Sept. 24, 1963 S. L. TRYBUS 3,104,571

SELF ADJUSTING WRENCH

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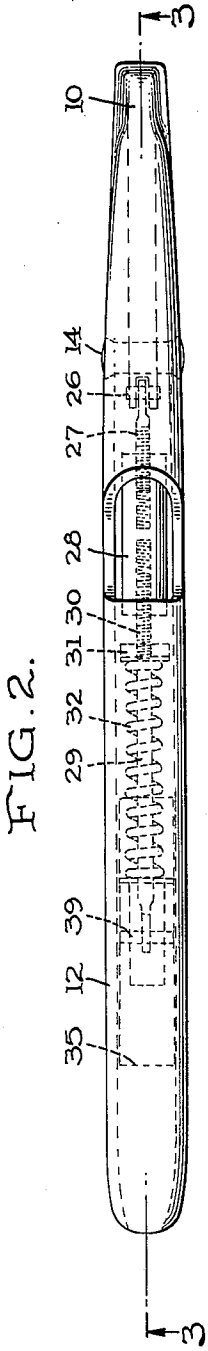


FIG. 2.

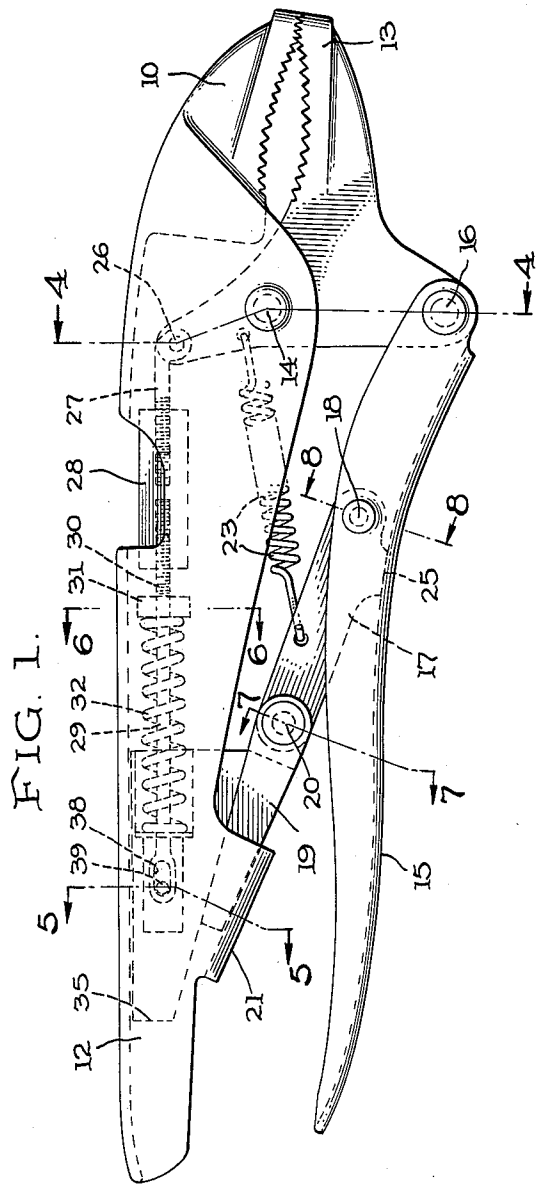


FIG. 1.

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FIG. 4.

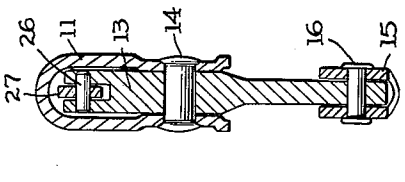


FIG. 3.

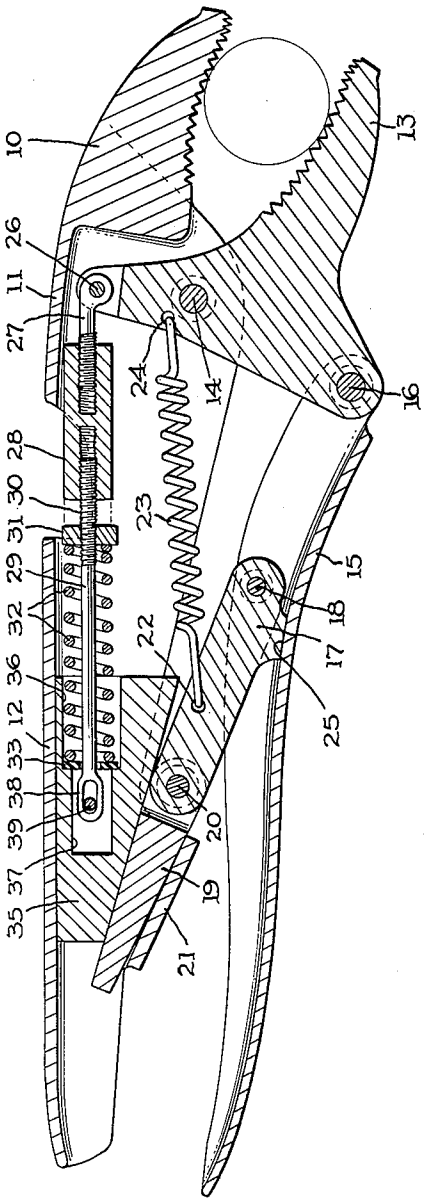


FIG. 8.

