12** and is guided and held in place by a transverse pin **38** extending through the upper end of the handle and through a slot **40** in a central depending lower blade-like portion **37** of the jaw **34**. The slidable movement of the heel jaw **34** is shown generally by the dotted lines in Fig. 1, the extent of slidable movement typically, in a wrench of the size shown in the drawing being that afforded by a slot **40** having a length of about 0.75 inch.

The heel jaw **34** has a slidable bearing surface **50** which slidably fits against a flat bearing surface **51** on the handle **12**. As shown in Figure 1, the flat bearing surface **51** and the jaw face **22** define a first acute angle therebetween in the neighborhood of 24 degrees. The acute angle is represented by the included angle between the lines A—B and the lines E—F with the apex at the point G. The jaw face **22** and the jaw face **35** defining a second acute angle therebetween of substantially 12 degrees. The second acute angle is represented by the included angle between the lines C—D and the lines A—B with the apex at the point H. The slot **40** has an elongated holding surface **52** which is adapted to engage the transverse pin **38** for slidably holding the slidable bearing surface **50** against the flat bearing surface **51**. The elongated holding surface **52** and the transverse pin **38** are slidably movable relative to each other between first and second stop limit-

ing positions and thereby correspondingly enables movement of said jaw face 35 relative to the jaw face 22 between said first and second stop limiting positions. In Figure 1, the jaw face 35 is shown in the first stop limiting position, and the dotted lines in Figure 1 show the jaw face 35 in its second stop limiting position. The jaw face 35 is closer to the jaw face 22 in the first stop limiting position than in said second stop limiting position for the same adjustable setting of the hand-turnable nut. The flat bearing surface 51 and the jaw face 22 have respectively outer terminating edges 53 and 54 substantially opposite each other. The slidable bearing surface 50 has outer and inner terminating ends 55 and 56, respectively. The outer terminating end 55 of the slidable bearing surface 50 substantially registers with the outer terminating edge 53 of the flat bearing surface with said jaw face 35 in said first stop limiting position. The outer terminating end 55 extends beyond the outer terminating edge 53 with the jaw face 35 in the second stop limiting position. The transverse pin 38 is located on a handle in a region between the terminating edge 53 of the flat bearing surface 51 and a line K—L drawn perpendicular to the flat bearing surface 51 and passing substantially through the outer terminating edge 54 of the jaw face 22. More specifically, the pin 38 is located on the handle in a region lying substantially on a line I—J which is drawn perpendicular to the jaw face 35 and passing substantially through the outer terminating edge 54 of the jaw face 22. This means that the pin 38 is closer to the outer terminating end 55 than it is to the inner terminating end 56 with the jaw face 35 in the first stop limiting position.

The pin 38 and the elongated holding surface 52 have a machine clearance therebetween, and the slidable bearing surface 50 and the flat bearing surface 51 have a machine clearance therebetween. This machine clearance provides for easy sliding of the heel jaw 34 relative to the handle. The heel jaw 34 may be rotated through a very small angle limited by the machine clearance, with the center of rotation being where the slidable bearing surface 50 rests against the terminating edge 53. This rotation enables the upper terminating end 56 to be spaced substantially four times the distance away from the flat bearing surface 51 as the point 57 is spaced from the flat bearing surface 51, the point 57 being a point on a circle having as its center the terminating edge 53 and passing through the center of the pin 38. If the machine clearance were normally .030 of an inch between the pin and the elongated holding surface 52, then the clearance at the point 57 would be approximately .030 of an inch and the clearance at the terminating end 56 would be substantially .120 of an inch. The reason for the wider clearance at the terminating end 56 than at the point 57 is the fact that the terminating end 56 is substantially four times the distance away from the terminating edge 53 as the point 57. The wider clearance at the terminating end 56 results from the fact that the pin 38 is located in a region closer to the terminating edge 53 than it is to the terminating end 56. This increase in clearance enables the heel jaw 34 to slide freely with respect to the handle even though the exposed edges of the flat bearing surface 51 and the slidable bearing surface 50 may become marred or dented from use of the tool.

As shown in Fig. 2, wherein the parallel teeth of jaw face 35 are omitted for clarity, the inner end of the heel jaw is provided with a curved cutout adapted to permit closer contact with the leg portion of the hook jaw 20.

In using a wrench of this invention, it will be appreciated that by providing a slidable jaw 34 in the manner indicated, it is possible to engage between the jaw faces 22 and 35 pipes or other articles of different diameters or sizes without having to turn nut 30 to alter the basic jaw spacing. Thus, it will be understood that it is possible to adjust a wrench of this invention to grip a pipe and be able equally well to grip an elbow or other pipe fitting of different diameter to be engaged on said pipe by virtue of the variable jaw spacing which, for a given adjustment of nut 30, is dependent on the position of slidable jaw 34 with respect to the handle 12. The advantages of this feature are obvious since it will be appreciated that it no longer is necessary to use two hands to adjust the jaw spacing repeatedly as the wrench is used.

