MEANS FOR LOCKING A PIVOTED WRENCH JAW IN SLIDABLY ADJUSTED POSITION

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The present invention relates to tools and more particularly to wrenches, having special reference to wrenches of the type exercising a binding grasp on articles embraced.

Wrenches having application to articles of various sizes provide various means for spatially positioning the jaws. Such wrenches generally provide a screw-threaded means for varying said spacing. Such adjustable structures are subject to certain difficulties, the elimination of which the present invention is generally directed. The adjustable structures are exposed to dirt and foreign material which subjects the same to jamming and other resistance to ease of operation. The jaws of such wrenches are not speedily adjusted to appropriate spaced relation. Once adjusted, subsequent handling frequently results in displacement of the jaws from adjusted position.

Wrenches having jaws adjustably spaced by screw-threaded means are not readily adapted to wide ranges of jaw spacing. When wide ranges are provided, considerable time is required to "run" the jaws from one limit to the other. The sloppy fit of such screw-threaded means generally employed in order to facilitate operation, is not conducive to accuracy of spacing of the jaws nor to the accurate maintenance of the spacing once adjusted.

An object of the present invention, therefore, is to provide an improved wrench of the type employing adjustably spaced jaw members.

Another object is to provide an improved wrench exercising a binding grasp on articles engaged.

Another object is to provide a wrench of the character and for the purposes set forth that is characterized by convenience and speed of spatial adjustment of the jaws thereof.

Another object is to provide a wrench in which the jaws are dependably maintained in position once adjusted.

Another object is to eliminate or materially to reduce jamming as known in conventional wrenches having adjustably positioned jaws.

Another object is to provide a wrench having jaws adapted for a wide range of spacing and further, to provide for expeditious utilization of said wide range.

Other objects and advantages will become apparent in the subsequent description in the specification.

Referring to the drawings:

Fig. 1 is a side elevation of a wrench embodying the principles of the present invention.

Fig. 2 is an fragmentary enlargement of the wrench having a portion thereof removed to reveal internal working elements.

Fig. 3 is a fragmentary enlargement illustrative of a spring loading of the lower jaw of the wrench relative to the shank portion of the upper jaw thereof.

Fig. 4 is a section taken on line 4—4 of Fig. 3.

Fig. 5 is a fragmentary enlargement illustrative of a spring loading of the lower jaw of the wrench relative to the shank portion of the upper jaw thereof.

Fig. 6 is a section taken on line 5—5 of Fig. 3.

Fig. 7 is a fragmentary enlargement of a portion of a wrench illustrative of a second form of locking mechanism.

Referring in greater detail to the drawings:

In Fig. 1, an upper jaw member is shown generally at 10 having an angularly related shank portion 11 and jaw portion 12. The jaw and the shank are preferably of unitary construction and in substantially right-angular relation.

The shank portion is preferably of uniform shape throughout its length for the slideable mounting of a lower jaw member thereon, as presently more fully described.

The shank has a longitudinal opening 15 formed therethrough underlaid at opposite end portions, as shown in Fig. 3, by web formations 16. As previously described the upper jaw and the shank portion are of unitary construction and may be considered an upper jaw member. Said member, formed with the opening and the webs, is of simple configuration readily adapted to formation by stamping, casting, forging, or the like.

A handle 17 of any suitable form is secured on the end portion of the shank 11 opposite the jaw 10 and in substantial alignment with said shank. For purposes of convenience said end of the shank is referred to as the lower end thereof.

The handle and shank are united in any suitable manner, such as by a tang and securing nut arrangement not shown, and are preferably separable to the end that the jaw members of the present invention may readily be disassociated.

A lower jaw member is illustrated generally at 19 comprising a lower jaw 20 and a slide or mounting portion 21. The slide is mounted on the shank 11 for longitudinal slideable positioning thereon.

The lower end portion of the shank is preferably slideably fitted to the shank and the upper end portion thereof slideably fitted to the sides of the shank but loosely fitted to the edges thereof whereby the slide may pivot on the shank so as reciprocally to position the lower jaw downwardly-outwardly...
and upwardly-inwardly in relation to the upper jaw member.

