Oct. 30, 1951 R. R. GOSSARD 2,573,327

INTERNALLY APPLIED, EXPANDING FRICTION-GRIP WRENCH

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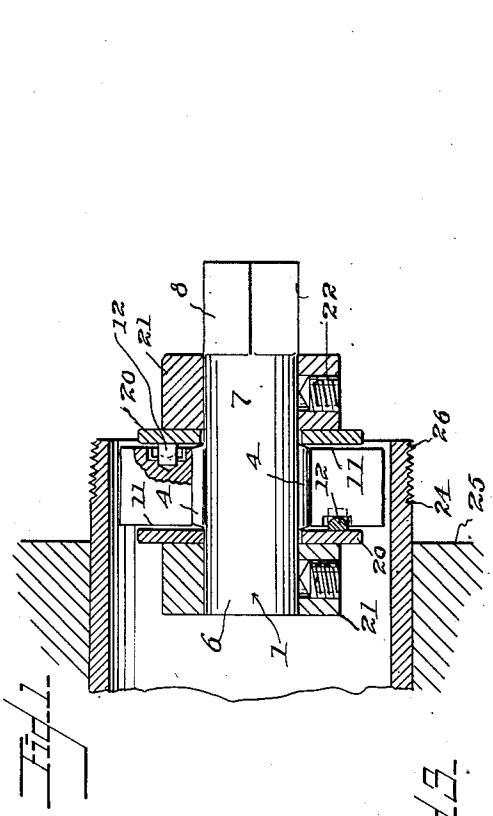


Fig. 1

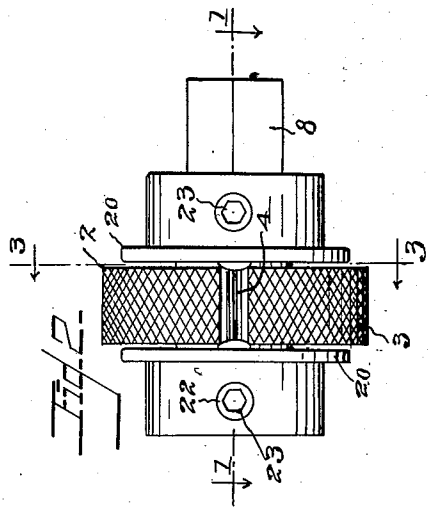


Fig. 2

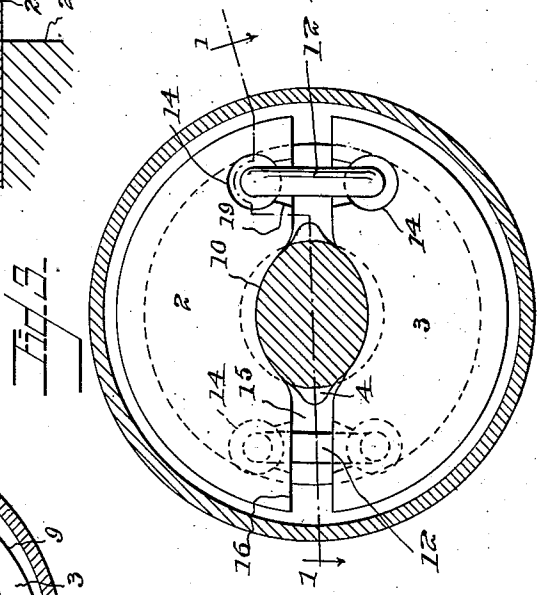


Fig. 3

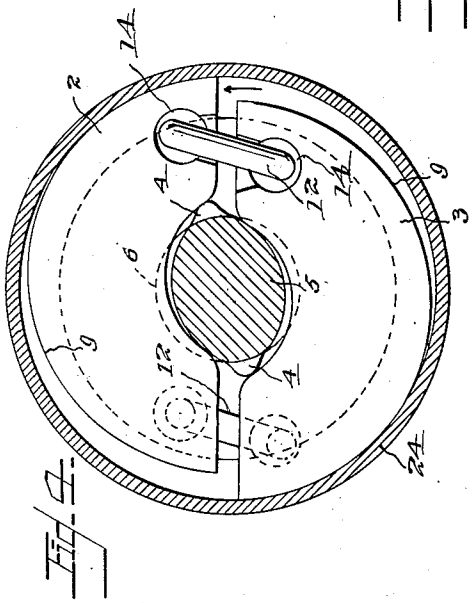


Fig. 4

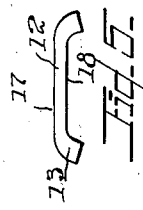


Fig. 5

INVENTOR.
Roy R. Gossard
BY
Francis D. Ammen
his Atty.

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INTERNALLY APPLIED EXPANDING FRICTION-GRIP WRENCH

Roy R. Gossard, Glendora, Calif.

