

Feb. 10, 1959

A. S. ZAKRZEWSKI ET AL

2,872,836

POWER OPERATED NUT RUNNER

Filed Aug. 15, 1957

FIG. 3.

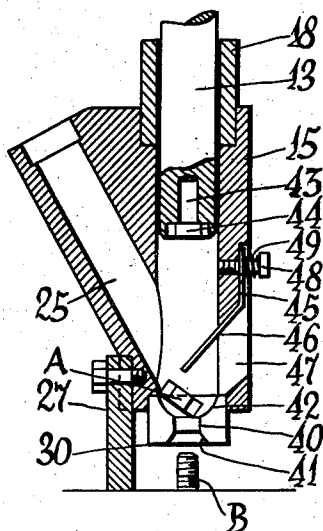


FIG. 2.

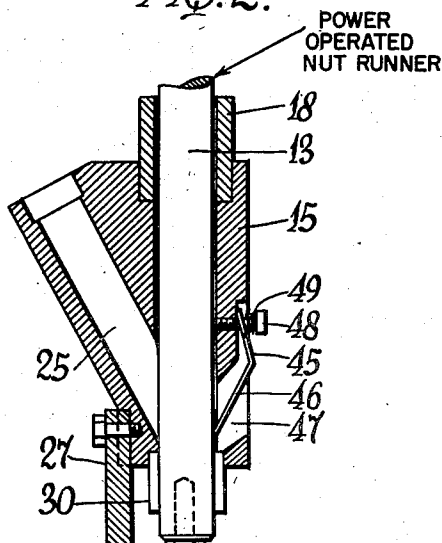
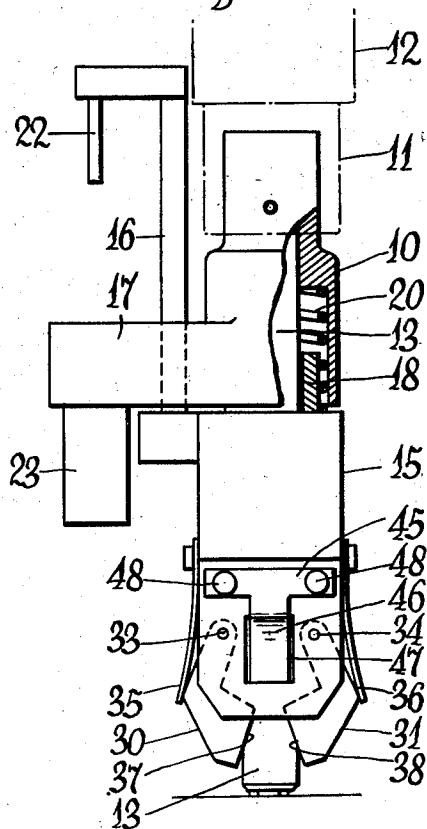


FIG. 1.



INVENTOR.
Andrew S. Zakrzewski,
 BY *George S. Ashby*
Beau, Brooks, Buckley & Beau
 ATTORNEYS.

1

2,872,836

POWER OPERATED NUT RUNNER

Andrew S. Zakrzewski, Toronto, Ontario, and George S. Ashby, Port Credit, Ontario, Canada, assignors to Pneuma-Serve Limited, Ontario, Canada

Application August 15, 1957, Serial No. 678,381

12 Claims. (Cl. 81—54)

This invention relates to means for receiving nuts from a nut feeding device and for orienting and positioning the same for cooperation with a power wrench mechanism.

Numerous prior art devices have been proposed for orienting screws and similar headed fasteners to align the shanks thereof for driving or otherwise operating upon the same. Furthermore, numerous prior art mechanisms exist which provide means for "setting" or "running" nuts onto a male threaded member. Most of the mechanisms in this latter category presuppose that the nuts fed thereto are in aligned predetermined positions so that the final receiving and "setting" or "running" means need only maintain the nuts in their aligned or oriented positions.