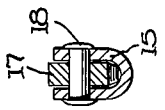


FIG. 7.

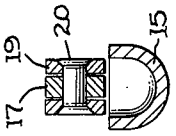


FIG. 6.

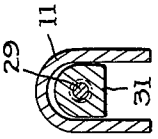
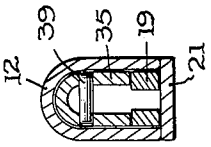


FIG. 5.



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United States Patent Office 3,104,571 Patented Sept. 24, 1963

3,104,571
SELF ADJUSTING WRENCH

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Filed Aug. 22, 1960, Ser. No. 51,118
5 Claims. (Cl. 81—380)

The present invention relates to self adjusting wrenches of the plier type and more particularly to such wrenches for gripping objects wherein the gripping jaws are automatically adjusted to the thickness of the object and in which the gripping force remains contant regardless of the thickness of the object to be gripped.

Heretofore various self adjusting plier-type wrenches have been proposed which automatically adjust for the thickness of the object to be gripped within the range of sizes for which the wrench is designed. These wrenches apply a preselected gripping force to the object regardless of thickness of the object and these structures prevent slippage of the locking mechanism which otherwise might allow the gripping force to weaken with release of the object being gripped.

In these prior art devices a stationary jaw is provided having a shank forming a handle with a movable jaw pivotally mounted on the shank of the stationary jaw; with a second handle pivotally connected to the movable jaw; with toggle linkage connecting the second handle with a locking wedge attached to one end thereof; and with a second wedge adjustably mounted within the first handle and positioned to coact with the locking wedge. A spring is usually provided in the handle of the stationary jaw for urging the parts into operative positions. A link of adjustable length is usually provided between the movable jaw and the second wedge to provide an approximate opening of the jaws for the thickness of the object to be gripped.

These prior art wrenches have certain disadvantages found primarily in the rigidity of the link connecting the movable jaw and the second wedge which is subject to wear and breakage and, because of its rigidity, tends to distort and spread the structure with which the second wedge is associated. As a matter of fact, certain prior art devices employ the distortion referred to in the structure adjacent the wedges to allow some further travel of the wedges together to permit the desired gripping power to be locked onto the object and maintained on the object during the gripping thereof.

The present invention provides novel structure for eliminating the wear and breaking strain incident to a linkage of fixed length between the movable jaw and the second wedge which, while accurately positioning the second wedge during the gripping operation, permits the linkage, in effect, to be compressed after the wedges have locked together to permit further gripping movement of the jaws without strain and breakage of the linkage or distortion of the tool assembly.

It is therefore the object of the present invention to provide a novel structure for a self adjusting wrench of the plier type in which the linkage between the movable jaw and its associated wedge is manually adjustable in length to determine the initial opening of the jaws and to position the associated wedge and, thereafter, during the gripping movement of the jaws the linkage can move with respect to its wedge to shorten its effective length to prevent breakage of the linkage and distortion of the associated part of the wrench.

One embodiment of the novel construction of the present concept is illustrated in the accompanying drawings and is described hereinafter in explanation of the invention. This illustrative embodiment should in no way be construed as defining or limiting the invention.

In the accompanying drawings, in which like reference characters indicate like parts, FIG. 1 is a side elevational view of an illustrative embodiment of a wrench incorporating the present invention;

FIG. 2 is a view from above of the embodiment of FIG. 1;

FIG. 3 is a sectional view of the wrench shown in FIG. 1 on the line 3—3 of FIG. 2 but with the jaws engaging an object;

FIG. 4 is a cross sectional view of the wrench of FIG. 1 on the line 4—4 thereof;

FIG. 5 is a cross sectional view on the line 5—5 of FIG. 1;

FIG. 6 is a cross sectional view on the line 6—6 of FIG. 1;

FIG. 7 is a cross sectional view on the line 7—7 of FIG. 1; and

FIG. 8 is a cross sectional view on the line 8—8 of FIG. 1.

With reference now to the several figures, the wrench is seen to comprise a fixed jaw 10 having a hollow U-shaped extension forming a body portion 11 and a handle 12. Movable jaw 13 is mounted on pivot 14 within body 11. Handle 15 which is hollow and U-shaped in cross section is pivoted at 16 to movable jaw 13. Link 17 is pivoted in handle 15 at 18. Wedge 19 which is hollow carries pivot 20 on which link 17 is mounted. Wedge 19 is carried by flap 21 extending between the sides of handle 12.