In order to urge the lower jaw outwardly and downwardly from the upper jaw member, as viewed in Fig. 1, preconditioned for the reception of an article to be grasped, a spring 22 is mounted on the slide interpositioned said slide and the shank at the side thereof adjacent the jaws. The preferable arrangement is illustrated in Fig. 5. So associated, the jaws 12 and 20 may be spatially related as desired by positioning the slide longitudinally of the shank. The slide is pivotally positionable relative to the shank to achieve the stated reciprocal positioning of the lower jaw 20. It will be clearly apparent that the reciprocal positioning of the lower jaw 20 is constrained to limits defined by the fit of the upper end portion of the slide to the edges of the shank. The jaws 12 and 20 may be provided with pipe gripping serrations, as shown in Fig. 1, or of any configuration suited to the purpose.

To the end of locking the jaws in selected spaced relation, a pair of sprockets 25 are journaled on the extensions 16 in the opening 15 of the shank 11 in longitudinally spaced positions. As shown in Fig. 4, the sprockets are conveniently mounted by means of spindles 26 secured in the webs by sweating or other suitable means. So mounted, the sprockets and their spindles are contained within the opening 15 of the shank and in no way obstruct longitudinal positioning of the slide 21.

An endless flexible chain 27 is mounted by the sprockets 25 for circuitous travel within the shank 11.

A pair of adjacent idler sprockets 30 are rotatably mounted by spindles 31 within the slide in engagement with the chain 27 on opposite sides of each of the sprockets 25. Thus it will be seen that as the slide is longitudinally positioned on the shank 11 the idler sprockets 30 travel along the chain in response thereto. To facilitate the mounting of the idler sprockets 30 in the slide after the chain 27 has been mounted in the shank 11 and the slide 21 fitted thereover, a plug member 32 is screw-threadedly engaged in the side of the slide which upon its removal provides access to the opening 15 of the shank through the side of the slide.

To the end of locking the idler sprockets against rotation, a braking structure suitable to the purpose is shown in Fig. 6. An indentation is provided in the plug 32 as at 33 and a further indentation 34 provided in the slide oppositely disposed thereto. A pair of guide plates 35 and 36 are positioned in the indentations 33 and 34 respectively and are guided in reciprocal inward and outward travel in the indentations by the walls thereof. A pair of braking shoes 37 and 38 are extended from the plate 35 through the plug 32 into abutting relation with the pair of idler sprockets 30. A pair of braking shoes 39 and 40 are extended from the plate 36 through the opposite side of the slide 21 from said plug into abutting relation with the opposite sides of said idler sprockets. A brake rod 42 is extended through the plug 32 and the opposite side of the slide 21 for axial movement and mounts the plates 35 and 36 concentrically thereon. The brake rod provides a head 43 outwardly disposed thereto. Helical compression springs 44 are interposed the plates and the sides of the slide adjacent thereto. The springs urge the braking shoes outwardly to disengagement from the idler sprockets 30. An eccentric 45 having a handle portion 46 extended therefrom is pivotally mounted on the end of the pin opposite its head 43 outwardly disposed the slide 21 and in engagement with the plate 35. When the handle portion 46 is outwardly extended from the slide, as shown in dotted line in Fig. 2, the eccentric releases the brake rod and the springs 44 disengage the braking shoes from the idler sprockets. In such condition the slide is free to move longitudinally of the shank 11 spatially to position the jaws 12 and 20 as desired. When the handle portion 46 is depressed in line in Fig. 2, the eccentric urges the plate 35 inwardly and through the head 43, draws the plate 36 inwardly, bringing the braking shoes 37, 38, 39, and 40 into cooperative gripping relation with their respective idler sprockets 30, locking the same against rotational movement.

**Operation**

The operation of the wrench is clearly apparent and is briefly summarized at this point. The eccentric 45 is pivoted to release the shoes 37, 38, 39, and 40 from the idler sprockets 30, depressing the handle portion 46 outwardly from the slide 21. The slide is longitudinally positioned on the shank 11 spatially to position the jaws 12 and 20 appropriately to the size of the object to be grasped. So adjusted, the handle 45 is depressed and the idler sprockets locked.

