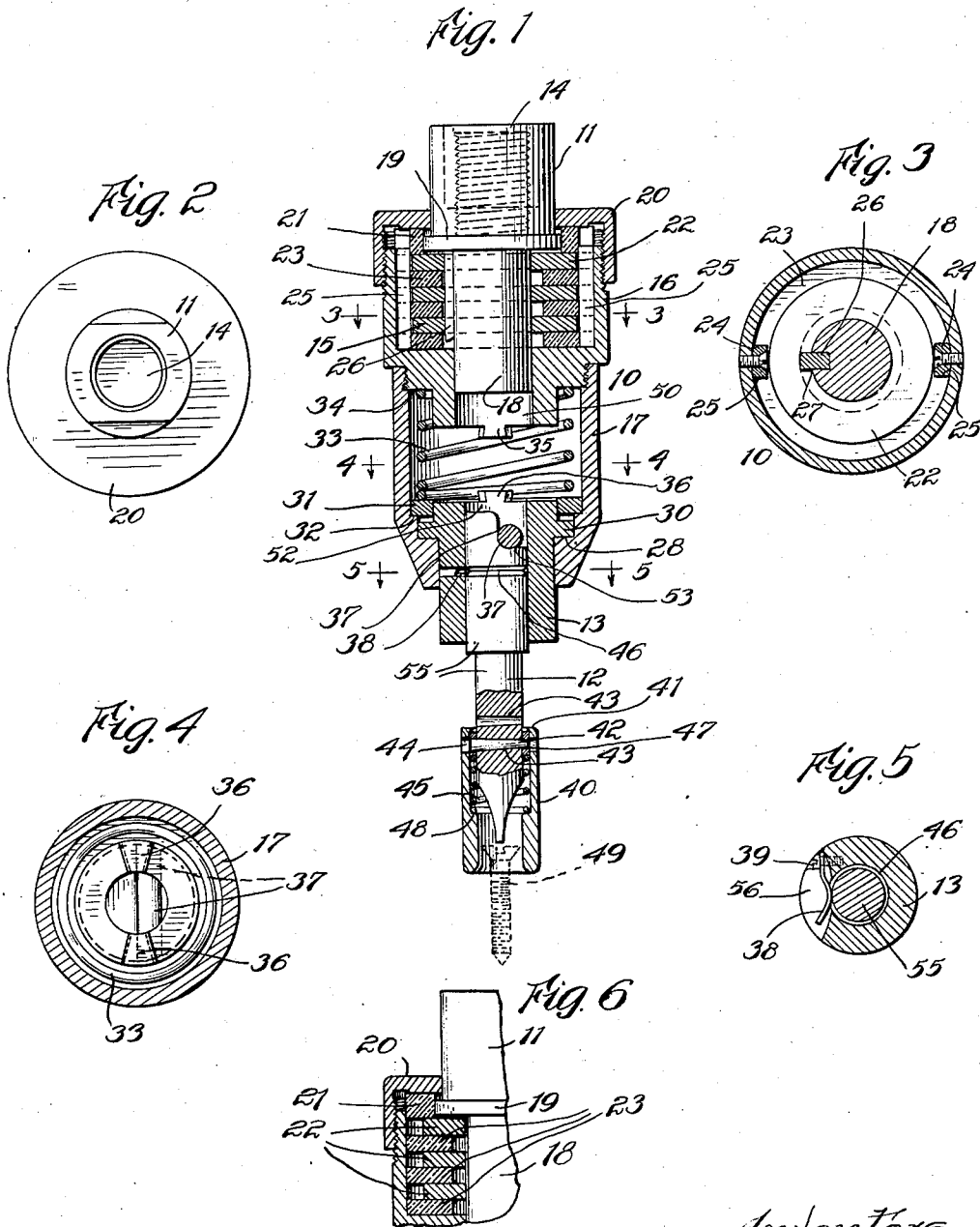


Dec. 8, 1925.

1,564,342

J. J. GEBHARDT ET AL
PORTABLE POWER DRIVEN TOOL

Filed March 3, 1923



Inventors
James J. Gebhardt
Oscar P. Woodcock
By Chindahl, Parker & Gordon
Attys

UNITED STATES PATENT OFFICE.

JAMES J. GEBHARDT AND OSCAR P. WODACK, OF CHICAGO, ILLINOIS, ASSIGNORS TO
WODACK ELECTRIC TOOL CORPORATION, OF CHICAGO, ILLINOIS, A CORPORATION
OF ILLINOIS.