Link 17 is apertured at 22 to receive one end of expansion spring 23 and the other end of expansion 23 is mounted in aperture 24 in jaw 13. Link 17 is provided with a flat surface 25 for engagement with the inner surface of handle 15 when pivots 16, 18, and 20 are in approximately the same straight line when handle 15 is moved toward handle 12 to cause rotation of jaw 13 toward jaw 10 and toward the gripping of an object.

A pivot 26 is mounted on jaw 13 opposite pivot 16 and a threaded link 27 is rotatably mounted thereon. A manually actuable adjusting nut 28 is mounted on the threads of link 27. A second link 29 is provided with threaded end 30 which is threaded into nut 28 and has nut 31 mounted thereon. Spring 32 surrounds link 29 behind nut 31 and engages washer 33 which is received against shoulder 34 of wedge 35. Wedge 35 is suitably shaped to be received within handle 12 and for locking engagement with wedge 19. Wedge 35 is cut away at 36 to receive spring 32 and is recessed at 37 to receive slotted end 38 of link 29. Pin 39 is mounted in wedge 35 and extends through slot 38 of link 29. Spring 32 acts to engage pin 39 in the left end of slot 38 as shown in FIG. 3. Nut 31 is adjustable along threads 30 to provide the desired compression of spring 32.

With this construction is will be seen that rotation of nut 28 to move links 27 and 29 into nut 28 will close jaws 13 and 10 ultimately to the position shown in FIG. 1 when handle 15 engages surface 25 of link 17. It follows that rotation of nut 28 adjusts the spacing of jaws 10 and 11. Handles 12 and 15 are then opened with respect to each other end, with the object to be gripped centered between jaws 13 and 10, handles 15 and 12 are moved toward each other. Movement of handle 15 toward handle 12 rotates link 17 against the action of spring 23 and moves wedge 19 to the left as seen in FIG. 3 within the housing formed by flap 21. Rotation of jaw 13 toward jaw 10 moves the linkage made up of link 27, nut 28, link 29 and spring 32 and associated wedge 35 to the left as seen in FIG. 3 since, to all intents and purposes at this point, this linkage arrangement is solid and unyielding. Movement of wedges 19 and 35 to the left continue until they come into locking engagement which occurs before handle 15 engages surface 25 of link 17.

Further movement of handle **15** toward handle **12** to move jaws **13** and **10** into firm gripping engagement on the object to be gripped would now strain the linkage between jaw **13** and wedge **35** and distort the wrench assembly but for the presence of spring **32**, slot **38** and pin **39**. During the final stages of the gripping engagement of jaws **13** and **10** on the object to be gripped, spring **32** compresses and slot **38** rides over pin **39** until surface **25** of link **17** comes into engagement with handle **15**. At this point maximum gripping action is provided on the object by jaws **10** and **13**, wedges **19** and **35** are firmly locked in position and no movement of jaws **10** and **13** can take place until handle **15** is moved relatively away from handle **12**.

It follows that this structure provides a novel spring loaded linkage to position the adjustable wedge **35** of the wrench which then allows the linkage to, in effect, change its length when handle **15** places pressure on movable jaw **13** of the wrench during the final gripping movement of jaw **13** with respect to jaw **10**.

It should now be apparent that the objectives of the present invention are obtained by the above described illustrative embodiment thereof.

Changes in or modifications to the described illustrative embodiment of this invention may be now suggested to those skilled in the art without departing from the invention and reference should therefore be had to the appended claims to determine the scope thereof.

What is claimed is:

1. In a wrench having an elongated handle forming a body portion with a stationary jaw, a coacting movable jaw pivoted to the body portion, a second handle pivoted to the movable jaw, a link pivoted to the second handle and to a wedge slidably mounted in the elongated handle, a second wedge slidably mounted in the elongated handle coacting with the first wedge and linkage connecting the second wedge and the movable jaw, said linkage including means movable with respect to the second wedge under predetermined force for decreasing the effective length of said linkage when the wedges are in set position in the elongated handle and the movable jaw is moved toward the stationary jaw.

2. In a wrench as described in claim 1, said means including a second link engaging and mounted for limited movement with respect to the second wedge and resilient means urging said link away from the second wedge.

3. In a wrench as described in claim 1, said means including a second link, an elongated slot at one end of said second link, a pin in said slot mounted in said second wedge and a spring urging said second link away from said pin.

4. In a wrench as described in claim 1 including resilient means between the link and the movable jaw, said linkage means including a second link, an elongated slot at one end of said second link, a pin in said slot mounted in said second wedge, a spring urging said second link away from said pin, threads on the other end of said second link, a manually rotatable nut on said threads, a third link pivoted to the movable jaw and threads on said third link engaged in said nut.

5. In a wrench as described in claim 1, said means including a second link connected for limited movement to the second wedge, resilient means urging said second link away from the second wedge, a manually actuated nut mounted on said second link and a third link extending between said nut and the movable jaw.

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