

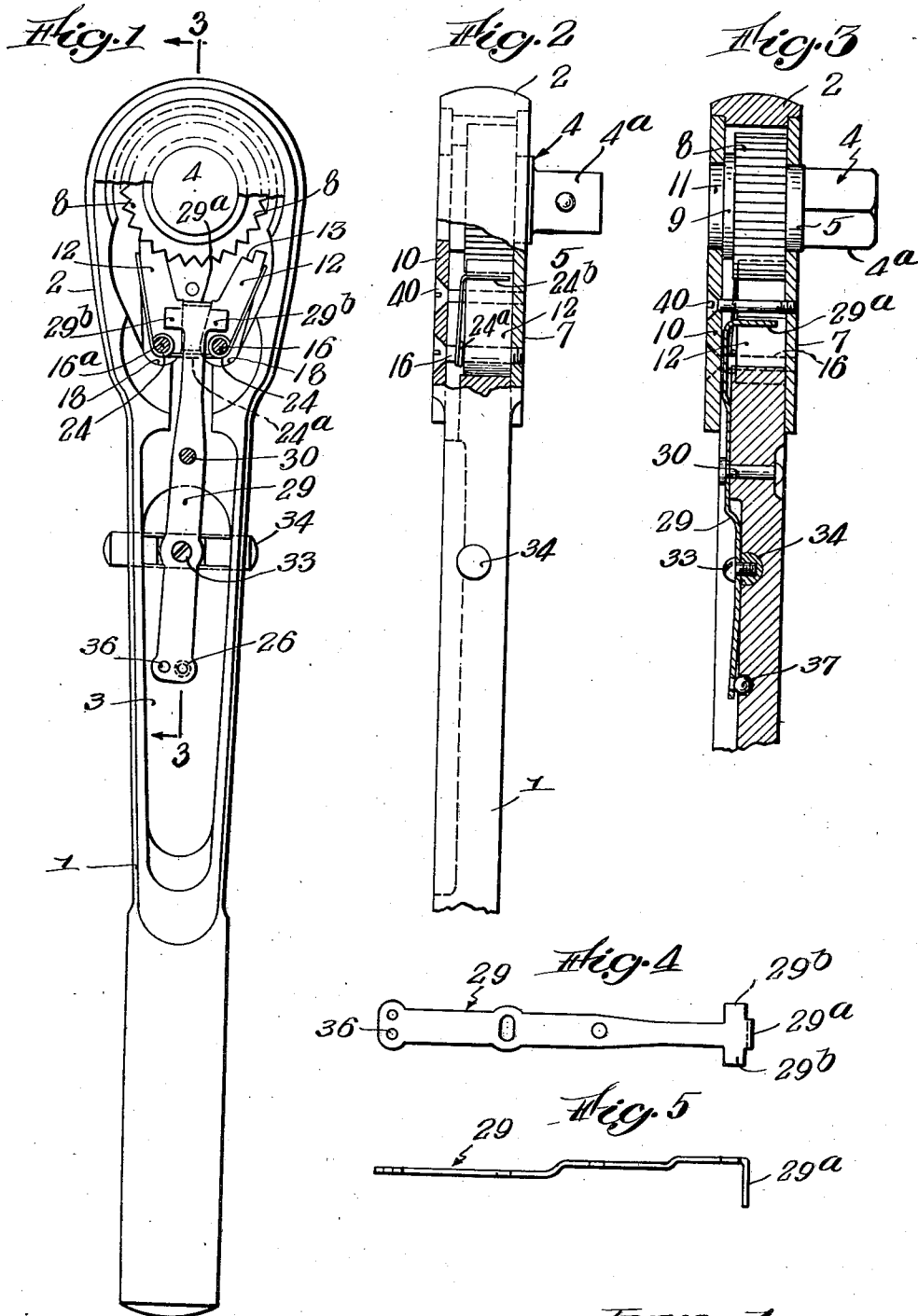
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RATCHET DEVICE

