United States Patent [19]

Knight

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[54] **CHAIN WRENCH**

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[52] **U.S. Cl.** **81/69,** 81/65, 269/131

[51] **Int. Cl.** **B25b 13/52**

[58] **Field of Search** ..... 81/57.15-57.17, 57.33, 81/57.34, 53 R, 53 A, 64, 65, 68, 69; 269/130, 131; 30/100

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[57] **ABSTRACT**

A chain wrench has an elongated handle which is connected to a jaw member through an eccentric. Rotational movement of the handle member relative to the jaw causes rotation of the eccentric and tightening of the chain around a pipe, tube, or similar article. Movement of the eccentric over its center position causes the wrench to be locked in position about the pipe. The degree of eccentricity of the eccentric is adjustable to vary the tightness of the chain around the pipe.

9 Claims, 8 Drawing Figures

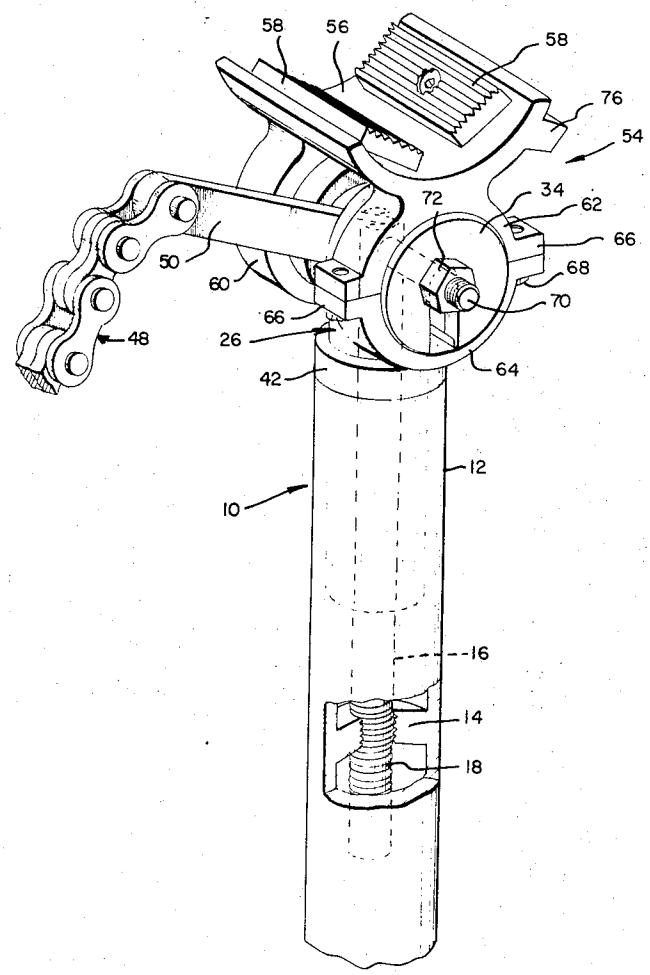
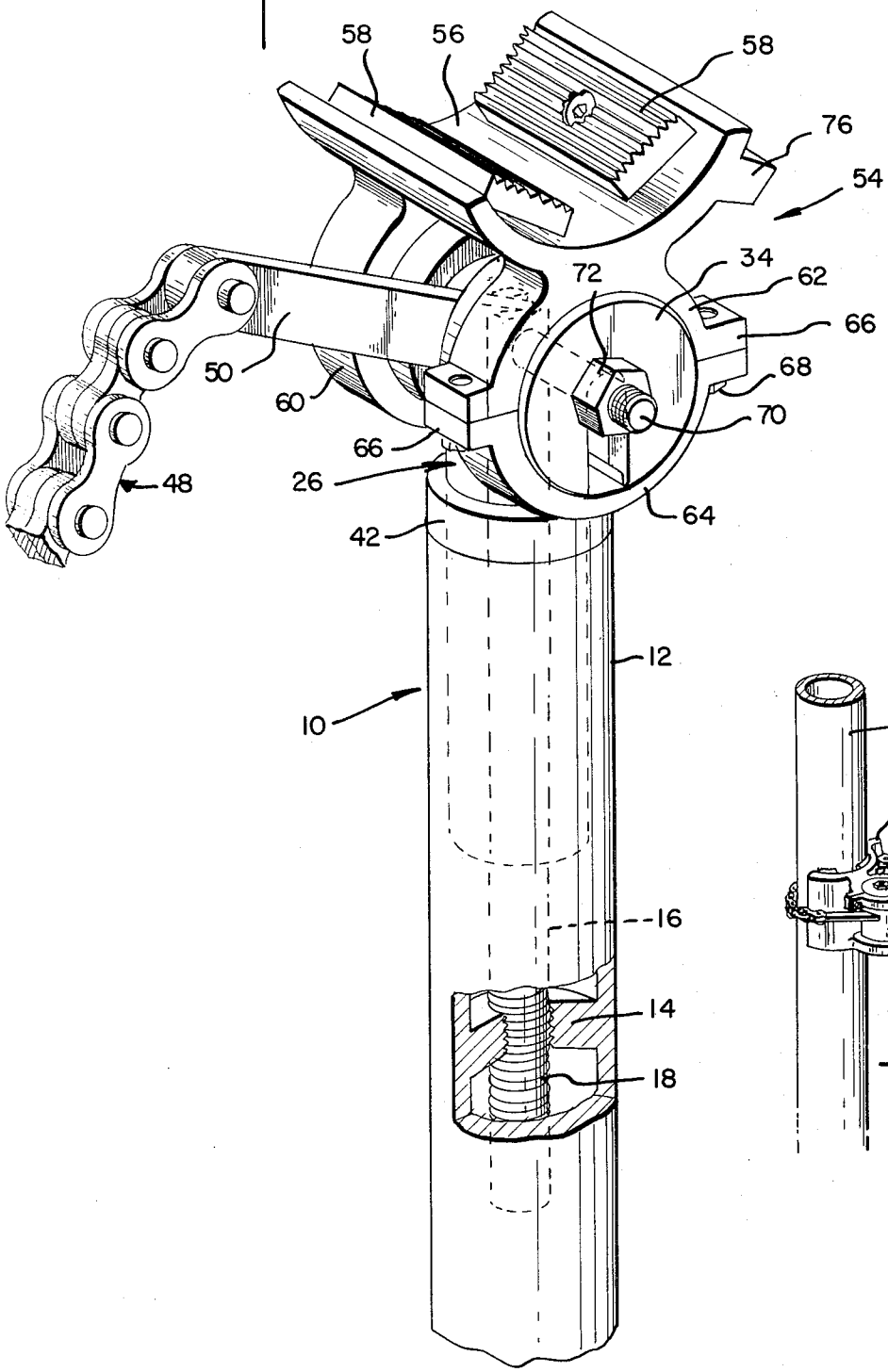