The means of the present invention is adapted to receive nuts which are fed singly as required but which pass to the nut securing means in an unoriented manner so that the individual nuts must be oriented and positioned for operation thereon by a power operated socket wrench member.

The problem of orienting and positioning the relatively flat nut members which are contemplated in the present invention is substantially different from that encountered in orienting screws or the like, which are usually oriented by acting upon their cylindrical shank portions.

Speaking generally, the present invention provides a vertical cylindrical nut receiving chamber with a curving lower end portion for camming falling nuts into horizontal position, that is, a position wherein their axes extend vertically. Further, the present invention provides a deflecting finger which prevents nuts from falling edgewise to the center of the bottom of the aforesaid chamber.

A single embodiment of the present invention is illustrated in the accompanying drawing and described in the following specification but it is to be understood that such embodiment is by way of example only and that various modifications may be made without departing from the spirit or scope of the invention, the same being limited only as defined in the appended claims:

In the drawings:

Fig. 1 is an elevational view of one form of the device of the present invention with a portion thereof broken away for further illustration;

Fig. 2 is a vertical central cross-sectional view of the apparatus of Fig. 1, the view being taken at right angles to Fig. 1; and

Fig. 3 is a view similar to Fig. 2 but with the wrench implement portion of the device withdrawn.

It is to be understood that power wrenches as such are old and well known and also that various means for delivering individual nuts to the mechanism of the present invention are known in the prior art and need not be illustrated or described herein.

Referring particularly to Fig. 1, an adapter sleeve 10 is removably fitted into the end bearing portion 11 of a power tool structure 12 which may be a conventional portable nut setting tool which includes a selectively ro-

2

tatable socket wrench member 13 which projects axially outwardly from the end bearing member 11 of the tool. It is to be understood that the adapter 10 is held removably but rigidly in bearing member 11 while the wrench member 13 is mounted for selective power rotation.

The nut orienting portion of the apparatus comprises a body member 15 which fits loosely about wrench member 13 and is guided for relative axial sliding movement with respect to adapter 10 by means of a guide rod 16 which is fixed at its lower end to a lateral extension of body member 15 and has axial sliding bearing in a lateral extension 17 of adapter 10. A bushing 18 is fitted into the upper end of body member 15 and a compression coil spring 20 acts between the adapter 10 and body member 15, urging the latter downwardly as shown in the drawing which, in effect, urges the wrench member 13 to an upward withdrawn position relative to the body member 15, this being the position illustrated in Fig. 3.

A laterally offset pin 22 carried by guide rod 16 may serve as a stop for limiting relative downward movement of body member 15 and may, as in the present instance, serve as an actuator for a valve member 23 which is operable to permit a nut to drop downwardly into the body member 15 with each successive return operation of body member 15 after a nut setting or applying cycle. This much of the structure is purely incidental and therefore need not be illustrated or described in further detail.

As shown in Figs. 2 and 3, the body member 15 is provided with a lateral angular passageway 25 which leads downwardly to the vertical central opening which receives the wrench member 13. A flexible conduit may connect with the upper end of passageway 25 and individual nuts may thus be selectively dropped through passageway 25. As far as the principles of the present invention are concerned, individual nuts may be manually dropped into the upper end of passageway 25. A foot member 27 is attached to the lower end of body member 15 to engage a table or work surface or work piece to locate the body member 15 a predetermined distance above the work.

Referring to Fig. 1, a pair of jaw members 30 and 31 are pivoted to the body member as at 33 and 34, respectively. The jaw members 30 and 31 are urged toward each other by leaf spring members 35 and 36, respectively, and have facing surfaces 37 and 38, respectively, which normally abut. These facing surfaces are provided with semi-circular curved formations so that when they are in abutment they form a screw shank receiving opening 40 having a lower beveled portion 41 for facilitating entry of a screw end and a partially spherical counterbore surface 42 which operates in a novel manner to guide or cam individual nuts into proper position for engagement by the socket end of wrench member 13, the socket opening of the latter being designated 44 in Fig. 3. In addition to the socket opening 44 the wrench member is provided with a further bore 43 serving as a clearance hole for receiving the threaded shank ends of screws.

