March 29, 1949. S. OSBORNE 2,465,695

FLEXIBLE RATCHET-TYPE PIPE WRENCH

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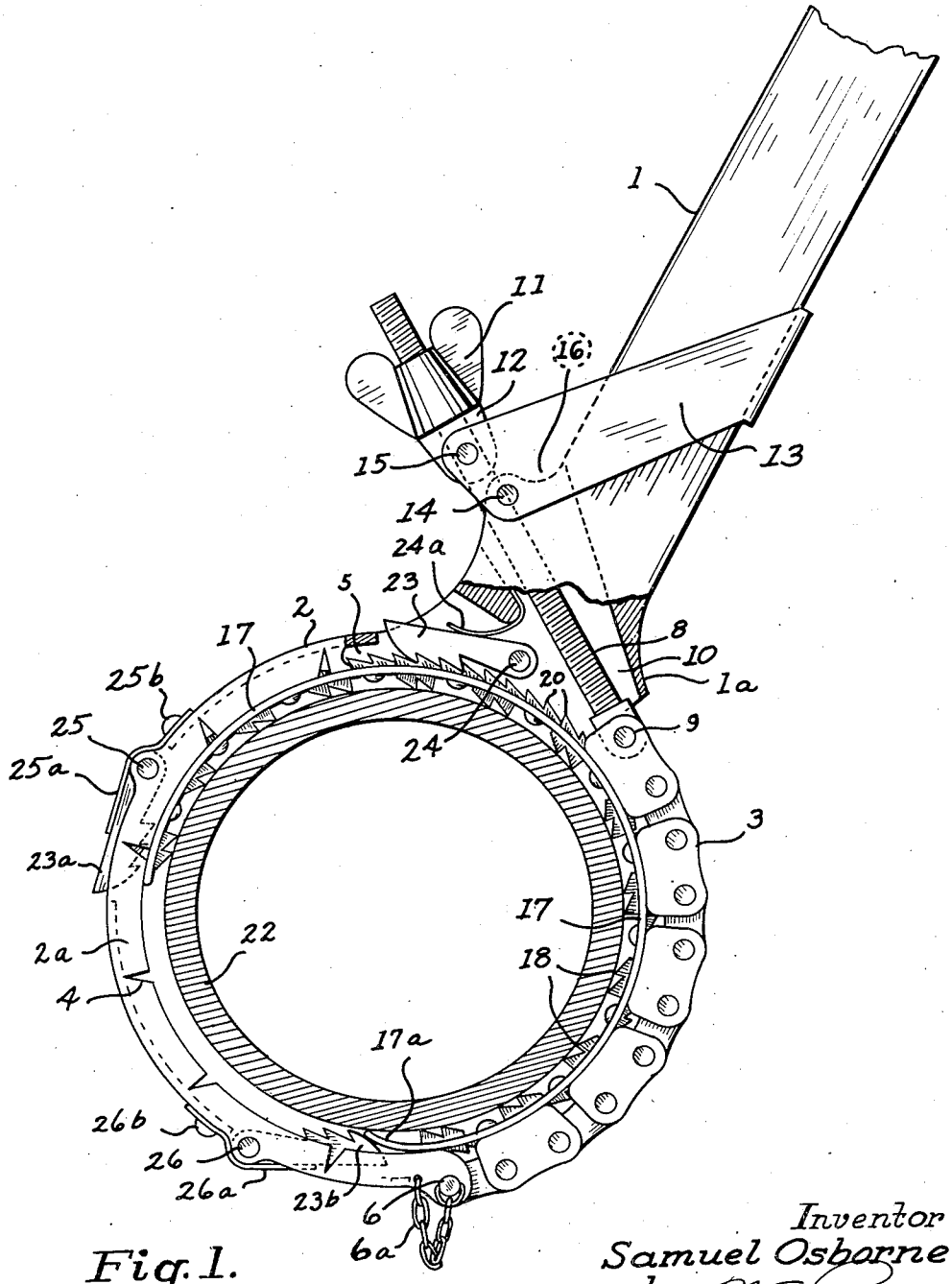


Fig. 1.