Fig. 1


58
56
58
76
54
34
62
72
66
68
70
50
60
66
26
48
64
42
12
10
16
14
18

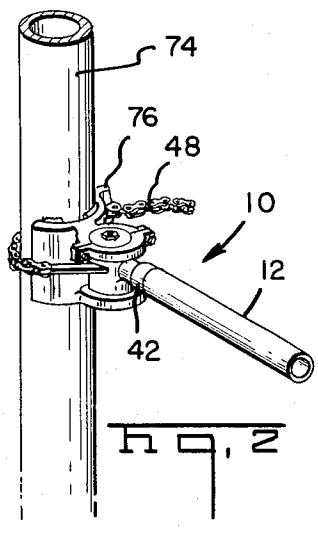

74
76
48
10
12
42

Fig. 2

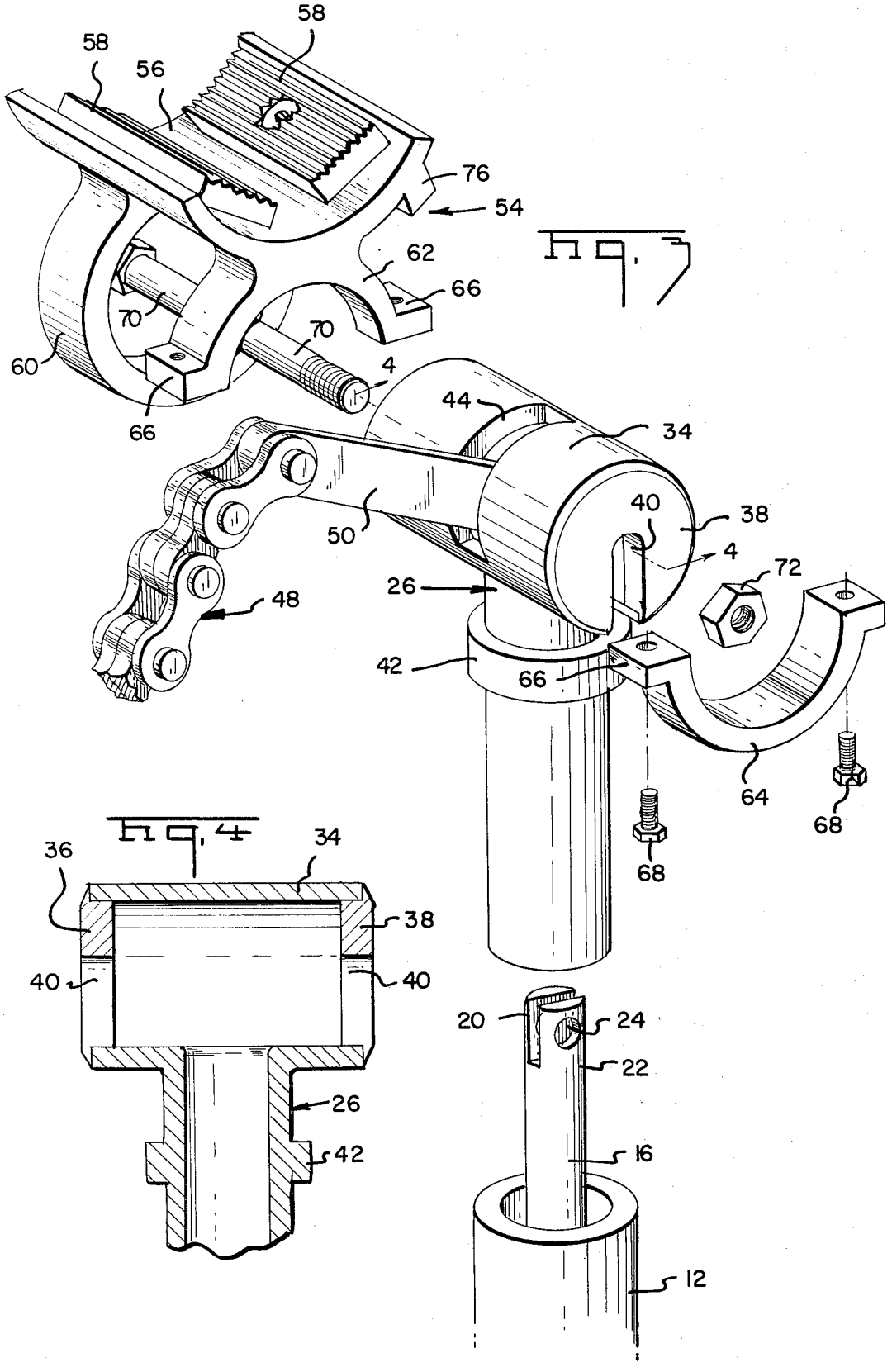

58
58
56
76
54
62
66
70
70
60
66
4
44
34
40
38
50
4
72
26
48
42
66
64
68
68

Fig. 7

36
34
38
40
40
26
42

Fig. 4

20