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RATCHET DEVICE

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This invention relates to a ratchet wrench of a simple, sturdy and improved type. In accordance with this invention, a ratchet wrench is provided which may have a minimum number of necessary parts arranged to afford a sturdy, dependable tool and arranged so that the parts may be readily assembled or disassembled, as well as inexpensively manufactured. To permit these desirable results the wrench is provided with two pivotally mounted pawls to engage the toothed portion of the spindle, the pawls being mounted on pivot pins which also act as screws to hold the cover for the hollow head of the wrench in place. While these pins or screws hold the pawls in place, the wall of the recessed head provides cylindrical surfaces concentric with the pins and arranged to engage complementary portions of the pawls so that when pressure is applied to one of the pawls during use of the wrench, this pressure may be opposed not only by the corresponding pivot pin but also by the concentrically disposed surface of the recessed head. A sheet metal control member is provided with an inturned end portion extending between the pawls to engage the same, and is provided with an opposite resilient end portion which cooperates with a protuberance on the handle to afford suitable detent means for holding the control lever in either of its adjusted positions. A transverse plunger may extend through the handle and is pivotally connected to the control lever, the ends of the plunger affording buttons which may be pressed to move the lever from one to the other of its normal positions. Further advantageous features of the invention relate to preferred details of construction which permit the manufacture of a satisfactory, sturdy ratchet wrench at low cost.

In the accompanying drawing:

Fig. 1 is a plan view of the wrench with the cover plate removed;
Fig. 2 is a side view of a portion of the wrench shown in Fig. 1;
Fig. 3 is a section on the line 3—3 of Fig. 1;
Fig. 4 is a plan view of the sheet metal control lever;
Fig. 5 is an edge view of the same.

The accompanying drawing shows a preferred form of wrench embodying the principles of the present invention. Such a wrench is provided with a steel handle 1 having a recessed head 2, the handle affording a shallow recess 3 which communicates with the recess of the head. A spindle 4 is rotatably mounted on the head and may afford any suitably shaped socket or non-

circular shank 4^a to engage the nuts, screws or fastenings which are to be tightened or loosened by the wrench. The spindle has a circular portion 5 rotatably disposed in the metal wall 7 at the bottom of the recess in the head of the wrench. The wall 7 preferably may be fixed to the head as by welding. The spindle is also provided with a toothed portion 8 within the recessed head and with an annular portion 9 affording a shoulder which may engage the inner face of a cover plate 10. This plate is provided with a circular opening to receive the circular end portion 11 of the spindle.

The movement of the spindle relative to the remainder of the wrench is controlled by means of two similar pawls 12. These pawls have rabbeted portions 13 which are shaped to engage the toothed portion of the spindle. As will be evident from an inspection of Fig. 3, the depth of the toothed portion of the spindle and the corresponding thickness of each pawl may be of the order of the thickness of the wrench itself. Thus these parts have substantial surfaces for engagement with each other. As shown, the rabbeted end of each pawl is so shaped that there are two surfaces provided respectively by the wall of the rabbet and by the end of the pawl for engaging the surfaces of two adjoining teeth.

Thus in the position of the parts illustrated in Fig. 1, the left-hand pawl provides two surfaces resisting the movement of the spindle in an anti-clockwise direction relative to the head of the wrench. On the other hand, the pawls are so shaped that the outer portions of the teeth may engage the pawl surfaces with a cam-like or wiping action tending to swing the corresponding pawl away from the toothed spindle to permit the rotation of the latter. Thus if the spindle as shown in Fig. 1 is rotated in a clockwise direction relative to the head of the wrench it may tend to swing the left-hand pawl outwardly, so that the spindle may rotate in this direction relative to the handle.

