Sept. 19, 1944. C. A. LATIMER 2,358,461

PRESSURE RELEASABLE WRENCH

Filed Oct. 28, 1942 2 Sheets-Sheet 1

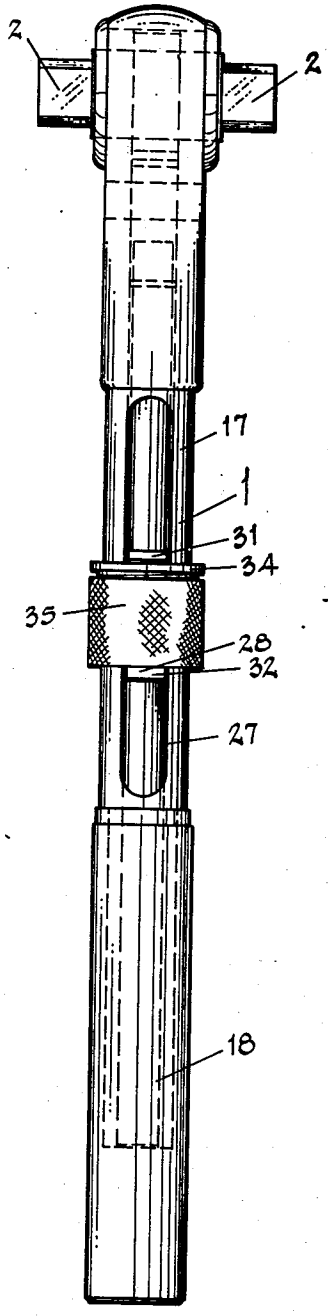


Fig 1

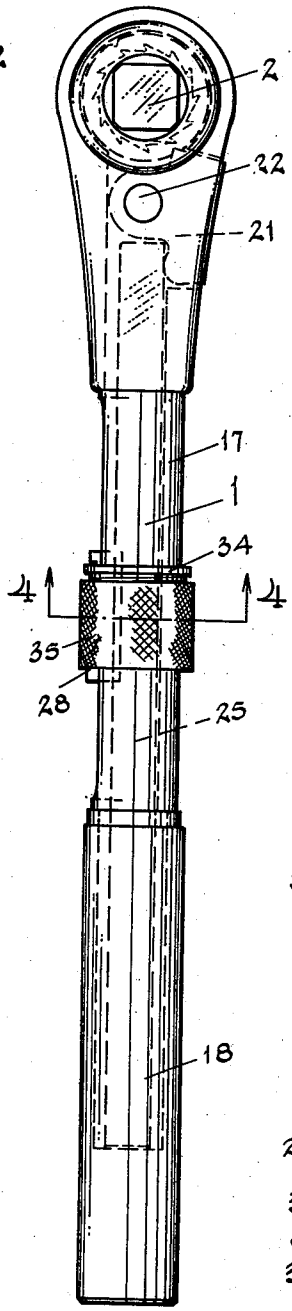


Fig 2

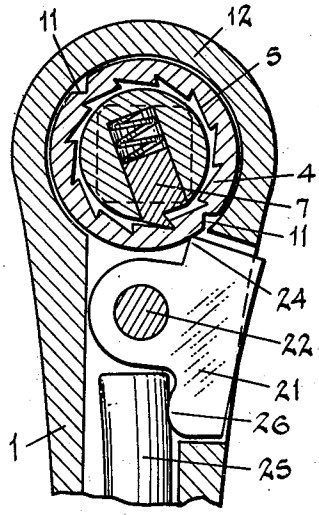


Fig 3

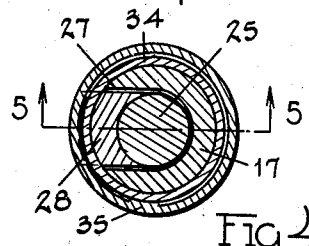


Fig 4

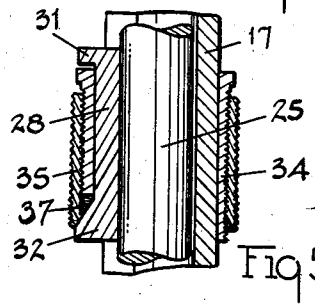


Fig 5

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PRESSURE RELEASABLE WRENCH

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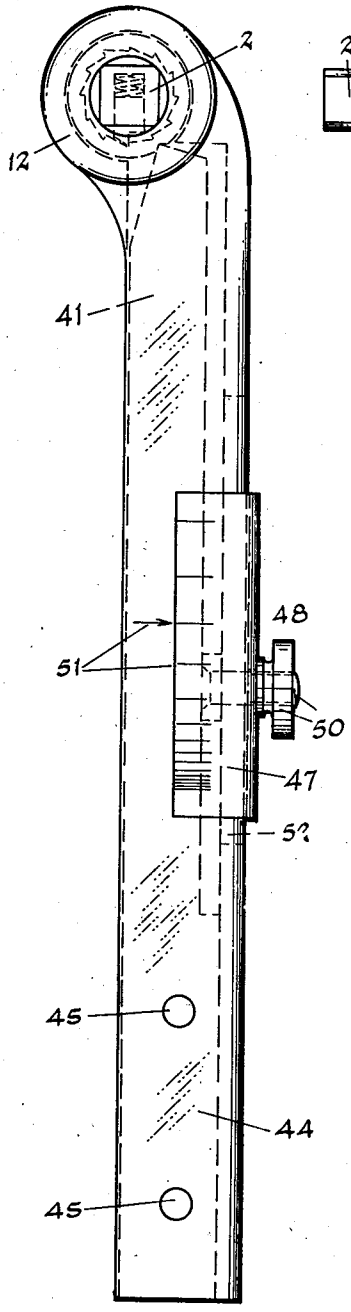


Fig 6

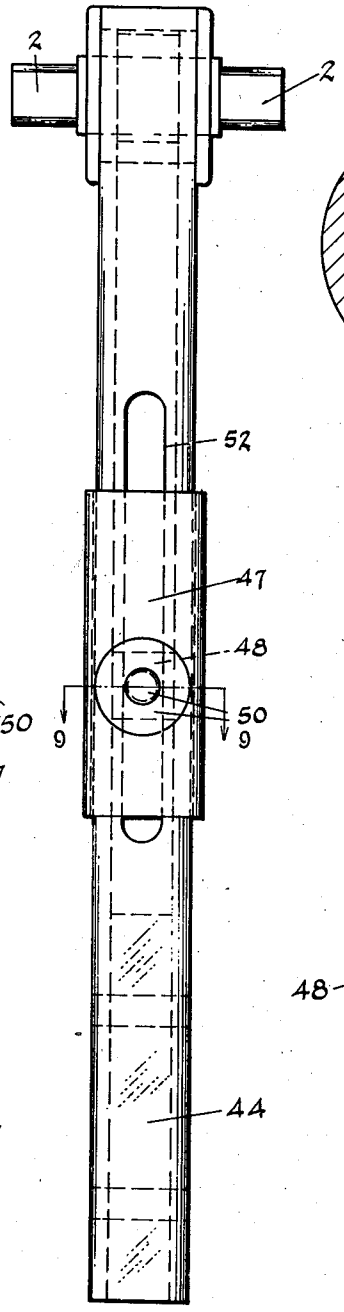


Fig 7

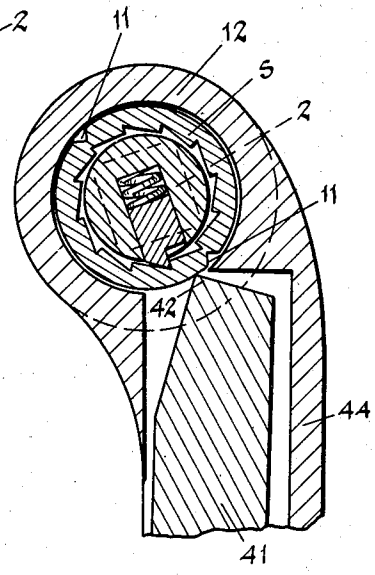


Fig 8

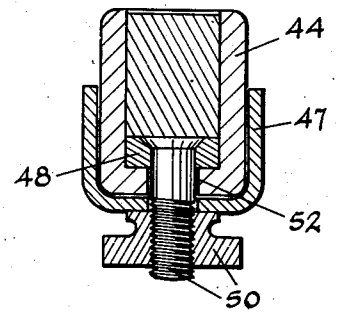


Fig 9

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Patented Sept. 19, 1944

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UNITED STATES PATENT OFFICE

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PRESSURE RELEASABLE WRENCH

Charles A. Latimer, Toledo, Ohio

Application October 28, 1942, Serial No. 463,618

2 Claims. (Cl. 81—60)

My invention has for its object to provide a wrench for rotatably manipulating an element having a threaded portion for screwing the element into or onto a threaded member, and a means for releasing the pressure that may be exerted by the wrench at a desired adjustable pressure point in rotating the element with reference to the member to prevent an excess interengaging pressure between the threads of the element and the member.

The invention thus provides a releasable resilient member for releasing the rotative pressure of the wrench, and prevent further rotation of the element by the wrench when the resistance to rotation of the element reaches a predetermined point.