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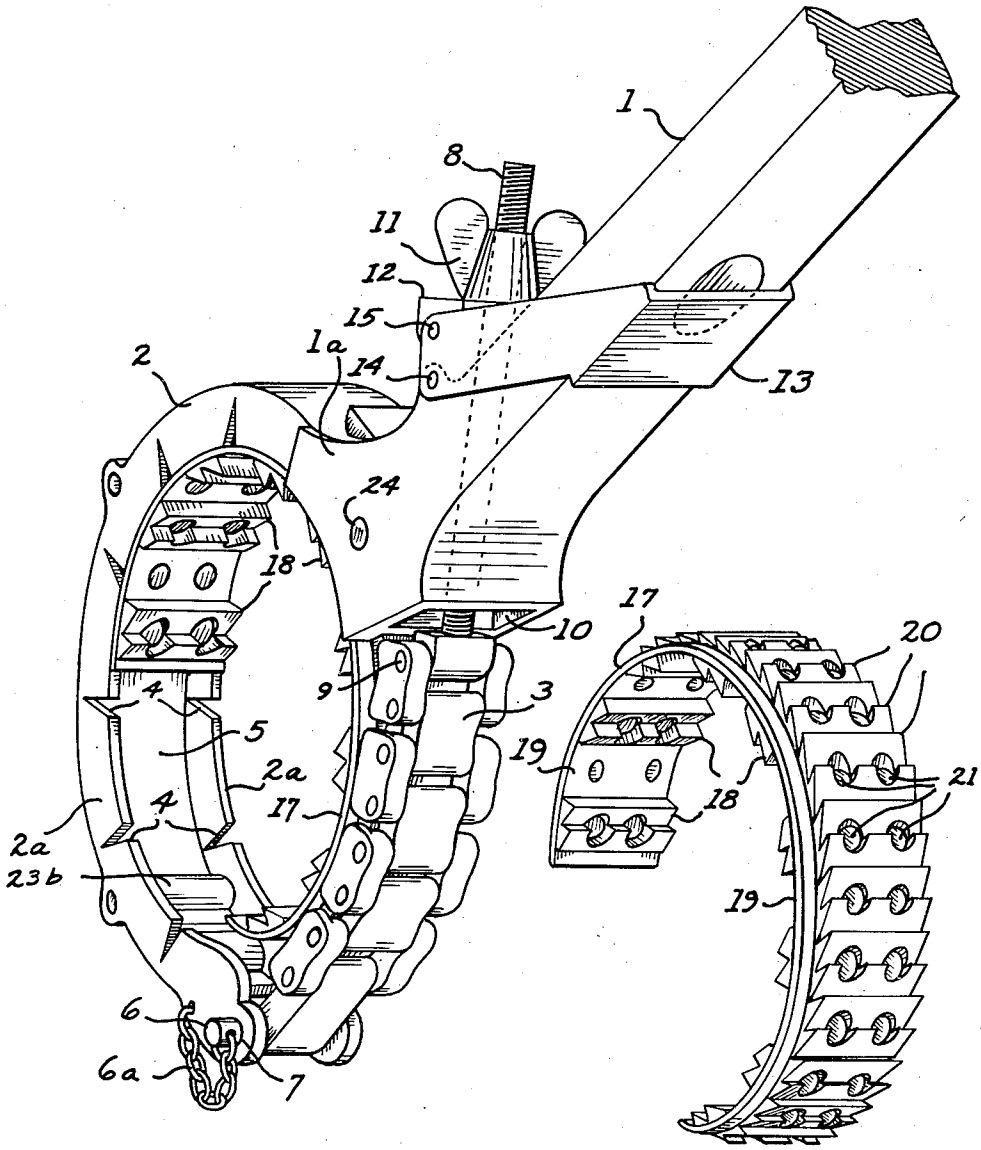


Fig. 2.

Fig. 3.

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FLEXIBLE RATCHET-TYPE PIPE WRENCH

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5 Claims. (Cl. 81—65)

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My invention relates to wrenches and particularly to that type of wrench adapted for engaging an object of circular section, such, for example, as a pipe wrench. It is frequently necessary to operate a wrench in a restricted area, and a wrench of this character must be capable of accommodating relatively wide ranges of sizes.

The principal object of my invention is to devise a wrench of this character which may quickly be secured to an object, which may be quickly and easily adjusted to size, and which is provided with ratcheting mechanism so that it can be turned by a handle moving through a relatively narrow arc.

A further and more specific object of my invention is to provide a wrench of this character having a work-engaging member which has work-engaging teeth upon one face thereof and ratchet teeth on the opposite face, the whole being relatively flexible to accommodate itself to various sizes and shapes of pipes, rods and other articles of generally circular section.

A still further object of my invention is to provide a wrench of this character with a device by which the major portion of such adjustment may be made through quick acting means, and the final and more precise adjustment may be made by means of a threaded nut.

