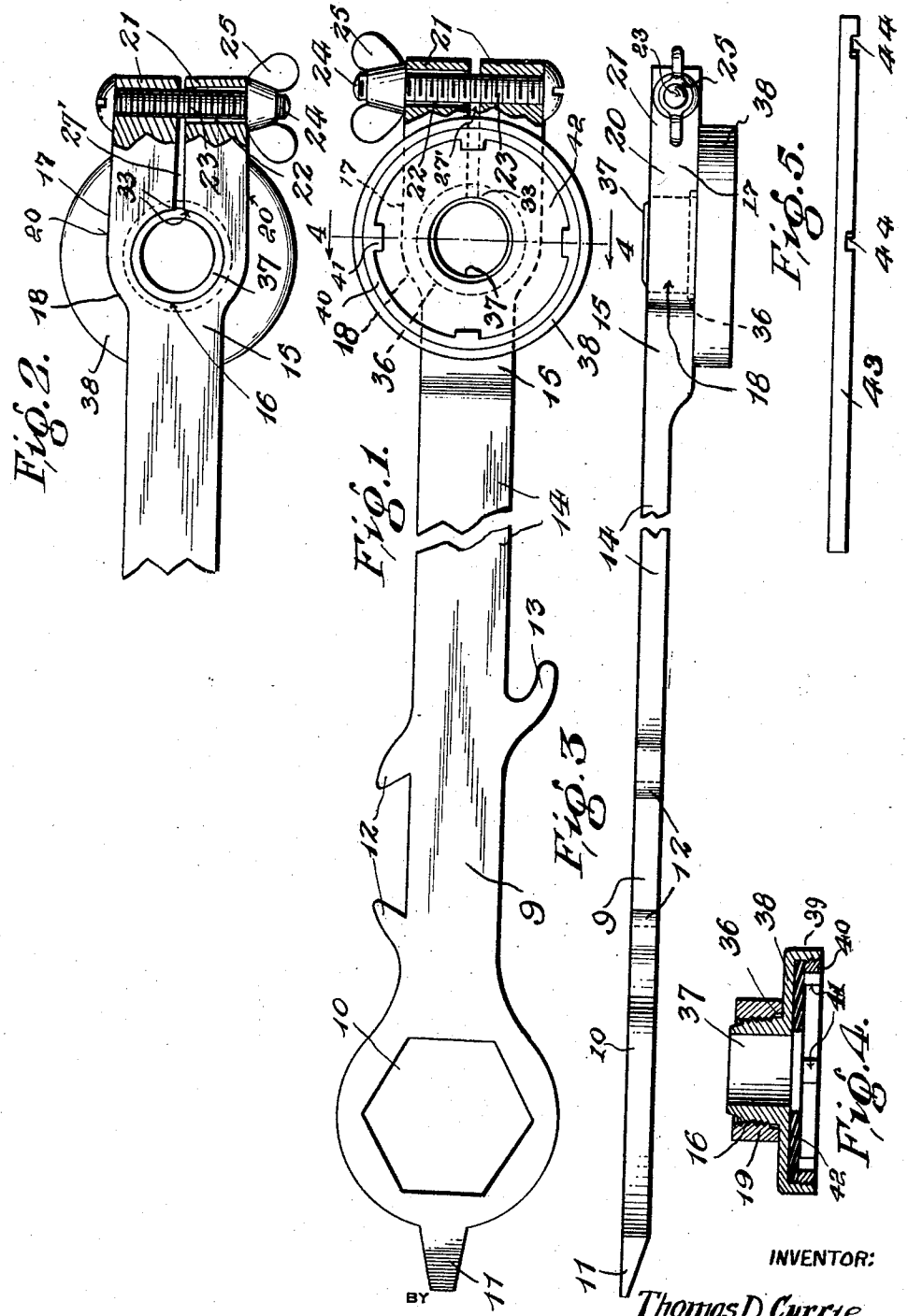
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WRENCH

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WRENCH

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The invention relates to wrenches of the character shown in Figures 3 and 4 of my prior application Serial #510,264, filed January 21, 1931.

The invention has for an object to effect improvement in the function of the spring-jaw wrench, to the end that round work may be gripped in a novel way by a quick adjustment, particularly in wrenches for special work.

It is a further important purpose to present a wrench which will have the advantages of safeguarding against liability of permanent strain of the work as stated in the objects and advantages set forth in my prior application, As in my first application, I obtain these functions in my wrench by so constructing it that compression of the work will be checked before the critical strain of the work is reached, when the wrench is designed and proportioned properly to fit the characteristics of the work involved.