PORTABLE POWER-DRIVEN TOOL.

Application filed March 3, 1923. Serial No. 622,696.

To all whom it may concern:

Be it known that we, JAMES J. GEBHARDT and OSCAR P. WODACK, both citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Portable Power-Driven Tool, of which the following is a specification.

Our invention relates to improvements in power driven tools such as are used for driving screws after being positioned or in setting nuts.

One of the objects of our invention is the provision in portable power driven tools of a construction such that screw driver bits and other attachments may, when desired, be held stationary while the tool is in operation, so as to facilitate the application of the tool to the work.

Another object is the provision of a tool having an improved positive and friction clutch connection between the driving element and the tool attachment.

Another object is the provision of an improved connection between the tool and its power connecting means whereby the tool stops rotating when the screw or nut is driven home, or when the resistance of the screw or nut exceeds a predetermined amount.

A further object is the provision of an improved tool which is adapted for use with a socket wrench or screw driver attachment to cause their rotation in either direction.

Other objects and advantages of the invention will be apparent as the description proceeds.

In the drawings,

Figure 1 is a longitudinal sectional view of the assembled driver.

Fig. 2 is a plan view.

Fig. 3 is sectional view along the line 3—3 of Fig. 1.

Fig. 4 is a sectional view along the line 4—4 of Fig. 1.

Fig. 5 is sectional view along the line 5—5 of Fig. 1, and

Fig. 6 is a detail of the ring packing constituting a friction clutch.

In the drawing, the numeral 10 designates a cylindrical casing having a head 11 axially mounted on one end and a bit 12 and a bit-socket 13 in the other end. The head 11 has a threaded socket 14 in its outer end for

connection with the spindle of a power driven mechanism.

The casing 10 and head 11 are operatively connected by a friction clutch 15 so that rotation of the head normally causes a corresponding rotation of the casing 10. The bit 12 and bit-socket 13 are mounted for reciprocal and rotatory motion relative to the casing 10 and head 11.

The casing 10 comprising an upper cup-shaped section 16 and a lower section 17 having threaded engagement which permits their easy separation and assembly. The head 11 is mounted in the section 16 and the bit 12 and the bit-socket 13 in the section 17. The head 11 has a stem 18 extending downwardly substantially through an aperture 50 formed in the bottom 51 of the section 16 and is provided with a flange 19.

A cap 20 is apertured to receive the head 11 and is threaded on to the upper end of the casing section 16 until it bears against the upper face of a fiber collar 21, which encircles the flange 19. The lower face of the collar 21 rests upon the upper one of a plurality of metal rings 22 which are arranged alternately and in vertical alinement with a plurality of fibre rings 23 so as to be supported on the bottom 51 of the cup section 16 to form the friction clutch 15. The fibre rings 23 each have a pair of diametrically opposed notches or keyways 24 formed in their outer peripheries. The keyways 24 engage corresponding vertical keys 25 which are fastened on the inner face of the casing section 16, so that the fibre rings 23 are movable along the keys 25 and cannot be rotated without at the same time rotating the casing 10. The metal rings 22 are of smaller exterior and interior diameters than the corresponding diameters of the fibre rings 23 so that the outer periphery of the rings 22 clear the keys 24 and their inner peripheries fit closely to the stem 18. The openings in the rings 23 are made of such size that they clear a key 26 mounted on the stem 18, and said key has a sliding fit with corresponding slots or keyways 27 in the inner periphery of the metal rings 22 so as to cause the rings 22 to rotate with the stem 18 and head 11.

By threading cap 20 downwardly, the collar 21 is pressed against the upper one of the metal rings 22 so as to force the

adjacent faces of the fibre and metal rings together. This contact of the rings forms the friction clutch 15 by means of which rotary movement of the head 11 is transmitted to the casing 10. The clutch 15 is adjusted by turning the cap 20 on or off as desired. The fibre collar 21 is made sufficiently deep to take up the wear in the various parts and prevent binding contact between the flange 19 and the cap 20 or the adjacent metal ring 22.

The lower end section of 17 tapers downwardly and inwardly so as to form a seat 28 on which the cylindrical bit-socket 13 is rotatably and reciprocally mounted. The bit-socket 13 has an outer collar 30 preferably integrally formed therewith which engages the seat 28 to limit the reciprocal movement of the socket downwardly. A metal washer 31 encircles the upper end of the bit-socket 13 above the collar 30 and normally rests upon a seat 32 in the casing, being held thereon by a spiral spring 33. The spring 33 has its upper end bearing against a shoulder 34 formed on the lower end of the casing section 16 and has its lower end bearing against the washer 31. The seat 32 is positioned above the seat 28 sufficiently to provide a slight clearance between the washer 31 and the collar 30 which permits a limited reciprocal motion of the bit-socket 13 without moving the washer 31 from its seat.