In the illustrated instance the nut receiving curved counterbore formation 42 is partly spherical but the same may be of multiple bevel formations of progressively greater angularity. The particular formation of this surface 42 is such that a nut dropping against the outer portion of the same edgewise is turned through approximately 90 degrees to a flat position by reason of the progressive curvature of the surface 42, or the progressive beveling thereof if that be the case. Thus a nut will not fall into and remain in an edgewise or oblique angle position as would be the case if the surface 42 were a plain single bevel surface as is frequently employed in devices of this type in connection with screw feeding or rivet feeding. In Fig. 3 a nut designated A is in the process of being turned to a flat position by its engagement with the gradually curving surface 42.

3

A flat member 45 has an oblique lower leg portion 46 which extends angularly through a lateral opening 47 in body member 15 as clearly shown in Fig. 3. Plate member 45 is resiliently held in the position illustrated in Fig. 3 by screw 48 having coil springs 49 interposed between their head portions and plate 45. Thus leg portion 46 of plate member 45 may be resiliently deflected laterally as when wrench member 13 moves downwardly through body member 15 and the position which plate member 45 and its leg portion 46 assume under these conditions is clearly illustrated in Fig. 2.

When plate member 45 and leg portion 46 are in their normal position, as in Fig. 3, nuts falling downwardly through passageway 25 must pass downwardly to the surface 42 at one side thereof so as to be properly deflected into flat position by the curved surface 42. Otherwise the nut might on occasion come to rest centrally of the openings in the jaw members 30 and 31 in an edgewise or upright position. As the edge of leg portion 46 protrudes past the center line of the driving head, the nut cannot fall "on edge." Use of the plate member 46 is optional and is particularly desirable when feeding and driving certain types of nuts, particularly thick nuts having a tendency of standing "on edge."

When a nut is resting flatwise on the curved surface 42 or nearly so, relative downward movement of wrench member 13 completes the flat orientation of the nut if that is necessary and engages thereover. The lower end of wrench member 13 is slightly beveled or rounded at its edges and thus cams against the curved surface 42 of the jaw members 30 and 31 to spread the latter, as clearly shown in Fig. 1, forcing its way between the jaw members and applying the nut to a screw such as is indicated at B in Fig. 3.

We claim:

1. A body member having an axial bore, a pair of jaw members pivoted to said body member adjacent to an end thereof and having jaw portions adapted to abut in a plane through the axis of said bore, said jaw portions having semi-circular openings cooperating to form a reduced continuation of said axial bore, means for depositing individual nuts into said axial bore, the upper ends of the openings in said jaw portions comprising a counterbore having a generally spherical contour, whereby the walls thereof at the upper portion are approximately vertical and at the lower portion adjacent to the reduced continuation portion are tapered, whereby nuts falling to said spherical contour counterbore in generally edgewise position are cammed thereby to a generally flatwise position.

2. A body member having an axial bore, a pair of jaw members pivoted to said body member adjacent to an end thereof and having jaw portions adapted to abut in a plane through the axis of said bore, said jaw portions having semi-circular openings cooperating to form a reduced continuation of said axial bore, means for depositing individual nuts into said axial bore, the upper ends of the openings in said jaw portions comprising a counterbore having a generally spherical contour, whereby the walls thereof at the upper portion are approximately vertical and at the lower portion adjacent to the reduced continuation portion are tapered, whereby nuts falling to said spherical contour counterbore in generally edgewise position are cammed thereby to a generally flatwise position, and a cylindrical wrench member having a nut receiving socket in its lower end and adapted to move downwardly in said axial bore to fit over a nut in said counterbore and engage the spherical counterbore surface to cam the jaw members apart and thus permit the nut and wrench to pass downwardly therebetween.