24
22
16
12

Fig. 5

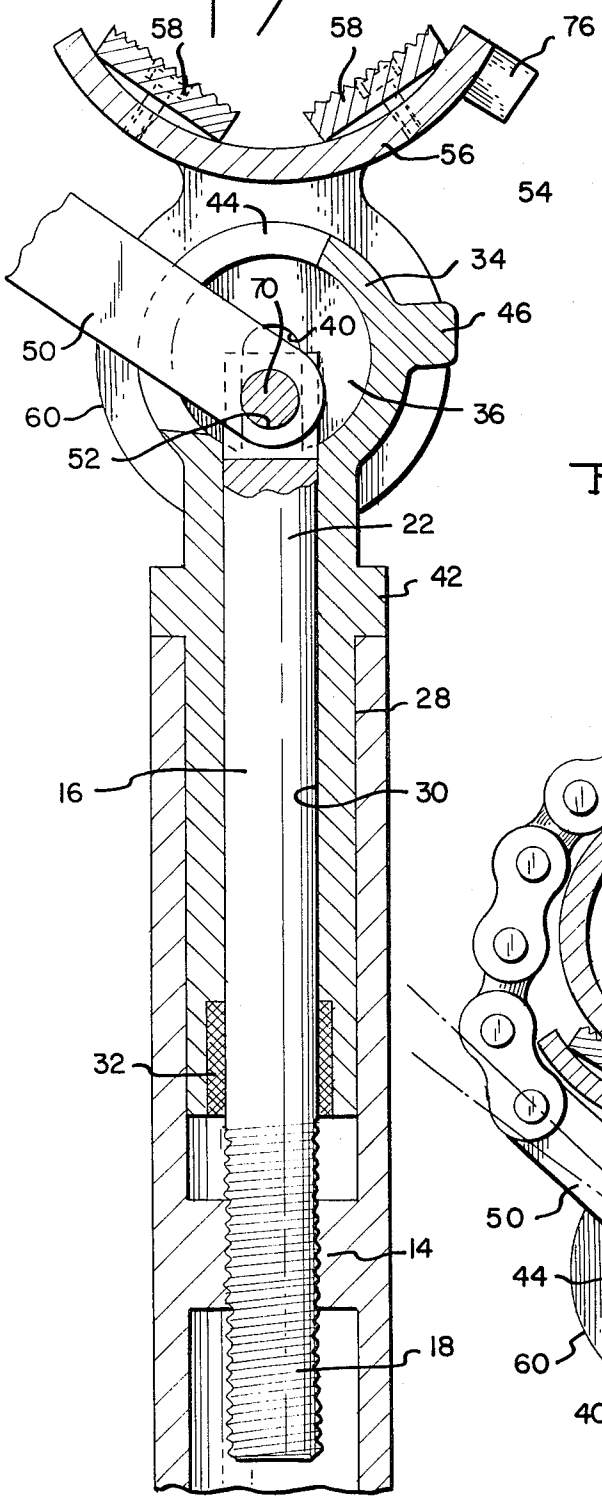


Fig. 6

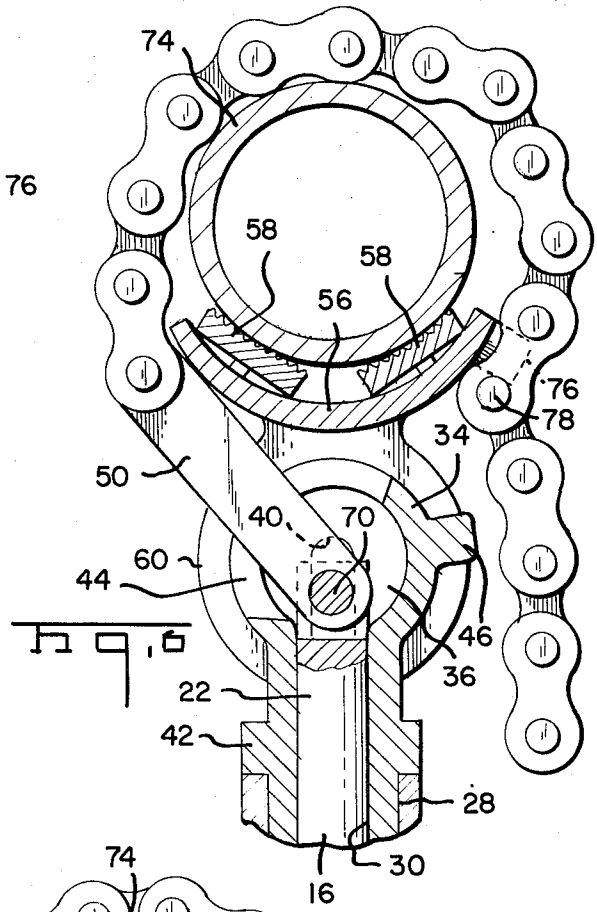
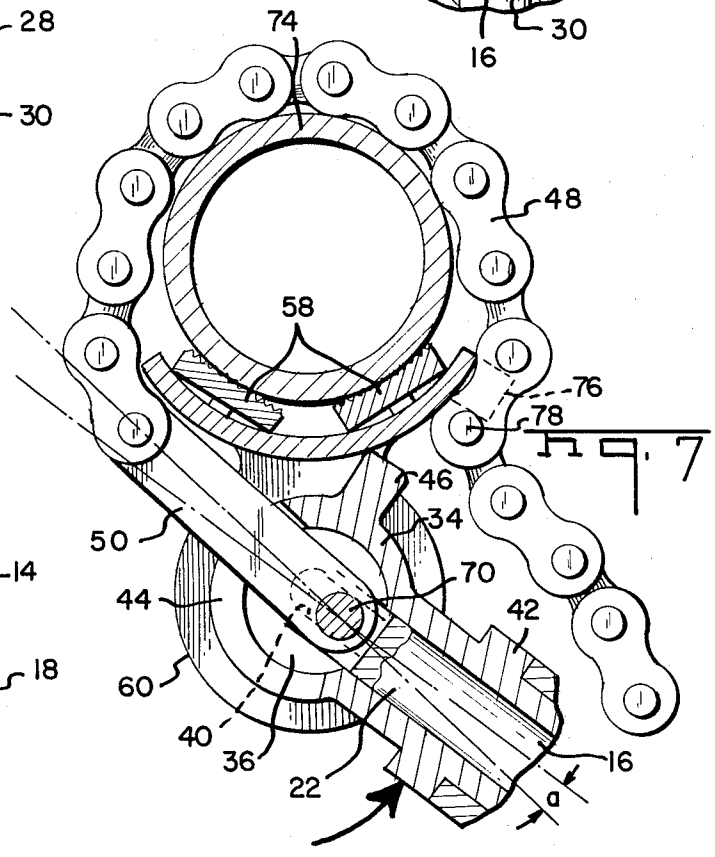