The invention, particularly, consists in a pressure releasable wrench having a rotatable ratchet or a rotatable co-acting dog to enable step by step movement of one of the rotatable parts that may be connected either to the ratchet or the dog and of desired variable lengths and means for engaging one of the parts at a point in the movement of the wrench, or at points spaced sufficiently to prevent re-engagement of the wrench at a suceeeding point of engagement when the wrench is released while under pressure.

Structures containing the invention may partake of different forms and may be varied in their details and still embody the invention. To illustrate the practical application of the inventiton, I have selected a pressure releasable wrench and a modification thereof as examples of the various structures containing the invention and will describe the wrench hereinafter, it being understood that certain features of my invention may be used to advantage without a corresponding use of other features of the invention and without departing from the spirit of the invention as presented in the claims. The particular structures selected are shown in the accompanying drawings.

Fig. 1 of the drawings illustrates one edge view of one form of the wrench. Fig. 2 illustrates a side view of the wrench. Fig. 3 illustrates a longitudinal section of an end part of the wrench. Fig. 4 illustrates a view of a cross section of a bar stop or anchor means for engaging a resilient bar to vary the length of the part yieldable to a deflecting pressure and vary the wrench release pressure. Fig. 5 is a view of a section of the anchor shown in Fig. 4, taken on the plane of the line 5—5. Fig. 6 illustrates a side view of a modified form of the releasable wrench. Fig. 7 is an edge view of the wrench shown in Fig. 6. Fig. 8 is a longitudinal section of the wrench head. Fig. 9 is a view of a section of the adjustable stop or anchor taken on the plane of the line 9—9 indicated in Fig. 7.

The wrench 1 has a coupling 2 for connecting a rotative part of the wrench, with a threaded element. The coupling may have any suitable engaging means for engaging the element, such as square or hexagonal, solid, protruding end parts for engaging an element having a corresponding socket, or it may have socketed end parts for engaging elements having solid ends. The wrench may be provided with an annular ratchet 5 having an inner ratchet surface and an outer cylindrical surface. The central part of the coupling 2 is located within the ratchet and is provided with a dog 7 slidably supported in a socket or recess formed within the coupling 2. The dog 7 has a suitable tooth for sequentially engaging the teeth of the ratchet to rotate the coupling 5. The dog 7 is preferably diametrically disposed in the coupling 2 and is pressed by a spring 8 located within a socket. The exterior cylindrical surface of the ratchet 4 has one or more shallow recesses 11, preferably two or four, that are spaced from each other along the cylindrical surface of the ratchet 5. The surfaces of the recesses slope relative to each other at about 90° and make substantially the same angle with the radius of the ratchet, through the line of meeting of the surfaces.

The wrench 1 may be provided with a head 12, and the ratchet 5 and the coupling may be rotatably supported in the head 12. The head 12 may be secured to one end of an elongated shell 17 and the other end of the shell may be used as a handle part 18. A block 21 is pivotally supported by the pivot pin 22 in the head 12. The block has a corner part 24 that is adapted to slide along the outer cylindrical surface of the ratchet 5, and to engage in one of the recesses 11. The angle of the surfaces of the corner of the block is also preferably about 90° to substantially fit in the recesses 11 with a relatively slight clearance. An elastic bar 25 is located in the shell 17 and is disposed so that one end is in engaging relation with the block to yieldingly press the corner part 24 of the block 21 in a direction to cause it to press against the surface of the cylindrical surface of the ratchet and to pivotally move the corner part of the block into the recesses 11 when rotation of the ratchet produces registration. If the resistance to further rotation of the coupling by reason of the thread pressure of the element is sufficiently great, the block

will be forced out of the recess. The corner part 24 of the block is elastically held against the surface of the ratchet in the recess and the cylindrical surface by a definite pressure that will yieldingly resist outward movement of the corner part of the block by the manual pressure exerted on the wrench to cause rotation of the ratchet or the wrench body one relative to the other and the threaded element.

The recesses 11 have relatively sloping side surfaces corresponding substantially to the side surfaces 24 of the block. Also they slope at the same angle to the radii of the ratchet where they meet or intersect. The action and counteraction of the surfaces of the block and the recess are first to prevent movement of the ratchet by the rotation of the wrench, unless the engaging and rotative pressure produced by the elasticity of the bar at the point or line of the corners of the recess and the block is greater than the resistance to rotation produced between the surfaces of the threads. The opposed engaging surfaces of the block and the recesses of the ratchet operate to tilt the block 21 and to slide one surface on the other, or the corner of the block on one of the sloping surfaces of the engaged recess until the corner part 24 of the block 21 is forced from the recess. The outer end of the bar is, preferably, tightly socketed in the outer end of the shell 17 or handle and the outward movement of the corner part 24 is rapidly increasingly resisted by the bar 25 due to the displacement of its end and the flexure of its end part until the ratchet is moved or the corner of the block slips from the recess. This results in the production of constant engaging pressure when the element reaches a definite resistance to rotation.