Further and other details of my invention are hereinafter described with reference to the accompanying drawings, in which:

Fig. 1 is a fragmentary elevation of a wrench embodying my invention, with portions shown broken away to disclose details of construction;

Fig. 2 is a similar fragmentary perspective view of such wrench; and

Fig. 3 is a perspective view of a work-engaging element, which is removable and replaceable, and which is generally flexible to accommodate various shapes and contours.

A wrench embodying my invention comprises a handle 1, terminating in a T-shaped end 1*a*, to which is secured a channel member 2, defining a part of an annular body. The remainder of said body is formed of a length of linked chain 3. The sidewalls 2*a* of said body are provided with a series of V-shaped notches 4, so that said member can be flexed to an arc of shorter radius. Between said sidewalls is a chamber 5. The length of linked chain 3 is secured to said body

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by a latch pin 6, which engages a hole 7. The other end of said chain carries a threaded bolt 8 secured to the chain by a pintle pin 9. Said bolt, thus, is free to swing angularly about said pintle pin to accommodate itself to the sweep of the annular head in its various diameters.

A hole 10 extends through the handle 1 and said bolt loosely passes through said hole. The sidewalls of said hole are sloped obliquely to accommodate the angular movement of said bolt. Adjacent the free end of said bolt is a threaded wing nut 11, which bears against a non-threaded nut 12. A bail element 13 is secured to said handle by a pivot pin 14 and to said non-threaded nut 12 by a pivot pin 15.

In the position said bail assumes in Fig. 1, for example, it applies tension to the bolt and to the annular head, which tension can be relaxed by pivoting said bail clockwise about the pivot pin 14 until pivot pin 15 moves into pocket 16. Attention is called to the fact that said pivot pins, when arranged as illustrated in Fig. 1 are slightly to the left of dead center, so that said tension tends to hold the bail up against the under surface of the handle to prevent inadvertent slackening of tension.

Journalled within the bore of said annular head is a work-engaging band 17, which is made of steel or other flexible material, so as readily to accommodate itself to changes in shape and contour. To the under surface of said band—that is, within the bore or concave portion thereof—are a series of spaced work-gripping teeth 18. Between said teeth are spaces 19 for accommodating such flexure. On the outer or convex face of said band are ratchet teeth 20, spaced generally at uniform intervals. I preferably make said teeth in pairs and rivets 21 either pass through said pairs of teeth to the band, or extend completely through and engage the work-gripping teeth, depending upon whether the ratchet teeth overlie said work-gripping teeth, or the spaces 19 between the latter.

The work-gripping teeth are arranged to rotate a pipe 22 or other work to be engaged in a clockwise direction, as is viewed in Fig. 1, and the ratchet teeth are arranged to be engaged by pawls 23, 23*a* and 23*b*, spaced about the periphery of said work-engaging band, as is shown in said figure.

Pawl **23** is arranged adjacent the point of connection between the head and the handle and is pivotally mounted upon a pin **24**, which passes through the handle and said head. A curved leaf spring **24***a* tends to hold the pawl in engagement with the ratchet teeth. Each of said pawls preferably has a plurality of engaging teeth formed thereon, thus to engage a corresponding number of ratchet teeth to distribute operating stresses over a large area.

Pawl **23***a* is pivotally mounted upon a pin **25** and is held in engagement by a leaf spring **25***a* fixed in position by a screw or rivet **25***b*. Pawl **23***b* is pivotally mounted upon pin **26** and is held in operating position by spring **26***a* secured by a screw or rivet **26***b* to the annular head.

Attention is directed to the fact that the end **17***a* of the band **17** is bent downwardly, so that the sloped and rounded heads of the pawls will ride smoothly thereover. That is, the band **17** does not completely encircle the work, and the gap between the ends thereof will sometimes underlie one pawl and at other times another, and each pawl must be free to pass over said ends without interrupting the ratcheting action.

The operation of said wrench is as follows:

The wrench may be adjusted to accommodate itself to any given diameter pipe or element within a limited range. Major changes in diameter may be made by screwing the wing nut **11** along the threaded bolt **8**. Attention is called to the fact that the threaded bolt **8** is of such length as to take up all of the adjustment which said wrench is adapted to accommodate.

The latch pin **6** is easily removed laterally, but is prevented from becoming detached from the body of said wrench, because it is secured thereto by a length of chain **6***a*.