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4 Claims. (Cl. 81—72)

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This invention relates to an inside wrench for enabling a piece of pipe, or a pipe-fitter, to be rotated on its axis. The wrench embodying this invention is particularly useful to attach or detach a pipe-fitting or section of pipe in a situation where the part to be removed projects only a short distance from a wall that would be likely to be injured or marred by the application of an ordinary outside wrench to the fitting. And it is also particularly useful in a situation where a wrench applied to the outside of a pipe connection, would have to be applied on external threads likely to become "flattened down" or marred by the pressure of the wrench upon the same.

One of the objects of the invention is to provide a tool of this character, of few parts and simple construction, that can be readily applied and operated for the purpose stated.

Another object of the invention is to provide a tool of this type, which will operate as readily for rotation in one direction as in the other, thereby enabling torque to be applied in either direction, for fittings having a right-hand or a left-hand thread.

Another object of the invention is to provide a tool of this character, which includes in its construction two jaws and a rotary member or mandrel between the same; and to provide such a tool with means for retaining the jaws and operating in such a way as to permit a limited but sufficient expanding movement of the jaws without the necessity of providing a cage or similar means for retaining the jaws.

Further objects of the invention will appear hereinafter.

The invention consists in the novel parts and combinations of parts to be described hereinafter, all of which contribute to produce an efficient two-way inside wrench.

A preferred embodiment of the invention is described in the following specification, while the broad scope of the invention is pointed out in the appended claims.

In the drawing:

Fig. 1 is a vertical section taken through a portion of a wall and showing the end portion of a pipe end or pipe fitting projecting from the same, and also illustrating this wrench partially in elevation, and partially in section taken about on the line 1—1 of Fig. 3.

Fig. 2 is a side elevation of the tool, illustrating the same removed from the pipe fitting illustrated in Fig. 1.

Fig. 3 is a vertical section taken on the line 3—3 of Fig. 2 looking in the direction of the arrow,

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showing the jaws of the tool in a neutral or unapplied position; and also showing in cross-section, the wall of a pipe fitting within which the wrench may be used. This view is upon a larger scale than Fig. 2.

Fig. 4 is a view similar to Fig. 3, and upon the same scale, but showing the jaws expanded by the mandrel into their clamping position.

Fig. 5 is a side view of a retaining link which constitutes a feature of the invention, and which is employed as a shackle or link to cooperate with other parts in retaining the jaws on the mandrel.

In practicing this invention, I provide an arbor or mandrel 1, on which I provide means for expanding the jaws of the wrench. The form of this means will depend upon how many jaws the wrench is provided with. While of course there may be as many of these jaws as desired, in the present instance I prefer to employ only two jaws 2 and 3, and in that case the expanding means preferably consists of cam means including two diametrically opposite extensions or cam toes 4 that are formed at diametrically opposite points on the mandrel. At the point where these cam toes are located, the mandrel may have an elliptical cross-section to form the cam body 5, and on each side of this cam body the mandrel has two cylindrical necks 6 and 7. In other words, the mandrel would ordinarily be made out of round iron or steel, and would be formed up at about its middle point to produce the cam body 5; and beyond one of the necks, for example, the neck 7, an angular shank 8 may be formed to receive an angular or square socket wrench to enable the mandrel to be rotated to expand its jaws, and turn the pipe fitting.

In the present instance, the two jaws 2 and 3 have arcuate peripheries 9, and they are of substantially semi-circular form, each inner edge being formed with a recess 10 that fits approximately to the profile of the elliptical cam body 5.

The two jaws 2 and 3 are not fastened in any way to the mandrel, but are preferably freely floating, and shackled together with a lost-motion shackle connection which prevents their being disconnected from the mandrel, but which, at the same time, will give them a limited expanding and contracting movement, the former of which will enable them to move outwardly sufficiently to jam their peripheries against the inner face of a pipe end or fitting into which the wrench has been introduced.

The jaws 2 and 3 are of relatively thick disc form, and present flat side faces 11. In order to

attain the shackling effect in a simple and practical manner, I prefer to employ shackles 12. These are preferably in the form of short links, the ends of which are provided with pintles 13 that are adapted to be received in sockets 14 formed in the side faces 11 of the jaws. In other words, at adjacent points the jaws are provided with oppositely disposed sockets, and in assembling the parts, the pintles 13 are dropped into these sockets so that the bodies of the links extend across the gap or opening 15 between the inner faces or adjacent edges 16 of the jaws. These pintles 13 are preferably formed by bending the ends of the links around so that the axes of the pintles extend approximately at right angles to the longitudinal axis of each link. The links are preferably formed of half round cross-section so that each link presents a flat face 17 on its outer side, and presents a rounded or half round face 18 on its inner side, that is to say, on the side that is disposed toward the jaws. In order to provide clearance for the bodies of these links, each jaw is provided with a clearance slot 19, the sides of which diverge toward the gap 15 between the jaws. These clearance slots give clearance and permit freedom of movement of the links when the jaws are shifted outwardly to jam their outer faces against the inner face of the wall of the fitting. The links are retained in connection with the jaws, preferably by means of loose washers 20 which are of relatively thin flat metal, and these washers are held in position or backed up by followers, or substantial collars 21, which fit over the cylindrical necks 6 and 7, and which are secured to the said necks by any suitable means such as set screws 22. These set screws are preferably countersunk into the bodies of the collars 21, and may have angular sockets 23 to receive the end of a small wrench for tightening up the set screws.

