Dec. 13, 1955 G. W. BLACKBURN 2,726,563

RATCHET WRENCH PROVIDED WITH SUPPLEMENTAL HEAD TURNING MEANS

Filed March 23, 1953 2 Sheets-Sheet 1

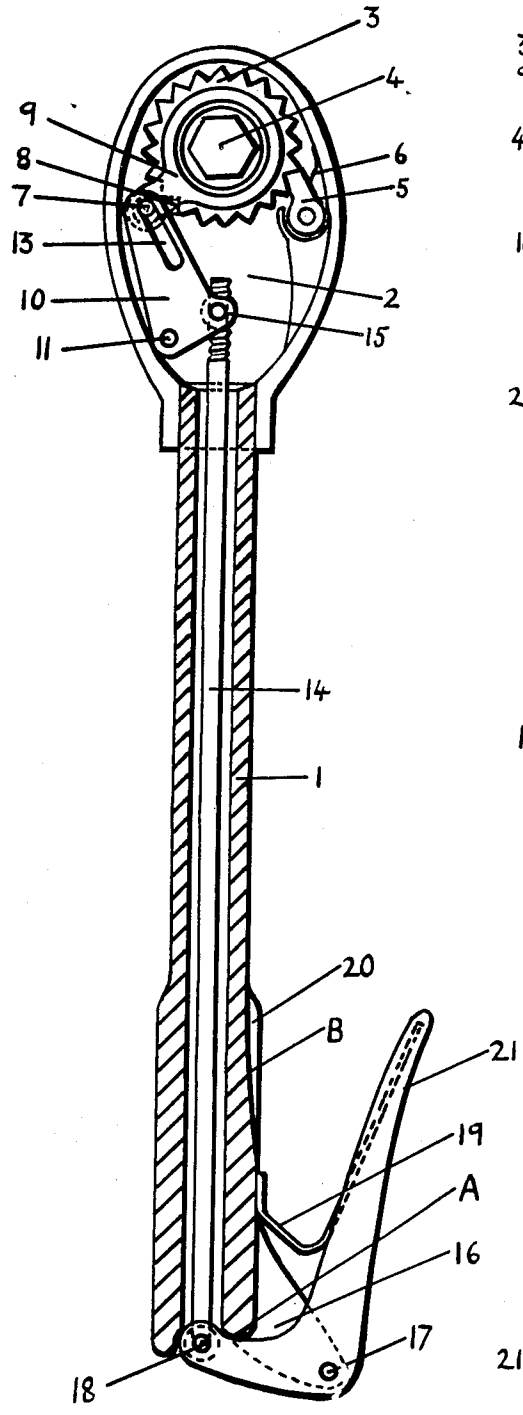


FIG. 1.

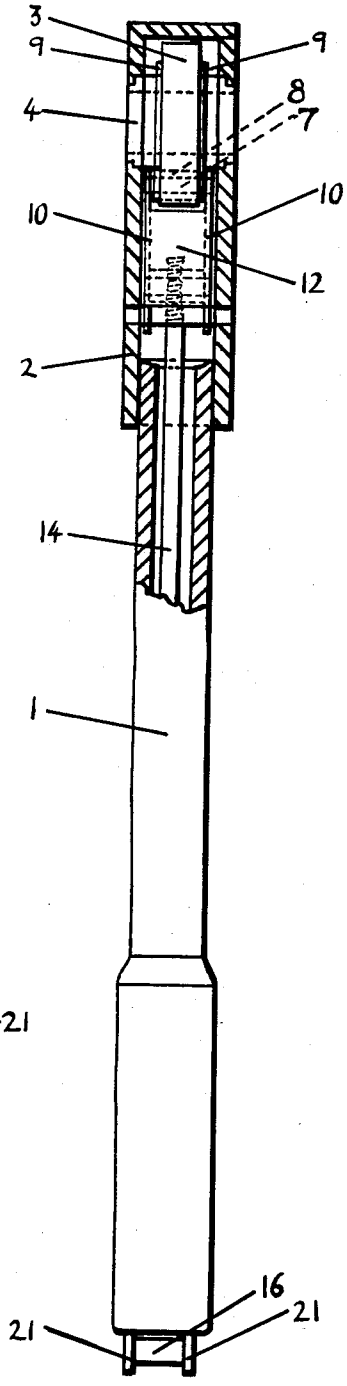


FIG. 2.