Additional objects, advantages and features of invention residing in the construction, arrangement and proportions of parts will be understood from the following description, in which,

Fig. 1 is a view of a preferred embodiment of the invention, showing the wrench loosely engaged upon the work,

Fig. 2 is a fragmentary view similar to Fig. 1 showing the wrench in gripping engagement upon the work.

Fig. 3 is an edge view of the tool.

Fig. 4 is a cross section on the line 4—4 of Fig. 1.

Fig. 5 is a side elevation of a tool especially useful in removing a ring embodied in a particular construction of valve, when my wrench is to be used thereon.

There is illustrated a tool specially adapted to a specific use, namely, the disassemly of certain automatic flush valves. This tool consists of a bar 9 of resilient metal having a hexagon socket wrench 10 at one end for removing the casing cap of such a valve, with a pry tooth 11 projected longitudinally from the outer side for lifting diaphragms; while on one edge next the socket 10 there are formed spaced teeth 12 inclined toward each other and spaced so as to receive thereunder slidably two mutually adjacent spacer or guide flanges or wings customarily formed on the stem portion of a certain type of valve. A lifter spur 13 is also formed on the edge of the tool opposite the teeth 12, adapted for insertion in the eye member on a certain valve to lift it from place.

The medial part of this bar forms a comparatively narrow handle 14 of considerable length, oblong in cross section. At the end opposite the socket 10, the material of the handle is thickened for a distance from the end, forming a head 15, and a short distance further toward the same end the material of the bar is also broadened in the direction of its major transverse dimension as at 17, a circular opening 16 being formed therethrough on an axis at right angles to the major plane of the head coincident with the longitudinal axis of the head. The outer edge faces 18 of the head where it begins to broaden are approximately concentric with and exceedingly close to the opening 16, for a substantial distance, forming an attenuated flexing part 19, while from a radius line at right angles to the longitudinal axis of the handle, the edge faces are continued tangentially and parallel to the longitudinal axis of the handle as at 20 forming a heavy rigid broadened part. This broadened part 20 extends a substantial distance longitudinally beyond the opening 16 and is slitted longitudinally in a plane at right angles to the major plane of the head as at 27′ forming two rigid jaw heads 21 and having angles or heel parts 33 formed by the intersection of the sides of the opening 16 with the inner faces of the jaw heads at the slit 27′. One of these jaws is provided with a threaded opening therethrough, the axis of which is in the medial plane of the jaws and at right angles to the longitudinal axis of the tool, while the other jaw is provided with a smooth bore 22 of larger diameter alined with the threaded opening. Screwed home in the threaded opening there is a bolt 23, the head of which is locked tight against the outer face of the jaw, and the shank 24 is extended loosely through the larger bore 22 and beyond, receiving a wing nut 25 on its extrem-

ity which may be screwed down against the jaw to compress the two.

The opening 16 is formed with a rabbet 36 therearound at one side of the tool, this being intended to permit the valve stem or nipple 37 to be screwed thereinto until the valve head 38 engages hard against the side of the tool, the unthreaded base part of the nipple stem 37 of the valve being accommodated in the rabbet.

The function of this last described form of the tool is similar to that disclosed in Figures 3 and 4 of my said prior application, but with some advantages in increased effectiveness of the functions. Thus, the concentric narrowed part 19 permits more free flexing of the jaws inward at their outer ends, and the continuous form of the opening 16 assures more positive peripheral support of the work against radial strain throughout. This will oppose indentation by inbending of the part of the work engaged by the angles 33.

The slit 27′ may be made of various widths, but in one form where the aperture 16 is made to receive a brass pipe or nipple of 7/8 inch external diameter and 1/2 inch internal diameter, the slot as cut has been 1/8 inch in width between the jaws. With this proportion, when the nut 25 is screwed up until the two jaws 21 converge and coengage at their extremities, there is no liability of damage to the work by distortion, and the penetration of the angles 33 is insufficient to mar the work or if threaded, to prevent ready engagement of unions or couplings thereon. Experience, or requirement of use may dictate a variation of the proportions of the tool, as will be appreciated.