Fig. 7



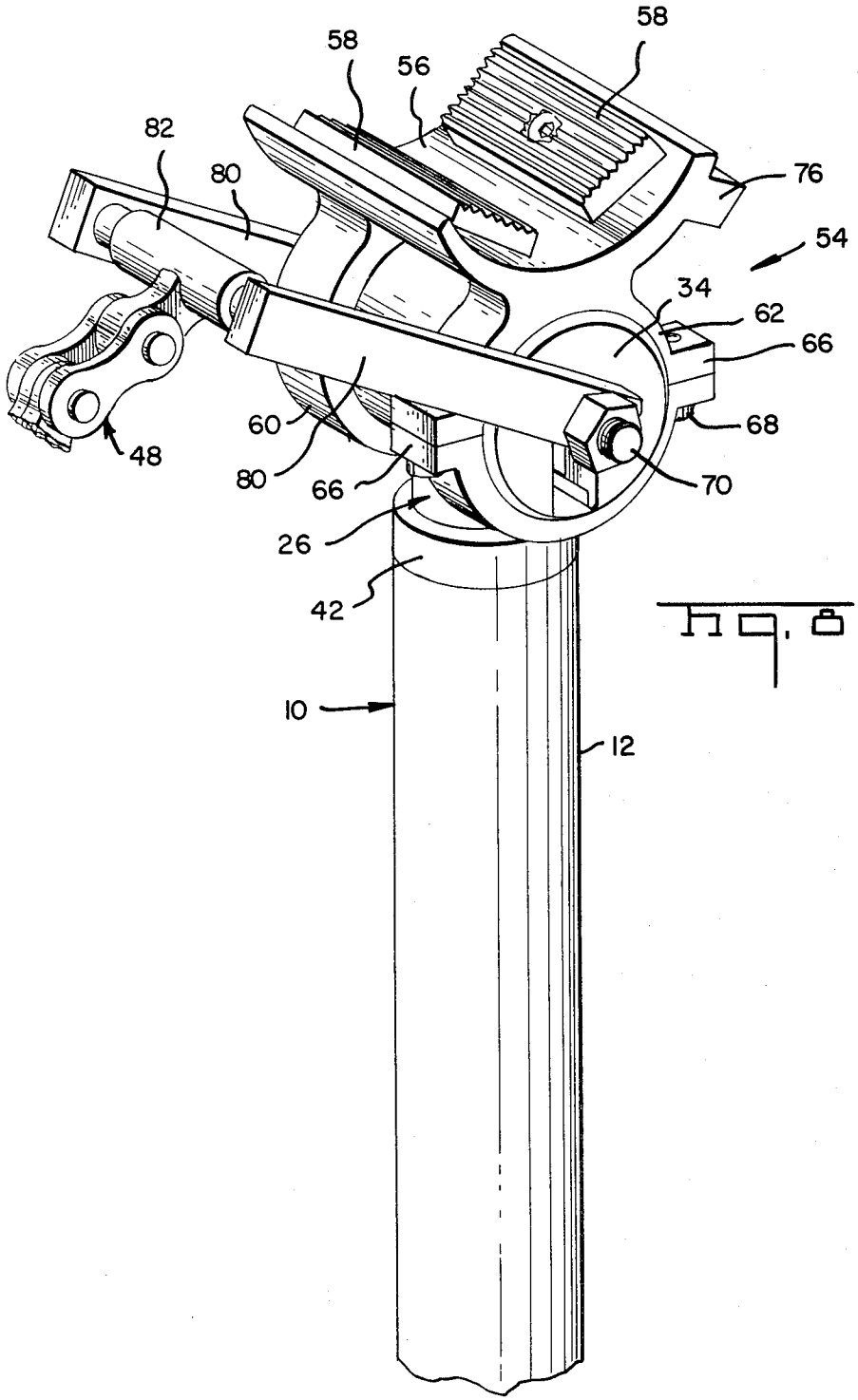


FIG. 8

CHAIN WRENCH

BACKGROUND OF THE INVENTION

This invention relates to wrenches of the type usable on pipes, tubes, or similar articles.