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RATCHET WRENCH PROVIDED WITH SUPPLEMENTAL HEAD TURNING MEANS

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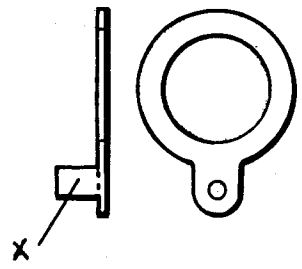


FIG. 3A.

FIG. 3B.

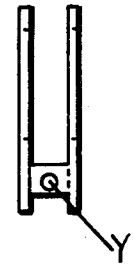


FIG. 3C.

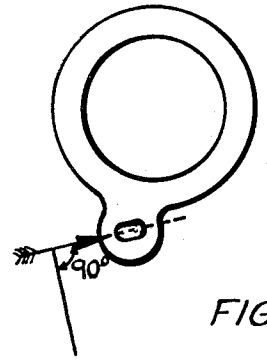


FIG. 4.

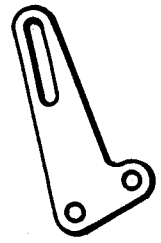


FIG. 5A.

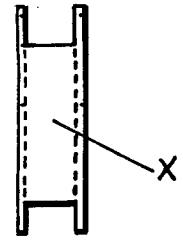


FIG. 5B.

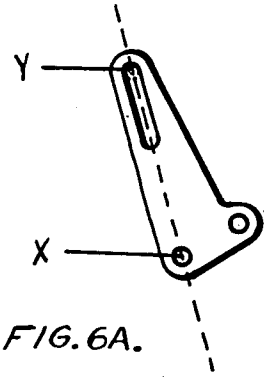


FIG. 6A.

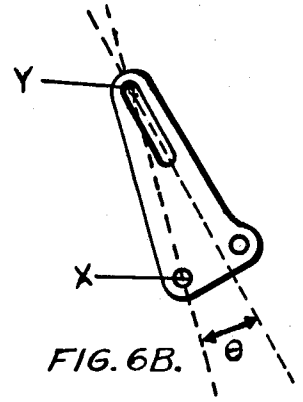


FIG. 6B.

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RATCHET WRENCH PROVIDED WITH SUPPLEMENTAL HEAD TURNING MEANS

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Application March 23, 1953, Serial No. 344,104

Claims priority, application Great Britain March 29, 1952

8 Claims. (Cl. 81—58.1)

This invention relates to hand tools for imparting turning movement to a work element such as a nut, screw or stud, of the kind comprising a ratchet wheel to which a socket member is attached, the socket member being adapted to engage the work element in order to transmit the rotational movement of the ratchet thereto.

The principal object of the invention is to provide an improved hand tool of the kind described which will allow speedy operation in restricted positions and, under normal conditions, will allow nuts, studs, screws or the like to be turned at greatly increased speeds.

According to the invention, a hand tool of the kind described, comprises a hollow head having an opening therein, a ratchet wheel mounted within said head and accessible via said opening, at least one spring-controlled pawl carried within and by said head and adapted to effect rotation of said ratchet wheel in one direction only by bodily rotation of said head about the axis of said ratchet wheel, a stirrup piece rotatably mounted about the axis of said ratchet wheel, a pivot rod carried by said stirrup piece, a spring-controlled pawl carried by said pivot rod and adapted on bodily rotation about the axis of said ratchet wheel to effect rotation of said ratchet wheel in the same direction as before, a bell-crank lever fulcrummed in said head, one arm of said lever being formed with a guide slot with which said pivot rod is in sliding engagement, and means for rotating said bell-crank lever about said fulcrum.

According to a preferred embodiment, the means for effecting rotation of the bell-crank lever consists of a rod which passes through a hollow handle secured to the hollow head, said rod being pivotally connected at one end to the lever and at the other end to a trigger mechanism pivoted on the handle.

Further important features of the invention will appear hereinafter.

The ratchet wheel can therefore be turned by means of the main pawl by swinging the spanner handle through an angle or by means of the moving pawl by imparting a movement by any suitable means to an actuating rod operating the bell-crank lever.

The ratchet head will contain a stud of square or other suitable polygonal section to which any one of a number of socket members may be fitted. It will be possible for the stud to protrude from the upper or lower face of the ratchet wheel in order that forces may be transmitted in clockwise and anti-clockwise directions.

One embodiment of a ratchet spanner according to the invention will now be described wtih reference to the accompanying drawings, in which:

Figure 1 is a plan view of the ratchet head with the handle in section,

Figure 2 is a side view corresponding to Figure 1 partly sectioned with the side casing of the head removed, and

Figures 3 to 6 illustrate details.