The wrench is engaged with the object to be turned and preferably rotated in a clockwise direction as viewed in Fig. 1. As such rotational movement is initiated, the lower jaw through its serrations grasps the object and urges the lower jaw upwardly and inwardly in pivotal movement relative to the slide 21, as previously described. The slide thus pivots about a point in its lower end portion. Such pivoted movement slightly reduces the spacing of the jaws resulting in a binding effect on the article grasped. The flexibility of the chain readily accommodates itself to said pivotal movement. Further, the chain is permitted to travel circuitously about its sprockets 25 any small distance required further to accommodate said pivotal movement. The binding grasp of the wrench on an article is readily released by effecting opposite turning movement of the wrench thereon.

Attention is drawn to the equalizing of opposite forces on the chain 21 by permitted travel about the sprockets 25 when an effort is made to move the slide 21 on the shank 11 when the sprockets 30 are locked. Such equalizing of forces dependably maintains the jaws in pre-adjusted spaced relation but for the minute variation permitted by the pivoting of the slide 21 on the shank 11.

**Second form of locking mechanism**

A second form of mechanism for locking the slide 21 on the shank 11 is illustrated in Figs. 7 and 8. Idler sprockets 50, similar to idler sprockets 30, are mounted in the slide 21 in engagement with the chain 27 oppositely disposed the sprockets 25 about which said chain is circuitously traveled. The idler sprockets 50 are preferably of a size causing the same to mesh where inwardly adjacent. Thus, as the slide is longitudinally positioned on the shank the idler sprockets rotate as before but in accurately timed relation by their intermeshing.

A brake rod 54 is positioned in the slide 21 in substantially parallel relation to the axes of rotation of the idler sprockets 50 and adjacent to the intermeshing of said sprockets. The rod is
mounted for axial movement in the slide. A locking cog 52 is journaled on the pin 51 in fixed longitudinal position thereon as maintained by thrust collar 53. The locking cog is adapted simultaneously to mesh with the idler sprockets 50 and preferably has sharpened teeth at 54 to facilitate meshing engagement. To urge the locking cog from engagement with the idler sprockets 50, a helical compression spring is provided circumscribing the pin 51 in abutting relation between a side of the slide and a spring seat 56 mounted on said pin. As shown in dotted line in Fig. 8, the helical compression spring urges the locking cog from engagement with the idler sprockets 50.

To the end of bringing the locking cog into idler sprocket engagement, an eccentric 57, similar to the eccentric 45 already described, is pivotally mounted on an end of the pin 51 engageable with a side of the slide 21. Said eccentric preferably provides a manipulating handle, not shown, but similar to the handle portion 45 shown in Fig. 2.

To longitudinally position the slide 21 on the shank 11 the eccentric is pivoted to release the pin which, under the urging of the spring, moves the pin axially a sufficient distance to disengage the cog 52 from the idler sprockets. The slide 21 is then longitudinally positioned on the shank 11 spatially to position the jaws 12 and 20, as before. To lock the idler sprockets 50 and thus to secure the jaws 12 and 20 in spaced relation, the eccentric is pivoted to move the rod axially bringing the locking cog into idler sprocket engagement. It will be clearly apparent that when the locking cog is engaged with the intermeshing idler sprockets, the triad of the pair of sprockets and the cog forms a locked association precluding rotational movement of any of the elements thereof. Said locked association, however, in no way prevents the pivot movement of pipes and the like. The present invention is not limited to wrenches adapted for such use. The jaws may readily take the form of conventional monkey wrench jaws or provide any other particular configuration desired.

The wrench of the present invention is speedily adapted to a wide range of jaw spacings merely by releasing the idler cogs and longitudinally positioning the slide on the shank 11. The jaws are speedily locked in desired position by depressing the handle portion 46 and locking the idler sprockets. The slide 21 surrounds the working mechanisms which are housed not only in the slide but by the shank 11 in its opening 15 as well, and shields the same from dirt and the like found to inhibit easy spacing of the jaws in conventional wrenches. Wrenches embodying the principles of the present invention can only occur in extremely aggravated conditions, such as permitting the wrench to rust severely. The wrenches of the present invention are speedily adjusted, accurately maintained in adjusted position, provide a wide range of adjustment, and readily embody binding action on engaged articles when desired. They are relatively simple in structure and economical to produce.