The pawls are mounted on pintle pins 16^a afforded by parts of two screws 16 which extend through openings in the cover 10 and have threaded extremities received in internally threaded openings in the bottom wall 7 of the recessed head. The recessed head is provided with surfaces 18 which are concentric with the pins 16^a and which engage the correspondingly shaped ends of the pawls. Accordingly, when, for example, the spindle 4 tends to turn in an anti-clockwise direction relative to the head of the wrench, the pressure imposed by the teeth

of the spindle on the end surfaces of the left-hand pawl 12 will not only be opposed by the corresponding pivot pin 16^a but also by the machined surface 18 of the recessed head. It is evident that this surface and the corresponding surface of the pawl extend for the major portion of the thickness of the wrench, thus cooperating with the end surfaces of the pawl and the teeth of the spindle in affording unusually sturdy and effective means to resist movement of the spindle relative to the handle. In order to permit the yieldable movement of the pawls away from the toothed portion of the spindle, suitable spring means is provided. Such spring means is preferably of the torsion type and mounted on the pintle pins 16^a. The provision of torsion spring means is advantageous, since a compact, yet effectively resilient, means may be afforded in an assembly of this type.

As shown, I prefer to provide a single resilient wire spring having two coiled portions 24 disposed about the respective pintles 16^a and connected by a wire section 24^a. The ends of the wire 24 extend outwardly to provide depending portions 24^b which engage the outer surfaces of the pawls adjoining the free ends thereof. It is evident that a spring of this type may be unusually compact and is particularly advantageous in affording resilient means adapted effectively to cooperate with two pawls swinging on two pintle pins in the manner disclosed herein.

A sheet metal control lever 29 is pivotally mounted on the handle of the wrench by means of a screw or rivet 30. The control lever 29 extends along the recess 3 and is pivotally connected by a screw 33 or the like to the intermediate portion of a plunger 34, which is slidably mounted in a transverse bore in the handle of the wrench, this bore opening into the lower part of recess 3, as shown. The ends of the plunger project slightly from the opposite sides of the handle, as shown in Fig. 1, to afford buttons which may be pressed to cause the control lever 29 to swing from one position to the other. The control lever is provided with an intumed or downturned end portion 29^a which extends between the pawls 12 assuring the spacing of the pawls at least at a minimum angle to each other in any position of the control lever, it being evident that the ends of the springs 24 tend to hold the pawls against this portion 29^a of the control lever. This end of the lever 29 is also provided with two tabs 29^b overlying the pawls, thus affording means to hold them against the bottom wall of the head and affording a clearance space for the spring 24. The opposite end of the sheet metal control lever affords a leaf spring and is provided with two openings 36, each of which may engage a protuberance 37 at the bottom of the recess 3. Such a protuberance may be integral with the handle of the wrench but preferably is provided by a ball disposed in a recess in the handle so that the ball may rotate. Thus the end of the control lever and the ball cooperate in affording detent means yieldably to hold the handle in either of its two adjusted positions.

A screw 40, Fig. 3, is provided to assist the screws 16 in holding the cover 10 in place.

It is evident that a wrench of this character may be readily assembled and disassembled. When the wrench is to be disassembled the screws 16 are removed and the screw 40 is also removed, thus permitting removal of the cover

10. The screws 30 and 33 may then be removed

and all of the movable parts separated from the handle and head of the wrench.

When a wrench of this type is to be used it is evident that a ratchet action in either direction may be obtained by suitable adjustment of the plunger 34. Thus, for example, the plunger and corresponding end of the control lever may be moved to the left to the position shown in Fig. 1, thus holding the right-hand pawl 12 away from the toothed portion of the spindle and permitting the spring 24 to move the left-hand pawl 12 into locking engagement with the spindle. In this position of the parts the end surfaces of the pawl 12 engage the surfaces of adjoining teeth of the spindle to oppose anti-clockwise movement of the latter relative to the handle. The spindle, however, can readily move in a clockwise direction relative to the handle, as permitted by the spring 24, the left-hand pawl 12 being swung away from the spindle as the latter turns due to the cam-like engagement of the ends of the teeth with the surfaces of the pawl.