Referring to Figures 1 and 2, the spanner comprises a hollow handle 1 and a head 2 containing the ratchet mechanism. A ratchet wheel 3 is fitted in the head casing and contains a hexagonal hole 4 to hold a suitable driving stud to engage a socket member or work element. A main pawl 5 is embedded in a projection of metal from the side of the head casing and operated by a suitably placed spring 6. A pin 7 is the pivot for a moving pawl 8 and supports the moving pawl in the upper and lower halves of a stirrup piece 9. The moving pawl will be suitably operated by a spring normally bearing against the stirrup piece. A bell-crank lever 10 is pivoted about a pin 11 which is fixed in the head casing. The bell-crank lever normally has a strengthening web 12 joining the top and bottom sections. The top and bottom sections of the bell-crank lever contain a guide slot 13 into which extensions of the moving pawl pin 7 above the surface of the top and bottom sections of the stirrup piece fit. An actuating rod 14 is joined to the bell-crank lever at the journal 15 and suitably fastened to this journal. A trigger 21 is pivoted at pin 17 situated on a suitable web 16 fastened to or part of the spanner handle. The other end of the actuating rod 14 is suitably fastened to the trigger journal 18. A return spring 19 is provided to return the trigger after operation.

The device operates in the following manner:

When the trigger 21 is depressed, the actuating rod 14 will be pulled downwards and the bell-crank lever 10 will pivot about pin 11. The moving pawl pin 7 will be forced to move in the guide slot 13, and the stirrup piece 9 carrying the moving pawl 8 will be rotated through an angle about the centre of the ratchet wheel. The ratchet wheel will be turned by the moving pawl through a similar angle. When the trigger is released, the ratchet wheel will be retained by the main pawl 5, but the return spring under the trigger, operating through the actuating rod 14, will return the moving pawl, stirrup piece, and bell-crank lever to their original positions. It will be possible therefore for the ratchet wheel to be turned by means of the main pawl 5 by swinging the handle in an arc or by means of the moving pawl 8 by operating the trigger.

Various modifications of the mechanism are possible to increase the efficiency of its operation. For example, a recess 20 can be formed in the handle stock to allow a greater angular movement to the trigger and therefore a great angular movement of the bell-crank lever.

Means for adjusting the mechanism or for taking up wear can be incorporated at journal 15 at the upper end of the actuating rod. The upper end of the actuating rod may be threaded, as shown in Figure 1, and screwed into a hole in journal 15 suitably threaded to receive it.

The movement of the bell-crank lever may be limited by arranging for the trigger to contact the surface of the handle, when open at A and when depressed at B.

Certain modifications are possible in connection with the structure of the stirrup piece. Figure 3 (B) shows a complete stirrup piece consisting of two sections, a top and a bottom one, each incorporating a flange X. The flanges on the top and bottom sections are fastened together as at Y by riveting, welding or by other suitable means, when the stirrup piece is in position about the ratchet wheel. The said web Y may be utilised to bear the reaction of the moving pawl control spring.

The initial movement of the bell-crank lever may be assisted by elongating slightly the holes in the stirrup piece through which the moving pawl pivot pin passes, see Figure 4. The elongation will be in a line at right angles to the axis of the guide slot when the bell-crank lever is in the initial position as shown in Figure 1. This elongation will allow the starting torque to be applied directly to the ratchet wheel and will allow an initial movement of the wheel to be made with little impedance or drag from the stirrup piece.

Various modifications can be made of the bell-crank lever. For example Figure 5 shows a bell-crank

lever incorporating a suitable web X for additional strength. The slope of the guide slot may be changed to give a slightly more efficient torque to the ratchet wheel for extreme positions of the bell-crank lever. Figures 6 A and B show two possible variations in slot slope. Figure 6 (A) shows a bell-crank lever with the slot axis along a line joining the centre of the pivot X and the centre of the moving pawl pin in its initial position as shown dotted at Y. Figure 6 (B) shows a bell-crank lever with the slot axis at an angle θ to a line joining the centre of the pivot X and the centre of the moving pawl pin in its initial position as shown dotted at Y. This slope will give a slightly improved torque to the ratchet wheel over the final angular movement of the bell-crank lever, since the force will be applied more obliquely to the ratchet wheel. The type of guide slot shown in Figure 6 (B) is incorporated in the ratchet spanner illustrated in Figures 1 and 2.

The main pawl may be mounted on a pivot fitted in the head casing or may be embedded in a suitable recess in the head casing.