In use, the work being engaged manually in the opening 16 and the wing nut 25 screwed tight, the work is clamped by a double function of the tool. Thus, when the nut 25 is screwed up, the work is first tightly compressed between the rounded surfaces of the opening 16 which is thus constricted snugly around the work. As soon as the lateral, narrow, concentric parts 19 engage the work firmly, the further compression of the work is opposed, and then they serve as fulcrums on the work, on which the jaw portions 21 then pivot, so that the extremities of the jaws incline quite pronouncedly toward each other (finally contacting if the nut is screwed home), and the angles are consequently caused to be presented inward, as indicated in Figure 4. This pivoting of the jaw heads adjacent that diameter of the opening transverse to the medial lines of the jaw heads is manifest also in the absence of work between the jaws.

In the particular valve for which the tool is designed, the valve head 38 is a disc having formed integrally and concentric therewith the nipple stem 37 which is to be engaged in and gripped in the opening 16 of my tool. The opposite side of the head is formed with a cylindrical interiorly threaded flange 39 onto which is screwed the thin retaining ring 40 with interior lugs 41, by which a replaceable rubber facing 42 is held thereunder. For removing this ring, when the stem of the valve is engaged in my tool as described, I provide a simple flat bar 43 having transverse arcuate grooves 44 formed across one side on a common center and of the same radius as the flange of the valve head, near one end of the bar. Opposite sides of the flange and ring of the valve head being adjusted in respective grooves of this bar, the bar may be operated as a wrench to unscrew the ring.

By making the slit in the tool of a proper width proportionate to the nature of the work to be operated on, the closing action of the jaws—especially the final inbending described—may be limited so that liability of strain of the work is avoided, as explained in my prior application. In the use of the tool, the extremities of the jaws are brought into contact after sufficient gripping action is attained, stopping further compression of the work, or tendency of the heel parts at the opening to gouge the surface engaged.

It is important to note that in this device the degree of impingement or penetration of the angles 33 is of very slight extent radially of the work, as compared to what might be expected in the action of teeth of ordinary wrenches or vises, and the tendency to crush in the work by local depression of a portion under the angles 33 is opposed by the complete peripheral support of the work by the sides of the opening 16 and the communication of radially manifest arch stresses to the tool.

While the tool illustrated has threads in the opening 16, it may be adapted to other work by omitting the threads or otherwise forming the work-engaging faces.

I claim:

1. A wrench comprising an elongated body of resilient metal elongated to provide a handle and having an opening therethrough to receive snugly the work to be held, the material of the body being thinned adjacent the sides of the opening transversely of the body, and being slitted on a radius between the thinned parts at one side the main wall of the opening being otherwise continuous, the material of the body being extended beside the slit a distance forming non-flexing jaw heads of exceeding length beyond the opening, and closing means at the extremities of the jaws.

2. A wrench of the character described comprising an elongated body of resilient metal elongated to provide a handle and having a head portion including two closely spaced jaws of substantial thickness, and having a circular opening uninterrupted except for a one-way slot defining the jaws formed in

the material of the two jaws intermediately of their length forming heel parts at the intersections of the opening and jaws, the parts adjacent the diameter of the opening transverse to the body being weakened and made more flexible adjacent the opening.

3. A hand tool of the character described consisting of a handle bar portion having a broadened head, a work receiving opening being formed through the head, the sides of the broadened part being extended in exceedingly close concentric relation to the opening a distance forming an attenuated highly flexible part of exceeding length, the material of the head being slitted from the opening longitudinally outwardly in one direction only, the material beside the slit on each side being thickened to form rigid jaw head portions and extended an exceeding distance, and manually operable means coengaged between the jaws for the purpose described.

4. The structure of claim 1 in which the said slit is of such width and the jaw heads so elongated that the extremities of said jaw heads coengage by convergence toward the extremities to stop further compression of the work after a maximum predetermined gripping movement.

5. A hand tool for gripping round work consisting of an elongated handle portion having an enlarged work-receiving head of resilient metal, said head having a work-receiving opening therethrough, the material of the head being severed at one side of the opening by a longitudinal slit arranged and located to form heel angles at the intersections of the sides of the opening with the slit, the head being thickened a substantial distance beside the opening and the slit to form rigid jaw heads, and being also extended beside the slit an exceeding distance; and manual means to compress the jaw heads toward each other coengaged between their extreme portions exceedingly distant from the opening, part of the material bounding the opening adjacent the diameter of the opening transverse to the jaw heads being so reduced that upon operation of the compressing means the jaw heads will pivot inwardly from adjacent said diameter in the absence of work in the opening.

In testimony whereof, I have affixed my signature.

THOMAS D. CURRIE.