In Figs. 1, 3, and 4, I illustrate the manner in which the wrench is applied inside the projecting tube end or pipe section 24. This pipe section is illustrated as projecting from the face of the wall 25, and is also represented as provided with threads 26 which are located at its tip. In situations such as this, it is practically impossible to employ an outside wrench without marring or injuring the face of the wall 25. If such a wrench is not applied substantially against the face of the wall 25, it will engage on the threads 26, and will crush them and flatten their peaks when the force is applied to the wrench to rotate the pipe end. My wrench, however, engages inside of the fitting, and cannot injure the thread. And of course by reason of the fact that the wrench is applied inside of the fitting, the face of the wall 25 will not be soiled or injured in any way.

In the present instance, I employ only two shackles 12, one at one side of the jaws and the other at the other side of the jaws, and these two links will of course be located diametrically opposite to each other.

In practice, the peripheral faces 9 of the jaws should have a rough character like that of a rasp or file, so that they will develop sufficient resistance when they contact the inner face of the wall of the fitting to develop enough "drag" on them to hold them stationary while the cam body 5 is rotated. As soon as this rotation takes place, the jaws will be expanded by the cam toes 4 that press against the adjacent faces or edges of the jaws so that they will be pressed outwardly with considerable force.

In Fig. 4 the arrow indicates the direction of rotation as being anti-clockwise, and this of course would be the direction of rotation for unscrewing a pipe fitting that is connected to another fitting by an ordinary right-hand thread. This would ordinarily be the direction of rotation. When it is necessary to return the pipe fitting to its position, or screw on a substitute pipe fitting, of course the direction of rotation would be clockwise in case the connection carries a right-hand thread.

By reason of the fact that the wrench is symmetrically formed, it is immaterial whether the rotation is clockwise or anti-clockwise. In either case, the jaws will be expanded so as to jam them against the wall of the pipe fitting.

Many other embodiments of the invention may be resorted to without departing from the spirit of the invention.

I claim as my invention:

1. In a two-direction inside wrench for rotating a pipe-fitting or the like, the combination of a rotatable mandrel having cam means formed on the body thereof, and having substantially cylindrical necks adjacent the ends of said cam means, a pair of jaws having arcuate peripheries and having recesses at their inner edges lying on opposite sides of the mandrel at said cam means said jaws having sockets at opposite ends and on opposite sides, means loosely engaging said sockets for shackling said jaws to each other, said shackling means permitting relative inward movement of said jaws and relative outward expanding movement with respect to each other, washers mounted on the said necks of said mandrel for retaining the shackling means in operative relation with said jaws and means adjustable on said mandrel for holding said washers in position against said jaws; all of said parts cooperating so that when the mandrel is rotated in either direction, the cam means will expand the jaws and jam them against the inner faces of the wall of the fitting.

2. In an inside wrench for rotating a pipe-fitting or the like, the combination of a rotatable mandrel, two jaws located on opposite sides of said mandrel and adapted to be received within the pipe fitting, said jaws having side faces with sockets disposed opposite each other, links having lateral bent ends extending into said sockets, said sockets disposed in pairs located on opposite sides of the axis of the mandrel, collars received over the mandrel and seating against the said links with means associated with the collars for securing them against the links; said mandrel including cam means for expanding the jaws to jam them against the inner face of the fitting wall when the mandrel is rotated.

3. In a two-direction inside wrench, the combination of a mandrel having cam means formed on the body thereof and provided with substantially cylindrical necks at the ends of said cam means, a pair of jaws having arcuate peripheries, and recesses at their inner edges lying on opposite sides of said mandrel at said cam means, means for shackling said jaws to each other including a pair of sockets on adjacent side faces of the jaws, and another pair of sockets on the adjacent side faces of the jaws located diametrically opposite to the first named sockets, said shackling means including links with bent ends loosely fitted in said sockets, and means for retaining the shackling means in association with said jaws.

4. In a two-direction inside wrench for ro-

tating a pipe-fitting or the like, the combination of a rotatable mandrel having side faces, freely floating jaws having side faces disposed transversely to the axis of the mandrel, said jaws located adjacent the side faces of said mandrel and adapted to be received within the pipe-fitting, shackles disposed respectively at adjacent ends of the jaws for retaining the same on the mandrel and operating to permit relative outward movement of said jaws away from the mandrel; said mandrel having cam-means between said jaws operating when the mandrel is rotated in either direction to expand the jaws and jam them against the wall of the fitting; the side faces of said jaws having sockets formed therein, said shackles including normally inclined links with laterally extending ends received in said sockets and freely movable therein; and means mounted on the mandrel at the outer sides of said links for holding them in engagement with the jaws.

ROY R. GOSSARD.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
138,568	Littlejohn	May 6, 1873
573,325	Gates	Dec. 15, 1896
1,251,408	Murray	Dec. 25, 1917
2,373,462	Crow	Apr. 12, 1945