I claim:

1. A hand tool for giving a turning movement to a work element such as a nut, screw or stud, comprising a hollow head having an opening therein, a ratchet wheel mounted within said head and accessible via said opening, at least one spring-controlled pawl carried within and by said head and adapted to effect rotation of said ratchet wheel in one direction only by bodily rotation of said head about the axis of said ratchet wheel, a stirrup piece rotatably mounted about the axis of said ratchet wheel, a pivot rod carried by said stirrup piece, a spring-controlled pawl carried by said pivot rod and adapted on bodily rotation about the axis of said ratchet wheel to effect rotation of said ratchet wheel in the same direction as before, a bell-crank lever fulcrumed in said head, one arm of said lever being formed with a guide slot with which said pivot rod is in sliding engagement, and means for rotating said bell-crank lever about said fulcrum.

2. A hand tool according to claim 1, wherein the guide slot in said bell-crank lever is at a slight angle to the line joining the centre of the pivot of the bell-crank lever to the centre of the pivot pin of said pawl in the normal position of the parts in such manner as to apply increased torque to said ratchet wheel over the final angular movement of the bell-crank lever.

3. A hand tool for giving a turning movement to a work element such as a nut, screw or stud, comprising a hollow head, an opening in said head, a ratchet wheel mounted within said head and accessible via said opening, at least one spring-controlled pawl carried within and by said head and in engagement with said ratchet wheel, a hollow handle connected to said head, said pawl being adapted on rotation of said head by means of said handle to effect rotation of said ratchet wheel in one direction only, a stirrup piece rotatably mounted about the axis of said ratchet wheel, a pivot rod carried by said stirrup piece, a spring-controlled pawl carried by said pivot rod and adapted on bodily rotation about the axis of said ratchet wheel to effect rotation of said ratchet wheel in the same direction as before, a bell-crank lever fulcrumed in said head, one arm of said lever being formed with a guide slot with which said pivot rod is in sliding engagement, a rod passing right through said hollow handle and pivotally connected at its upper end to the other arm of said bell-crank lever, and a trigger mechanism pivotally mounted on said hollow handle and pivotally connected to the lower end of said rod.

4. A hand tool according to claim 3, wherein said handle is formed with a recess to accommodate the trigger mechanism when depressed, thereby increasing its angle of movement.

5. A hand tool according to claim 3, comprising spring means for returning the trigger mechanism to its normal position after actuation.

6. A hand tool according to claim 3, wherein adjusting means are provided at the pivotal connection between said rod and the bell-crank lever.

7. A hand tool for giving a turning movement to a a work element such as a nut, screw or stud, comprising a hollow head, an opening in said head, a ratchet wheel mounted within said head and accessible via said opening, at least one spring-controlled pawl carried within and by said head and adapted to effect rotation of said ratchet wheel in one direction only by bodily rotation of said head about the axis of said ratchet wheel, a stirrup piece rotatably mounted about the axis of said ratchet wheel, a pivot rod mounted in elongated pivot holes in said stirrup piece, a spring-controlled pawl carried by said pivot rod and adapted on bodily rotation about the axis of said ratchet wheel to effect rotation of said ratchet wheel in the same direction as before, a bell-crank lever fulcrumed in said head, one arm of said lever being formed with a guide slot with which said pivot rod is in sliding engagement, said elongated pivot holes being at right angles to said guide slot in the normal position of said bell-crank lever, and means for rotating said bell-crank lever about said fulcrum.

8. A ratchet spanner, comprising a hollow head having an opening therein, a ratchet wheel mounted within said head and accessible via said opening, at least one spring-controlled pawl carried within and by said head and adapted to effect rotation of said ratchet wheel in one direction only by bodily rotation of said head about the axis of said ratchet wheel, a stirrup piece rotatably mounted about the axis of said ratchet wheel, a pivot rod carried by said stirrup piece, a spring-controlled pawl carried by said pivot rod and adapted on bodily rotation about the axis of said ratchet wheel to effect rotation of said ratchet wheel in the same direction as before, a bell-crank lever fulcrumed in said head, one arm of said lever being formed with a guide slot with which said pivot rod is in sliding engagement, and means for rotating said bell-crank lever about said fulcrum.

References Cited in the file of this patent

UNITED STATES PATENTS

616,540	King	Dec. 27, 1898
714,586	Landis	Nov. 25, 1902
1,398,180	Dietrich	Nov. 22, 1921
1,970,721	Walton	Aug. 21, 1934
2,633,044	Pasquariello	Mar. 31, 1953