Conventional forms of pipe wrenches presently in use employ a pair of jaw members which function to grip a pipe therebetween and to bite into the pipe thereby permitting the operator of the wrench to rotate the pipe in a desired direction. Wrenches of this type have several drawbacks. These wrenches rely on squeezing pressure between the jaws for their connection to the pipe and therefore it is necessary that the jaws bite into the outer surface of the pipe. This marring of the pipe surface is often undesirable and may serve to weaken the pipe, remove outer protective coverings, and in some instances to actually render the pipe unsuitable for further use. A further problem with conventional wrenches is that their size and jaw configuration renders them suitable for only a limited range of pipe sizes, therefore requiring an operator to stock several such wrenches in order to have the ability to work on a wide variety of pipe sizes.

OBJECTS AND SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to provide an improved wrench which is usable on pipes, tubes, or similar articles without marring the surface thereof.

Another object of the present invention is to provide an improved wrench which is capable of being locked in position around a pipe and which is capable of retaining itself in such position.

A further object is to provide an improved wrench which is adjustable to vary the degree of gripping pressure between the wrench and the pipe or similar article.

Another object of the present invention is to provide a wrench which can be used in ratchetting fashion in those instances where there is insufficient room to continually rotate the wrench about the pipe.

A still further object of the present invention is to provide a wrench which is usable with a wide variety of pipe sizes without sacrificing the efficiency of the wrench operation.

In accordance with the above objects, the wrench of the present invention comprises a jaw member and a gripping chain cooperable to wrap around a pipe disposed therebetween. The chain is connected to a handle member through an eccentric mechanism which is movable to an over-center position thereby to lock the chain in gripping position about a pipe. The degree of pressure exerted by the chain around the pipe is adjustable by varying the degree of eccentricity of the eccentric mechanism. By providing a gripping surface entirely around the pipe there is minimized the risk of damage to the pipe through marring or crushing or the like.

BRIEF DESCRIPTION OF THE FIGURES

In the drawings, in which like reference numerals refer to like parts:

FIG. 1 is a perspective view of a chain wrench constructed in accordance with the teachings of the present invention;

FIG. 2 is a perspective view showing the wrench of FIG. 1 in tightened position around a pipe;

FIG. 3 is an exploded perspective view showing the various parts of the wrench of FIG. 1;

FIG. 4 is a fragmentary cross-sectional view taken along the line 4—4 of FIG. 3;

FIG. 5 is a cross-sectional view of the wrench of FIG. 1 showing the operative parts in their rest position;

FIG. 6 is a cross-sectional view similar to FIG. 5 and showing the wrench loosely positioned around the pipe;

FIG. 7 is a view similar to FIG. 6 and showing the wrench in its tightened position; and

FIG. 8 is a cross-sectional view showing an alternative embodiment of the present invention.

DETAILED DESCRIPTION

With reference now to the drawings there is shown wrench indicated generally at **10** having an elongated handle member **12** which is shown as a hollow tubular member and provided intermediate its ends with a nut member **14** having internal threads thereon and being suitably secured to the handle **12.** Disposed within handle **12** is an elongated rod **16** (See FIG. **5**), the rod being threaded at its lower end **18** for cooperation with the nut **14** of the handle member. The end of rod **16** opposite to the threads **18** is bifurcated as shown in FIG. **3** to provide a pair of extensions **20** and **22,** each of the extensions having an aperture **24** therethrough for a purpose to be described. Rod **16** and handle member **12** are coaxial and are movable longitudinally relative to each other by rotation of the handle member relative to the rod.

Disposed within the upper portion of handle **12** is a coupling member **26** of generally T-shaped configuration and best seen in FIGS. **3** and **4.** The coupling member has a lower tubular portion **28** having an outside diameter slightly less than the inside diameter of handle **12** so that the tubular portion is receivable within the handle member and slidable relative thereto. The portion **28** has a hollow interior as indicated at **30** fo receiving therein the major portion of rod **16.** Rod **16** is axially movable relative to the coupling member **26** and there may be provided a bushing **32** to facilitate relative sliding movement between the coupling member and the rod **16.** The coupling member has a generally cylindrical upper portion **34** having an axis at right angles to the axis of portion **28.** A pair of end caps **36** and **38** are provided at opposite ends of cylindrical portion **34** and each end cap is provided with a radially extending slot **40** which extend along lines which are parallel to the axis of tubular portion **28.** The end caps **36** and **38** are secured to cylindrical portion **34** by any suitable means such as welding or the like.