3. A body member having an axial bore, a pair of jaw members pivoted to said body member adjacent to an end thereof and having jaw portions adapted to abut in a plane through the axis of said bore, said jaw por-

4

tions having semi-circular openings cooperating to form a reduced continuation of said axial bore, means for depositing individual nuts into said axial bore, the upper ends of the openings in said jaw portions comprising a cup-shaped counterbore having a central relatively flat portion and an outer portion of substantially greater inclination, whereby nuts falling to said cup-shaped counterbore in generally edgewise position are guided thereby to a generally flatwise position.

4. A body member having an axial bore, a pair of jaw members pivoted to said body member adjacent to an end thereof and having jaw portions adapted to abut in a plane through the axis of said bore, said jaw portions having semi-circular openings cooperating to form a reduced continuation of said axial bore, means for depositing individual nuts into said axial bore, the upper ends of the openings in said jaw portions comprising a cup-shaped counterbore having a central relatively flat portion and an outer portion of substantially greater inclination, whereby nuts falling to said cup-shaped counterbore in generally edgewise position are guided thereby to a generally flatwise position, and a wrench member having a socket end adapted to move downwardly in said axial bore to engage over a nut in said counterbore and force the same downwardly between the jaw members by camming engagement of the lower edges of the wrench member against the walls of the cup-shaped counterbore.

5. A body member having an axial bore, a pair of resiliently separable jaw members carried by said body member adjacent to an end thereof, said jaw members having semi-circular openings cooperating to form a reduced continuation of said axial bore, means for depositing individual nuts into said axial bore, the upper ends of the openings in said jaw portions comprising a cup-shaped counterbore with the outer upper portions of the walls thereof forming a downward continuation of said axial bore and the inclination varying progressively toward the bottom of said counterbore, whereby the bottom thereof is substantially flat and nuts falling to said counterbore in generally edgewise position are guided thereby to a generally flatwise position.

6. A body member having an axial bore, a pair of resiliently separable jaw members carried by said body member adjacent to an end thereof, said jaw members having semi-circular openings cooperating to form a reduced continuation of said axial bore, means for depositing individual nuts into said axial bore, the upper ends of the openings in said jaw portions comprising a cup-shaped counterbore with the outer upper portions of the walls thereof forming a downward continuation of said axial bore and the inclination varying progressively toward the bottom of said counterbore, whereby the bottom thereof is substantially flat and nuts falling to said counterbore in generally edgewise position are guided thereby to a generally flatwise position, and a wrench member having a socket end adapted to move downwardly in said axial bore to engage over a nut in said counterbore and force the same downwardly between the jaw members by camming engagement of the lower edges of the wrench member against the walls of the cup-shaped counterbore.

7. Nut positioning and applying means comprising a body member having an axial bore, a pair of jaw members pivoted to said body member adjacent to an end thereof and having jaw portions adapted to abut in a plane through the axis of said bore, said jaw portions having semi-circular openings cooperating to form a reduced continuation of said axial bore, means for depositing individual nuts into said axial bore, the upper ends of the openings in said jaw portions comprising a counterbore having a generally spherical contour, whereby the walls thereof at the upper portion are approximately vertical and at the lower portion adjacent to the reduced continuation portion are tapered, and a deflector mem-

5

ber in said axial bore above said counterbore, whereby nuts falling through said axial bore to said spherical contour counterbore in generally edgewise position are deflected to the side of said counterbore and are thence guided thereby to a generally flatwise position.

8. Nut positioning and applying means comprising a body member having an axial bore, a pair of jaw members pivoted to said body member adjacent to an end thereof and having jaw portions adapted to abut in a plane through the axis of said bore, said jaw portions having semi-circular openings cooperating to form a reduced continuation of said axial bore, means for depositing individual nuts into said axial bore, the upper ends of the openings in said jaws portions comprising a counterbore having a generally spherical contour, whereby the walls thereof at the upper portion are approximately vertical and at the lower portion adjacent to the reduced continuation portion are tapered, and a laterally yieldable deflector member in said axial bore above said counterbore, whereby nuts falling through said axial bore to said spherical contour counterbore in generally edgewise position are deflected to the side of said counterbore and are thence guided thereby to a generally flatwise position and a cylindrical wrench member having a nut receiving socket in its lower end and adapted to move downwardly in said axial bore to move said yieldable deflector member aside and fit over a nut in said counterbore and engage the spherical counterbore surface to cam the jaw members apart and thus permit the nut and wrench to pass downwardly therebetween.