In the position of the bit-socket 13 shown in Fig. 1 there is no operative connection between the socket and the casing 10 so that the socket is free to rotate relative to the casing or remain stationary while the casing rotates. A slight longitudinal pressure on the bit 12 is sufficient to move the bit-socket 13 into frictional contact with the washer 31 so that the socket will, if desired, rotate with the casing 10 and the bit 13 be quickly brought into engagement with the screw slot. The possible frictional contact between the collar 30 and the washer 31 is slight and is limited by the yielding of the spring 33 under pressure. This enables the operator to easily check or stop the resulting rotation of the bit 12 and bit-socket 13 by exerting a slight finger pressure radially on the socket 13 or upon the shank 55 of the bit.

A pair of clutch teeth 35 formed on the lower end of section 16 and a corresponding pair of teeth 36 formed on the upper end of the bit-socket 13 provide for positive engagement of the bit-socket with the casing 10. This is accomplished by pushing the bit-socket 13 and washer 31 against the yielding pressure of the spring 33 up until the teeth 35 and 36 are in position to mesh. The teeth are under cut to prevent their disengagement while rotating together, and are adapted for rotation in either direction

so that the device is equally as effective in removing screws or nuts as it is in driving them home.

The bit 12 is operatively connected with the socket 13 by inserting the shank 55 of the bit in a bore 52 formed in the socket. The upper end of the shank 55 has one side cut away to form a seat 53 adapted to receive a pin 37 which is mounted in the socket 13 so as to cause the bit 12 and socket 13 to rotate together. The bit 12 is held in operative engagement with the socket by a spring 38 which fits in an annular groove 46 formed in the shank 55 so as to permit of the easy insertion and removal of the bit from the socket. The spring 38 is positioned in a kerf 56 formed in the side of the bit-socket 13 and is fastened by means of a screw 39.

A sleeve 40 is rotatably and reciprocally mounted on the lower end of the bit 12 so as to serve as a combination guide, centering and knock-out device. A collar 47 which is fastened to the bit 12 is adapted to serve as a stop with which an intumed flange 41 formed on the upper end of the sleeve 40 normally engages. The collar 47 is rigidly fastened to the bit 12 by a tapered pin 42 which is mounted as desired in either of the holes 43 in the bit. A spiral spring 45 is mounted in the sleeve 40 with one end bearing against the collar 47 and the other end bearing against a shoulder 48 formed in the sleeve. The pin 42 is inserted through a hole 44 in the wall of the sleeve 40 after the sleeve is positioned on the bit. The spring 45 yieldingly holds the sleeve 40 in its outermost position as shown in Fig. 1.

The sleeve 40 serves as a center device facilitating the positioning of the bit 12 in engagement with a screw 49, which has been positioned as shown in Fig. 1.

In operation, the head 11 being connected with the spindle of a power actuated mechanism rotates continuously driving the casing through the friction clutch 15. The socket 13 and bit 12 are free to rotate with the casing 10 and normally do so by reason of the friction in their bearings, but the operator is able to stop the bit by a slight radial pressure on its shank. The sleeve 40 guides the bit into axial alinement with the screw 49 and a slight axial pressure causes the point of the bit to engage the screw slot at a slow velocity. Further axial pressure will cause the spring 33 to yield and the socket to move upwardly until the teeth 36 engage the teeth 35 and the bit be thereby rotated to drive the screw home.

It will be observed that the space separating the socket 13 from the section 16 (as shown in Fig. 1) is relatively great. This serves to prevent the interengagement of the teeth 35 and 36 before the bit 12 locates

the screw slot. We have found in practice that an approximate spacing of $\frac{3}{8}$ " is desirable for this purpose.

The spring 45 is adapted to yield under slight pressure so that when the sleeve 40 comes into contact with the face of the work, the bit 12 is permitted to advance relative to the sleeve. When the spring 45 reaches its maximum compression, the advance of the bit is stopped and its continued rotation drives the screw forwardly so as to automatically become disengaged from the bit. In the event that the screw is to be counter-sunk, the collar 47 is adjusted to its highest position to permit the descent of the bit below the surface of the work, and when the screw is to be driven flush, the collar is adjusted to its lower position.

