Jan. 9, 1945. C. A. KOZA 2,366,859

DEVICE FOR APPLYING AND REMOVING NUTS

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Fig. 1.

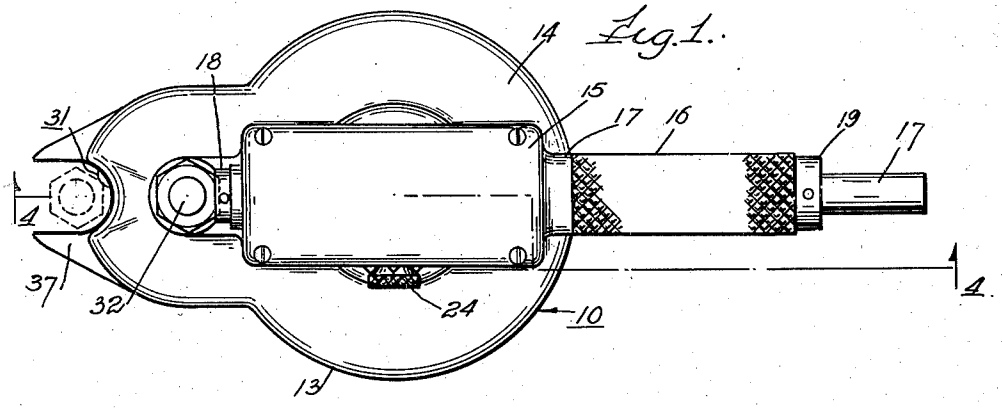


Fig. 2.

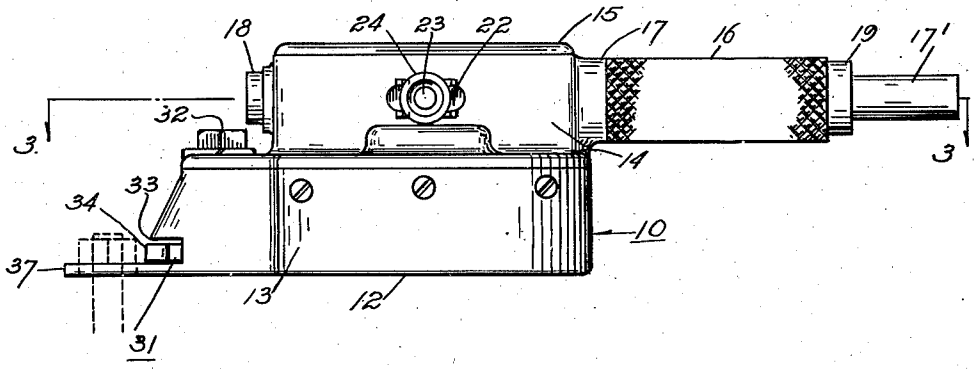
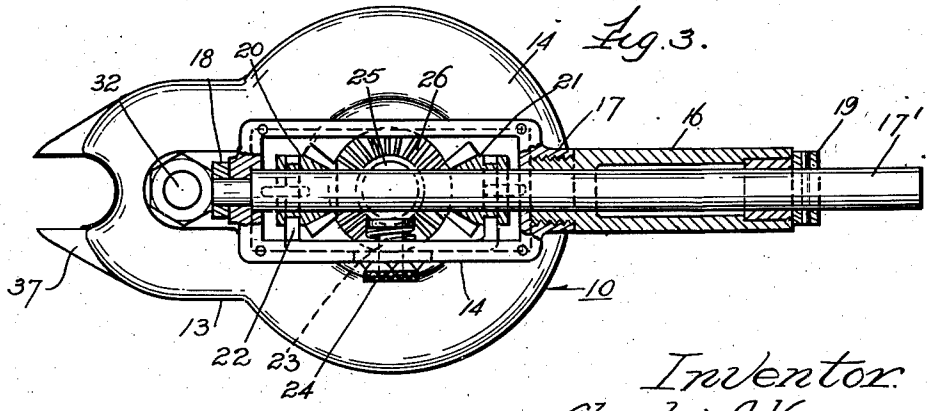


Fig. 3.