Moreover, a further singular advantage of a wrench of this invention is that a high degree of self-tightening action is provided by the slidable jaw action. Thus, referring to Fig. 1, it will be understood that as a pipe is gripped between the jaw faces 22 and 35 and clockwise pressure applied to the handle 12, it will be appreciated that jaw 34 will tend to slide upwardly thereby reducing the jaw spacing and effectively tightening the gripping action of the wrench to prevent slippage.

The various components of a wrench of this invention can be formed of any suitable high strength material now usually used in the manufacture of pipe wrenches. Thus, illustrative materials of construction are various steels, e.g., tool steel, alloy steel, and the like.

It is to be understood that, although the invention has been described with specific reference to particular embodiments thereof, it is not to be so limited since changes and alterations therein may be made which are within the full intended scope of this invention as defined by the appended claims.

I claim:

1. A pipe wrench comprising, in combination, a handle provided at one end with a lateral extension portion having a longitudinally extending opening therethrough and said handle having at the same end a flat bearing surface having a recess portion, an L-shaped hooked jaw member having first and second angularly related portions, said first angularly related portion having a first jaw face and said second angularly related portion having thread means thereon, said second angularly related portion extending through said longitudinally extending opening, a heel jaw member having a slidable bearing surface and a second jaw face, said slidable bearing surface slidably fitting against said flat bearing surface with said second jaw face disposed opposite said first jaw face on said L-shaped member, a hand-turnable nut engaging said handle and said thread means for adjustably setting the space between said first and second jaw faces, said heel jaw member having a holding portion projecting from said slidable bearing surface and extending into said recess portion, said holding portion having an elongated holding surface, transverse pin means mounted on said handle and extending across said recess portion, said transverse pin means being engageable by said elongated holding surface to slidably hold said slidable bearing surface of said heel jaw member against said flat bearing surface, said elongated holding surface and said transverse pin means being slidably movable relative to each other between first and second stop limiting positions and thereby correspondingly enabling movement of said second jaw face relative to said first jaw face between said first and second stop limiting positions, said first and second jaw faces being closer together in said first stop limiting position than in said second stop limiting position for the same adjustable setting of said hand-turnable nut, said flat bearing surface and said first jaw face defining a first acute angle therebetween and said first and second jaw faces defining a second acute angle therebetween less than said first acute angle, said flat bearing surface and said first jaw face having respectively outer terminating edges substantially opposite each other, said slidable bearing surface having outer and inner terminating ends, said outer terminating end of said slidable bearing surface substantially registering with said outer terminating edge of said flat bearing surface with said second jaw face in said first stop limiting position and extending beyond said outer terminating edge of said flat bearing surface with said second jaw face in said second stop limiting position, said transverse pin means located on said handle in a region between said terminating

edge of said flat bearing surface and a line perpendicular to said flat bearing surface and passing substantially through said outer terminating edge of said first jaw face.

2. A pipe wrench comprising, in combination, a handle provided at one end with a lateral extension portion having a longitudinally extending opening therethrough and said handle having at the same end a flat bearing surface having a recess portion, an L-shaped hooked jaw member having first and second angularly related portions, said first angularly related portion having a first jaw face and said second angularly related portion having thread means thereon, said second angularly related portion extending through said longitudinally extending opening, a heel jaw member having a slidable bearing surface and a second jaw face, said slidable bearing surface slidably fitting against said flat bearing surface with said second jaw face disposed opposite said first jaw face on said L-shaped member, a hand-turnable nut engaging said handle and said thread means for adjustably setting the space between said first and second jaw faces, said heel jaw member having a holding portion projecting from said slidable bearing surface and extending into said recess portion, said holding portion having an elongated holding surface, transverse pin means mounted on said handle and extending across said recess portion, said transverse pin means being engageable by said elongated holding surface to slidably hold said slidable bearing surface of said heel jaw member against said flat bearing surface, said elongated holding surface and said transverse pin means being slidably movable relative to each other between first and second stop limiting positions and thereby correspondingly enabling movement of said second jaw face relative to said first jaw face between said first and second stop limiting positions, said first and second jaw faces being closer together in said first stop limiting position than in said second stop limiting position for the same adjustable setting of said hand-turnable nut, said flat bearing surface and said first jaw face defining a first acute angle therebetween and said first and second jaw faces defining a second acute angle therebetween less than said first acute angle, said flat bearing surface and said first jaw face having respectively outer terminating edges substantially opposite each other, said slidable bearing surface having outer and inner terminating ends, said outer terminating end of said slidable bearing surface substantially registering with said outer terminating edge of said flat bearing surface with said second jaw face in said first stop limiting position and extending beyond said outer terminating edge of said flat bearing surface with said second jaw face in said second stop limiting position, said transverse pin means located on said handle in a region between said terminating edge of said flat bearing surface and a line perpendicular to said flat bearing surface and passing substantially through said outer terminating edge of said first jaw face, said region being substantially on a line perpendicular to said second jaw face and passing through said outer terminating edge of said first jaw face.

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