It will be observed that the friction clutch 15 operates with equal efficiency in either direction of rotation and that the teeth 35 and 36 are also constructed for effective engagement regardless of the direction of rotation. This adapts the tool for use with both right and left threaded screws and for removing screws as well as for driving them home. The tool can be used for threading nuts on and off bolts by providing a socket wrench attachment with a shank similar to the shank 55 of the bit 12.

Thus it will be seen that we have provided a tool adapted both to drive screws and set nuts and which automatically stops rotating when the torsional resistance of the screw or nut exceed a predetermined amount. It will be further observed that the tool is adapted for use with both right and left handed screws and bolts to remove the same as well as to drive them home, and is also adapted for holding screw drivers, bits and other attachments stationary while the tool is in operation so as to facilitate the application of the tool to the work; and still further we have provided an improved guide, centering and knock-out device for mounting on the tool attachments to automatically release the attachment from the screw being driven.

We claim as our invention:

1. A device of the class described having, in combination, a driving member connected with a source of power, a tool-holding member slidably and rotatably mounted in said member, normally disengaged coacting clutch members on said driving member and tool holding member respectively, and resilient means positioned in said driving member to bear against said tool holding member only when it is moved inwardly for engagement of the clutch members.

2. A device of the class described having, in combination, a rotatable element adapted for connection with a rotary power driven member, a tool-holding member slidably and rotatably mounted in said element, normally

disengaged coacting clutch members on said element and holding member respectively, a slidable thrust washer seated in the path of and normally out of engagement with the holding member, and a resilient member yieldingly holding said washer on its seat but permitting said holding member and washer to be moved inwardly with said washer bearing on said holding member until said clutch members are in their operatively engaged position and thereby causing said holding member and element to rotate together for an appreciable period before said clutch members engage.

3. A device of the character described comprising, in combination, a casing adapted for attachment to a tool spindle for rotation thereby, said casing having a clutch member rigid therewith, a tool holder rotatable relative to the casing and having a second clutch member rigid therewith, said holder being also mounted for movement axially relative to the casing, and means including a spring acting to hold said clutch members in spaced relation and normally having a bearing in the casing independently of the tool holder whereby to permit relative rotation between the latter and the casing unrestrained by the action of said spring.

4. A device of the class described comprising, in combination, a casing constructed in two separate sections rigidly secured together in axial alignment, a member adapted for attachment to a tool spindle and extending into the upper section of the casing, a friction clutch enclosed within said upper section of the casing for connecting said member with the casing, a tool holder mounted for relative rotational and axial movements in the lower section of the casing, and means enclosed within the lower section of the casing and providing a positive driving connection between the casing and the tool holder comprising a pair of clutch members rigid with the tool holder and the casing respectively, and a spring adapted to hold the tool holder in the lower end of the casing whereby to maintain said clutch members normally in spaced relation.

5. A device of the class described comprising, in combination, a casing constructed in two separate sections rigidly secured together in axial alignment, a member adapted for attachment to a tool spindle and extending into the upper section of the casing, a friction clutch enclosed within said upper section of the casing for connecting said member with the casing, a tool holder mounted for relative rotational and axial movements in the lower section of the casing and means enclosed within the lower section of the casing and providing a positive driving connection between the casing and the tool holder.

6. A device of the character described

4

comprising, in combination, a casing formed in two sections rigidly secured together in axial alinement, the upper one of said sections being in the form of a cup having a cap screw-threaded upon its upper end, and having an aperture in its bottom wall, a member adapted for attachment to a tool spindle depending through said cap and into the casing with its lower end entered in said aperture, a friction clutch in the upper section of the casing adapted to connect said casing therewith, a tool holder mounted in the lower section of the casing for rotational and axial movement therein, spring means normally holding the tool holder in the lower end of the casing, and coacting members rigid with the tool holder and the bottom wall of the upper casing section respectively.

7. A device of the class described com-

prising, in combination, a member adapted to be secured to a tool spindle for rotation thereby, a casing having a friction clutch connection with said member adjustable so as to permit relative rotary movement between the casing and said member when the resistance to the rotation of the casing by said member exceeds a predetermined amount, a tool holder mounted in the casing for rotary and axial movements relative thereto, a pair of clutch members rigid with the casing and the tool holder respectively, and spring means enclosed within the casing and acting to hold said clutch members in disconnected relation.

In testimony whereof we have hereunto affixed our signatures.

JAMES J. GEBHARDT.
OSCAR P. WODACK.