A shoulder **42** is provided on the portion **28** and is arranged to abut the upper end of handle **12** when the coupling member **26** is disposed in position within the handle.

The cylinder **34** has an opening **44** disposed generally midway between end caps **36** and **38** and extending for approximately 120° around the circumference of cylinder **34.** The opposite surface of cylinder **34** from opening **44** is provided with an abutment **46** extending radially outwardly from the cylinder for a purpose which will be more apparent hereinafter.

A suitable length of chain **48** is provided and is connected at one end to a link **50** which has one end suit-

ably secured to the chain and has a second end which extends through opening **44** and has a circular opening **52** disposed within the interior of the cylindrical portion **34** of the coupling member.

Referring now to FIG. **3** there is shown in detail the jaw member indicated generally at **54.** The jaw member ma be conveniently formed as a casting and has an upper portion **56** which is of arcuate configuration and is provided with a pair of grippers **58** secured thereto by any suitable means. The grippers have their upper surfaces serrated so as to be capable of firmly engaging a tube or pipe or similar article. The lower portion of jaw member **54** comprises an annular bearing member **60** and a split bearing member **62** and **64,** the members **62** and **64** being provided with flanges **66** which receive threaded fasteners **68** for securing the bearing members **62** and **64** together.

The wrench of FIGS. **1** through **7** is assembled by inserting rod **16** into handle **12** and by placing the coupling **26** over the rod **16** and within the upper portion of handle **12.** The jaw member **54** is then slid over the cylindrical portion **34** of the coupling member. Securing the split bearing member **64** to member **62** will retain the jaw member in position on the coupling member. Replacement of the jaw member is thus easily affected by removing the fastener **68** to separate the split bearing member to thus permit the use of different size jaw members or to permit replacement of a jaw member in the event that damage should occur. After the jaw member **54** is secured in position the link **50** is inserted through opening **44** and an elongated bolt **70** is inserted through the slots **40** of each caps **36** and **38** through the opening **52** in link **50.** The opening **52** of the link is disposed between the bifurcated rod extensions **20** and **22** of rod **16** and therefore the bolt also passes through the apertures **24** formed in the extensions. A nut **72** is then threaded onto the end of bolt **70** to complete the assembly. With the tool thus assembled it can be seen that rotation of the handle **12** will cause axial displacement of rod **16** thus causing the bolt **70,** extending through the end of rod **16,** to move within the slots **40** thus changing the position of the bolt relative to the cylindrical member **34.** The purpose of this movement will become apparent as the description proceeds

The operation of the wrench will now be explained with particular reference to FIGS. **5** through **7.** FIG. **5** shows the wrench with the movable parts in their position at the start of an operating cycle. When it is desired to apply the wrench to a pipe the chain **48** is grasped and moved around the outer periphery of a pipe **74** as shown in FIG. **6.** It can be noted that the pipe **74** is surrounded on one side by the chain and on the opposite side by the grippers **58.** The chain is loosely surrounding the pipe at this point in the cycle and a link of the chain is inserted between a pair of projections **76** provided on the upper portion **56** of the jaw member. The projections are of an appropriate size and shape so that a chain link may be disposed between the projections and maintained in position by cooperation of the pins **78** of the chain and the sides of projections **76.** At this point the handle member **12** is moved in a counterclockwise direction as shown by the arrow in FIG. **7** and such handle movement causes the rod **16** to exert a pulling force on link **50** thus causing tightening of the chain about the pipe. It can be seen that the bolt **70** which connects the rod **16** to link **50** is eccentrically located within the cylindrical member **34** and thus continued rotation of the handle will cause continued tightening of the chain until the bolt **70** moves to an over-center position as shown in FIG. **7** by the angle *a.* This movement to an over-center position causes the wrench to be locked in a tightened position around the pipe and enables the wrench to maintain itself about the pipe in a manner such as shown in FIG. **2** of the drawings. The operator can release the wrench entirely without fear that the wrench will fall or that the grip on the pipe will be diminished.

The extent of movement of the handle **12** is limited by engagement of the abutment **46** with the undersurface of portion **56** as shown in FIG. **7.** Continued counterclockwise movement of the handle causes the pipe **74** to be turned under the gripping influence of the grippers **58** and the chain **48.** The pipe is not crushed or marred during this operation because the gripping force is distributed over a major portion of the outer surface of the pipe rather than being centralized at only a few points as is the case with conventional wrenches.