If the wrench is to be secured to a free or disconnected end of a pipe, it can be done merely by slipping the wrench endwise over said free end. If the wrench must grip a central section of the pipe, and no free ends are available, this may be done by adjusting the work-engaging band **17**, so that the gap between the ends thereof is alined with the section of the wrench normally closed by the chain **5**. The chain may be disengaged by pulling out said latch pin **6** and slipping the wrench over the pipe through the gap in said band **17**. The chain then can be replaced, the latch pin **6** inserted in position, and the final adjustment may be made by tightening the wing nut **11** and rotating the bail element **13** to the position it occupies in Fig. 2.

When the wrench is properly adjusted, the work-gripping teeth bite into the exterior surface of a pipe to rotate it clockwise, as viewed in Fig. 1. This may be rotated by reciprocating the handle back and forth through longer or shorter arcs, dictated by the working space. On clockwise sweeps of the wrench the pipe will be engaged and rotated, and on counter-clockwise movements the wrench and its annular head will journal upon the band **17**, so as correspondingly not to rotate the pipe.

The ratchet teeth **20** on said band are housed within the channeled member **2**, and the band bears upon the internal face of said channeled member. Disengagement of the work is effected by reversing said action, and rotation of the pipe in the opposite direction is accomplished by turning said wrench over, so that it operates opposite hand.

I claim:

1. A wrench of the character described, having a handle terminating in a relatively flexible annular body, means for varying the diameter of said body, a non-continuous flexible work-engaging band of less length than the circumference of the largest pipe to be gripped journalled in said body within the bore thereof and flexed by said body, toothed work-gripping elements secured to said band in spaced predetermined relation, ratchet teeth elements secured to the periphery of said band, said body being chambered to house said ratchet teeth elements, and a pawl pivotally mounted upon said body and extending into the chambered portion of the latter to engage said ratchet teeth elements, whereby said band may be rotated by said pawl in one direction within said body and may rotate freely in the opposite direction.

2. A wrench of the character described, having a handle terminating in a relatively flexible annular body, said body comprising in part a linked chain element, means for varying the diameter of said body, a non-continuous flexible work-engaging band of less length than the circumference of the largest pipe to be gripped journalled in said body within the bore thereof and flexed by said body, toothed work-gripping elements secured to said band in spaced predetermined relation, ratchet teeth elements secured to the periphery of said band, said body being chambered to house said ratchet teeth elements, and a pawl pivotally mounted upon said body and extending into the chambered portion of the latter to engage said ratchet teeth elements, whereby said band may be rotated by said pawl in one direction within said body and may rotate freely in the opposite direction.

3. A wrench of the character described, having a handle terminating in a relatively flexible annular body, said body comprising in part a linked chain element adjustably secured to the remainder of said annular body, means including a threaded connection for varying the diameter of said body, a flexible work-engaging band of less length than the circumference of the largest pipe to be gripped journalled in said body within the bore thereof and flexed by said body, toothed work-gripping elements secured to said band in spaced predetermined relation, ratchet teeth elements secured to the periphery of said band, said body being chambered to house said ratchet teeth elements, and a pawl pivotally mounted upon said body and extending into the chambered portion of the latter to engage said ratchet teeth elements, whereby said band may be rotated by said pawl in one direction within said body and may rotate freely in the opposite direction.

4. A wrench of the character described, having a handle terminating in a relatively flexible annular body, means for varying the diameter of said body, a non-continuous flexible work-engaging band of less length than the circumference of the largest pipe to be gripped journalled in said body within the bore thereof and flexed by said body, toothed work-gripping elements secured to said band in spaced predetermined relation, ratchet teeth elements secured to the periphery of said band, said body being chambered to house said ratchet teeth elements, and a series of spring-pressed pawls pivotally mounted upon said body and extending into the chambered portion of the latter to engage said ratchet teeth elements, whereby said band may be rotated by said pawls in one direction within said body and may rotate freely in the opposite direction.

5. A wrench of the character described, having

a handle terminating in a relatively flexible annular body, said body comprising in part a linked chain element adjustably secured to the remainder of said annular body, means including a threaded connection and an adjustable bail element for varying the diameter of said body, a flexible work-engaging band of less length than the circumference of the largest pipe to be gripped journalled in said body within the bore thereof and flexed by said body, toothed work-gripping elements secured to said band in spaced predetermined relation, ratchet teeth elements secured to the periphery of said band, said body being chambered to house said ratchet teeth elements, and a series of spring-pressed pawls pivotally mounted upon said body and extending into the chambered portion of the latter to engage said ratchet teeth elements, whereby said band

may be rotated by said pawls in one direction within said body, and may rotate freely in the opposite direction.

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