Although I have herein shown and described my invention in what I have conceived to be the most practical and preferred embodiments, it is recognized that departures may be made therefrom within the scope of my invention, which is not to be limited to the details disclosed herein, but is to be accorded the full scope of the claims.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A wrench comprising a pair of slidably associated jaw members, a pair of spaced sprockets rotatably mounted by one of said members, an endless chain mounted on the sprockets defining parallel runs of the chain, a pair of idler sprockets rotatably mounted in the other jaw member individually in meshing engagement with opposite runs of the chain, and means borne by said other jaw member engageable with the idler sprockets to secure the same against rotation.

2. A wrench comprising a pair of slidably associated jaw members, an endless chain, means for mounting the chain for circuitous travel on one of said jaw members so as to present two substantially parallel portions of the chain in substantially alignment with the relative slidable movements of the jaw members, a pair of idler sprockets rotatably mounted on the other jaw member in engagement with the parallel portions of the chain, and means for simultaneously securing the idler sprockets against rotation.

3. A wrench comprising an upper jaw member having a shank portion in substantially right angular relation thereto, a lower jaw member mounted on the shank portion of the upper jaw member for slidable movement longitudinally thereof to spatially position the jaw members, a pair of sprockets rotatably borne by the shank portion of the upper jaw member in longitudinally spaced positions, an endless chain mounted about the sprockets so as to have opposite runs, a pair of idler sprockets rotatably mounted on the second jaw member individually in meshing engagement with opposite runs of the chain between the mounting sprockets, and means for locking the idler sprockets against rotation in the second jaw member whereby the jaws are secured in selected spaced relation by oppositely directed forces applied to the chain by the idler sprockets upon attempted movement of the lower jaw member on the shank portion of the upper jaw member.

4. A wrench comprising an upper jaw, a shank extended from the upper jaw in substantially right angular relation thereto, a slide member longitudinally positionable on the shank, a lower jaw extended from the slide at the end thereof adjacent the upper jaw in cooperative engagement with said upper jaw, said slide having a lower end portion slidably fitted to the shank and an upper end portion loosely fitted to said shank for movement of the lower jaw laterally to the shank, resilient means interposed the slide and the shank urging the lower jaw laterally from the shank, a pair of sprockets rotatably mounted in the shank, a pair of idler sprockets longitudinally spaced on said shank, a chain mounted by the sprockets for circuitous travel thereabout, a pair of idler sprockets rotatably mounted in the slide in engagement with the chain on opposite sides of the sprockets, and means borne by the slide manually operable to lock the idler sprockets against rotation whereby the jaws are locked in spaced relation.
5. A wrench comprising a shank, a slide longitudinally positionable on the shank having a lower end portion slideably fitted to the shank and an upper end portion loosely fitted thereto for pivotal movement of the slide relative to the shank, a pair of adjacent jaws, one thereof laterally extended from the upper end of the shank and the other thereof laterally extended from the upper end portion of the slide, a resilient means interposed the upper end portion of the slide and the shank at the side thereof from which the jaws are laterally extended, a pair of sprockets rotatably mounted in the shank in longitudinally spaced positions, and an endless chain mounted by the sprockets for circuitous travel, a pair of idler sprockets rotatably mounted on the slide in engagement with the chain oppositely disposed the mounting sprockets, braking means borne by the slide abuttable with the idler sprockets, resilient means located between the slide and said braking means urging the braking means away from the idler sprockets, and a manually operable eccentric borne by the slide member operable to force the braking means into idler sprocket engagement whereby rotation of said idler sprockets is precluded and the slide secured in adjusted longitudinal position on the shank achieving desired spatial positioning of the jaws.

6. A wrench comprising a shank having a longitudinal opening formed therethrough, a slide mounted on the shank and longitudinally movable therewith, a pair of jaws, one thereof being laterally extended from an end portion of the shank and the other thereof laterally extended from the adjacent end portion of the slide, a pair of sprockets rotatably mounted in the shank at opposite end portions of the opening therein, an endless chain mounted by the sprockets for circuitous travel about the sprockets, a pair of adjacent idler sprockets rotatably mounted in the slide in engagement with the chain between the mounting sprockets, a rod mounted for axial movement adjacent to the idler sprockets and extended through the opening of the shank, brake shoes oppositely disposed the idler sprockets slidably mounted by the rod for movement axially thereof, resilient means urging the shoes from engagement with the idler sprockets, an eccentric pivotally mounted on the rod and abutting a side of the slide whereby pivoting of the eccentric urges the brake shoes into locking engagement with the idler sprockets.