Obviously when the plunger 34 is actuated to swing the control lever from one position to the other, one opening in the end of the lever snaps out of engagement with the ball 37 which provides a cam-like engagement with this portion of the lever. As the lever moves to its opposite position the ball engages with the other opening yieldably to hold the lever in this position.

It is evident that the present invention affords a simple, compact, and sturdy ratchet wrench wherein the parts may be readily assembled and disassembled.

I claim:

1. A device of the class described comprising a handle and a hollow head, a spindle rotatably mounted on the head, teeth upon the spindle, a pair of opposite pawls pivotally mounted within the head for alternately engaging the teeth of the spindle, pins upon which the pawls are mounted, torsion spring means on said pins yieldably urging the pawls toward the teeth, said means comprising a single resilient wire having coiled portions disposed about the respective pins and having portions engaging the respective pawls in the region of the teeth of the spindle, a control lever extending from the head along the handle and movable to either one of two positions to hold either of the pawls out of engagement with the teeth of the spindle, whereby the spindle may be rotatable in either direction relative to the handle but may be held against relative rotation in the other direction.

2. A device of the class described comprising a handle and a hollow head, a spindle rotatably mounted on the head, teeth upon the spindle, a pair of opposite pawls pivotally mounted within the head for alternately engaging the teeth of the spindle, pins upon which the pawls are mounted, torsion spring means on said pins yieldably urging the pawls toward the teeth, a control lever extending from the head along the handle and movable to either one of two positions to hold either of the pawls out of engagement with the teeth of the spindle, whereby the spindle may be rotatable in either direction relative to the handle but may be held against relative rotation in the other direction, said control lever being formed of sheet metal and having an elongate body portion extending in the general direction of the handle, the sheet metal lever having a portion extending above the level of

the pawls and carrying an intumed end portion disposed between the pawls.

3. A device of the class described comprising a handle and a hollow head, a toothed spindle rotatably mounted on the head, a pair of opposite pawls pivotally mounted within the head for alternately engaging the teeth of the spindle, pins upon which the respective pawls are mounted, the hollow head providing curved surfaces concentric with the pins to reinforce each of the latter when the corresponding pawl is opposing movement of the toothed spindle, yieldable means urging the pawls toward the teeth, and a control member movable to either one of two positions to hold either of the pawls out of engagement with the teeth of the spindle, a cover for the hollow head, said pins being in the form of screws which hold said cover in place and which also support said yieldable means.

4. A device of the class described comprising a handle and a hollow head, a toothed spindle rotatably mounted on the head, a pair of opposite pawls pivotally mounted within the head for alternately engaging the teeth of the spindle, a cover for said hollow handle, screws detachably holding said cover in place and providing pins upon which the pawls are pivotally mounted, the hollow head providing curved surfaces concentric with the pins to reinforce each of the latter when the corresponding pawl is opposing move-

ment of the toothed spindle, a single resilient wire having coiled portions disposed about the respective screws between the pawls and the cover and having portions engaging the respective pawls in the region of the teeth of the spindle, and a control member movable to either one of two positions to hold either of the pawls out of engagement with the teeth of the spindle.

5. A device of the class described comprising a handle and a hollow head, a spindle rotatably mounted on the head, teeth upon the spindle, a pair of opposite pawls pivotally mounted within the head for alternately engaging the teeth of the spindle, pins upon which the pawls are mounted, torsion spring means on said pins yieldably urging the pawls toward the teeth, a control lever extending from the head along the handle and movable to either one of two positions to hold either of the pawls out of engagement with the teeth of the spindle, whereby the spindle may be rotatable in either direction relative to the handle but may be held against relative rotation in the other direction, said control lever being formed of sheet metal and having an elongate body portion extending in the general direction of the handle, the sheet metal lever having a portion extending above the level of the pawls and carrying laterally extending tabs overlying the pawls and an intumed end portion disposed between the pawls.

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