Preferably, the block 21 has a curved surface 26 that engages the end of the elastic bar 25. The surface 26 rocks on the end of the bar as the block is tilted.

The shell 17 is provided with a slot 27 and a block or anchor 28 is slidably located in the slot 27 formed in the wall of the shell. The anchor 28 is also located in a pair of coaxially located threaded sleeves 34 and 35. One end part 31 of the anchor protrudes outwardly to extend over end edges of the shells and the other end part 32 has a sloping surface inclined to the axis of the shell 7, that is engaged by the outer shell to clamp the anchor against the pair of shells and the elastic bar 25. The inner of the sleeves has a slot 37 of short length to receive the enlarged end part 32 of the anchor. The enlarged end part 32 has an inclined surface that is engaged by an end edge of the outer sleeve 35 (Fig. 5) to force the lower end of the anchor inwardly within the slot of the inner sleeve 34 and the slot 27 of the shell 17 to engage and anchor or lock the bar 25 to the shell 17 at a desired point along the shell 17 to vary the portion of the bar that is flexed and thereby vary the elastic resistance of the bar to a bending movement. The anchor and the sleeves readily slide along the shell 17 when the anchor is disengaged by the outer sleeve, and the sleeves and anchor are thus easily located at a point to produce the desired yielding resistance to the release of the ratchet by the block 21 when it engages the ratchet.

The chief difference between the differnt forms of construction shown in the drawings is that the block 21, best shown in Fig. 3, is omitted and the elastic bar 41 directly engages the recesses 11 of the ratchet 5. The end of the bar 41 has end surfaces located substantially at 90° to each other to form the ratchet engaging corner 42. The corner enters recess 11 as they register with the corner upon relative return rotation of the wrench and then upon forward rotation to move the threaded element relative to the threaded member.

The bar 41 is secured in a shell in the form of a channel 44, by the rivet pins 45. The bar is substantially square or oblong in cross section as appears in Fig. 9 and a saddle 47 located exterior to the shell and a block 48 located intermediate the bar 41 and the shell 44 may be secured in any desired position by a bolt and nut 50 with reference to a gauge 51 located in part on the shell 44 and in part on the saddle. The bolt extends through a slot 52 formed in the shell and is slidable in the slot with the block and the saddle to any desired position with reference to the gauge 51. The block 48 forms an anchor means or stop to vary the length of the bend or deflected part of the bar 41 by the resistance to rotation of the ratchet, or the coupling, or the threaded element that the wrench is connected with by the coupling. The operations of the two forms of structures are substantially the same.

I claim:

1. In a wrench, a body part and a head part; a rotatably supported annular member located in the head part and having an outer cylindrical surface; a rotatably supported coupling located in and rotatably supported relative to the member; the member having a female ratchet formed on the inner surface of the member and a plurality of recesses located on outer cylindrical surface of the ratchet and extending transverse the thickness of the member each of the recesses having plane relative sloping surfaces located at an angel to each other; the coupling having a radially slidably supported spring pressed dog for engaging the ratchet of the member and connecting the coupling to the member when one moves in one direction relative to the other and to release the connection when one moves in the opposite direction relative to the other; an elastic bar located in the body part of the shell and having an end part for engaging the surface and recesses of the member and for yieldingly resisting displacement of the said end part from a recess and the rotation of the member relative to the shell; an anchor part slidably supported on the shell for positively engaging the bar; and means for adjustably securing the anchor part along the bar to vary the length of the bendable part of the bar and the resistance to the rotation of the member by the wrench when the recess is engaged by the said bar and until the said end part is forced from the recess.

2. In a wrench, a body part and a head part; a rotatably supported annular member located in the head part and having an outer cylindrical surface; a rotatably supported coupling located in and rotatably supported relative to the member; the member having a female ratchet formed on the inner surface of the member and a plurality of recesses located on the outer cylindrical surface of the ratchet and extending transverse the thickness of the member, each of the recesses having plane relatively sloping surfaces located at an angle to each other; the coupling having a radially slidably supported spring pressed dog for engaging the ratchet of the member and connecting the coupling to the member when one moves in one direction rela-

tive to the other and to release the connection when one moves in the opposite direction relative to the other; an elastic bar located in the body part of the shell and having an end part for engaging a surface recess of the member and for yieldingly resisting displacement of the said end part from the recess and the rotation of the member relative to the head; a pair of coaxially located threaded sleeves slidably supported on the body part; an anchor part slidably supported on the body part and with reference to the bar and connected to the sleeves; and means operated by the sleeves for securing the anchor part to the shell and positively engage the bar to adjust the yieldable length of the bar to the movement of the engaging means and vary the elastic resistance of the bar to the movement of the wrench.

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