9. Nut positioning and applying means comprising a body member having an axial bore, a pair of jaw members pivoted to said body member adjacent to an end thereof and having jaw portions adapted to abut in a plane through the axis of said bore, said jaw portions having semi-circular openings cooperating to form a reduced continuation of said axial bore, means for depositing individual nuts into said axial bore, the upper ends of the openings in said jaw portions comprising a cup-shaped counterbore having a central relatively flat portion and an outer portion of substantially greater inclination, and a deflector member in said axial bore above said counterbore, whereby nuts falling through said axial bore to said spherical contour counterbore in generally edgewise position are deflected to the side of said counterbore and are thence guided thereby to a generally flatwise position.

10. Nut positioning and applying means comprising a body member having an axial bore, a pair of jaw members pivoted to said body member adjacent to an end thereof and having jaw portions adapted to abut in a plane through the axis of said bore, said jaw portions having semi-circular openings cooperating to form a reduced continuation of said axial bore, means for depositing individual nuts into said axial bore, the upper ends of the openings in said jaw portions comprising a cup-shaped counterbore having a central relatively flat portion and an outer portion of substantially greater inclination, a laterally yieldable deflector member in said axial bore

6

above said counterbore, whereby nuts falling through said axial bore to said counter-bore in generally edgewise position are deflected to the side of said counterbore and are thence guided thereby to a generally flatwise position, and a cylindrical wrench member having a nut receiving socket in its lower end and adapted to move downwardly in said axial bore to move said yieldable deflector member aside and fit over a nut in said counterbore and engage the counterbore surface to cam the jaw members apart and thus permit the nut and wrench to pass downwardly therebetween.

11. Nut positioning and applying means comprising a body member having an axial bore, a pair of resiliently separable jaw members carried by said body member adjacent to an end thereof, said jaw members having semi-circular openings cooperating to form a reduced continuation of said axial bore, means for depositing individual nuts into said axial bore, the upper ends of the openings in said jaw portions comprising a cup-shaped counterbore with the outer upper portions of the walls thereof forming a downward continuation of said axial bore and the inclination varying progressively toward the bottom of said counterbore, whereby the bottom thereof is substantially flat, and a deflector member in said axial bore above said counterbore, whereby nuts falling through said axial bore to said counterbore in generally edgewise position are deflected to the side of said counterbore and are thence guided thereby to a generally flatwise position.

12. Nut positioning and applying means comprising a body member having an axial bore, a pair of resiliently separable jaw members carried by said body member adjacent to an end thereof, said jaw members having semi-circular openings cooperating to form a reduced continuation of said axial bore, means for depositing individual nuts into said axial bore, the upper ends of the openings in said jaw portions comprising a cup-shaped counterbore with the outer upper portions of the walls thereof forming a downward continuation of said axial bore and the inclination varying progressively toward the bottom of said counterbore, whereby the bottom thereof is substantially flat, and a laterally yieldable deflector member in said axial bore above said counterbore, whereby nuts falling through said axial bore to said counterbore in generally edgewise position are deflected to the side of said counterbore and are thence guided thereby to a generally flatwise position, and a cylindrical wrench member having a nut receiving socket in its lower end and adapted to move downwardly in said axial bore to move said yieldable deflector member aside and fit over a nut in said counterbore and engage the counterbore surface to cam the jaw members apart and thus permit the nut and wrench to pass downwardly therebetween.

References Cited in the file of this patent

UNITED STATES PATENTS

2,658,538	Kitterman	Nov. 10, 1953
2,689,589	Allen et al.	Sept. 21, 1954
2,763,173	Bailey et al.	Sept. 18, 1956