When the operator rotates the wrench from the position of FIG. **6** to that of FIG. **7** he may detect that the chain is too loose or too tight around the pipe. This may result because many size pipes may be used and the chain is limited in its versatility by the dimension between the pins **78** of each chain link. However, the wrench of the present invention is infinitely adjustable due to the ability of the operator to rotate handle **12** thus changing the degree of eccentricity thereby changing the effective length over which link **50** is pulled during handle movement. The operator can therefore adjust the handle until he feels proper tension in the tool during movement to the over-center position.

It will also be apparent that it is unnecessary to continually rotate the tool in order to rotate the pipe **74.** The tool can be used in a ratchetting fashion because each clockwise movement of the handle will cause loosening of the chain **48** thereby allowing the tool to slip around the pipe in readiness for the next counterclockwise movement of the tool during the operating cycle. This feature is of extreme importance when the tool is being used in confined areas where there is insufficient room to spin the handle through 360°.

With reference to FIG. **8** there is shown a modified form of the present invention. Those parts which are identical to the form of FIGS. **1** through **7** have been assigned the same reference numerals as previously described. The tool of FIG. **8** is more suitable for use with very large diameter pipes and is provided with a generally U-shaped yoke member **80** connected at its ends to bolt **70** in straddling relationship to the jaw member and coupling member. The opening **44** of the FIG. **1** form is unnecessary in this embodiment. The opposite end of yoke **80** is provided with a collar **82** which is rotatably mounted on the yoke member and which is secured by suitable means to the end of chain **48.** Operation of the tool of FIG. **8** is identical to that of the tool previously described in that the arms of yoke member **80** perform the same function as link **50.** The yoke member of FIG. **8,** however, does permit the end of the chain to be further removed from the eccentric axis defined by bolt **70** thus moving the chain to a position where larger diameter pipes may be encircled. This further insures that no damage to the pipe will result during tightening of the tool in an operating cycle.

Changes in construction will occur to those skilled in the art and various apparently different modifications and embodiments may be made without departing from the scope of the invention. The matter set forth in the foregoing description and accompanying drawings is offered by way of illustration only.

What is claimed is:

1. A wrench for use with pipes or similar articles, said wrench comprising an elongated cylindrical handle member, a jaw member, means on said jaw member for engaging a workpiece, a coupling member for operatively connecting said jaw member to said handle member, said coupling member having a first cylindrical portion disposed with its axial generally normal to the major extent of said handle member, bearing means on said jaw members cooperating with said first cylindrical portion whereby said jaw member and coupling member are rotationally mounted relative to each other, said coupling member further having a second cylindrical portion disposed with its axis generally parallel to the major extent of said handle member, said coupling member and said handle member being rotationally mounted relative to each other about the axis of said second cylindrical portion, a chain-like member, link means secured to one end of said chain-like member, retaining means on said jaw member for retaining a portion of said chain-like member displaced from said one end, pin means eccentrically mounted within said first cylindrical portion of said coupling member, said pin means operatively connecting said link means to said handle member, whereby arcuate movement of said handle member relative to said jaw member causes movement of said chain-like member relative to said jaw member, and adjustment means connecting said pin means to said handle member for altering the degree of eccentricity of said pin means relative to said first cylindrical portion of said coupling member, said ajustment means being effected by rotation of said handle member relative to said second cylindrical portion of the coupling member.

2. A wrench as set forth in claim **1** whereby said eccentrically mounted pin means is movable to an over-center position to thereby retard movement of said wrench from an operative to an inoperative position.

3. A wrench as set forth in claim **2** further comprising abutment means on said coupling member engagable with said jaw member for limiting relative rotational movement therebetween.

4. A wrench as set forth in claim **1** wherein said adjustment means comprises an elongated rod member having one end connected to said pin means and having a second end which is threadably connected to said handle member whereby rotational movement of said handle member about its longitudinal axis causes relative axial movement between said rod member and said handle member.

5. A wrench as set forth in claim **4** wherein said workpiece engaging means comprises a pair of gripping members securkd to said jaw member and having a serrated surface thereon.

6. A wrench as set forth in claim **1** wherein said first cylindrical portion has a peripheral opening provided in the central portion thereof and wherein said link means extends through said peripheral opening.

7. A wrench as set forth in claim **1** wherein said first cylindrical portion is provided with end caps having radial slots therein and wherein said pin means extends through said slots, said adjustment means causing said pin means to move along said radial slot.

8. A wrench as set forth in claim **7** wherein said link means comprises a yoke member secured to said pin means externally of said end caps.

9. A wrench as set forth in claim **7** wherein said radial slots are aligned with the longitudinal axis of said handle member.

* * * * *