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Fig. 4.

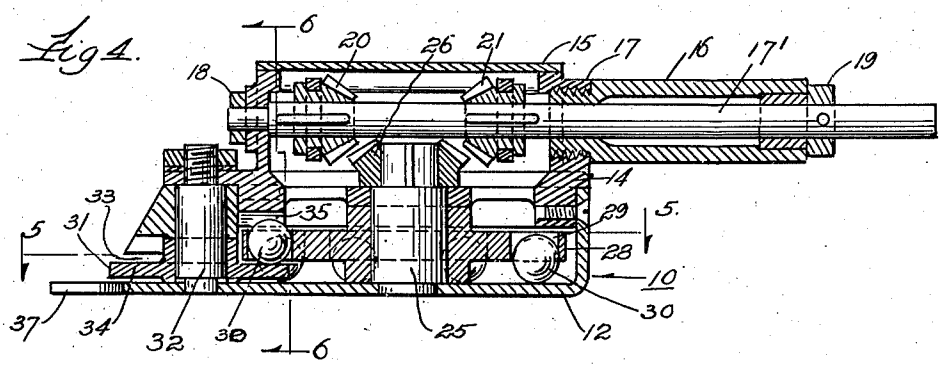


Fig. 5.

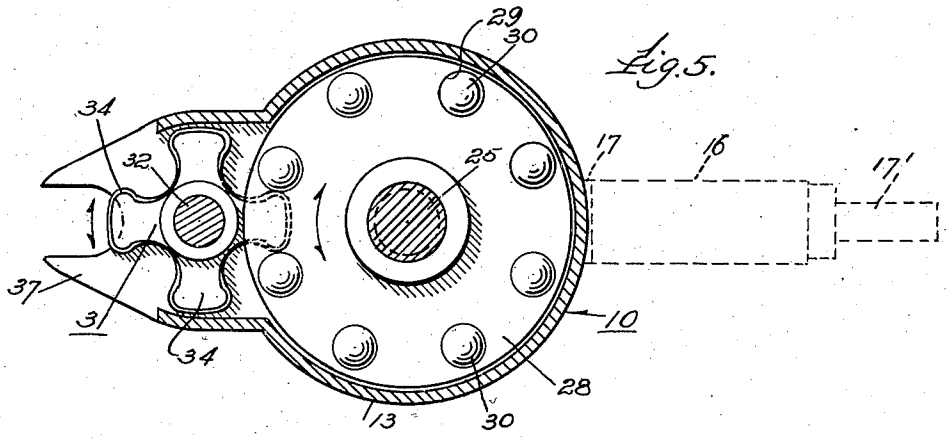
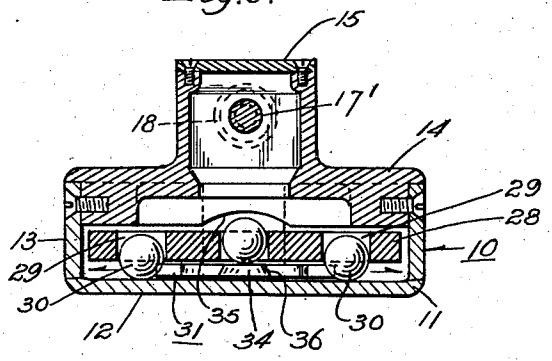


Fig. 6.



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UNITED STATES PATENT OFFICE

2,366,859

DEVICE FOR APPLYING AND REMOVING NUTS

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Application November 29, 1943, Serial No. 512,099

10 Claims. (Cl. 81—57)

This invention relates to a device for turning nuts onto or off of a stud bolt or the like.

Nut applying and removing devices as known heretofore have usually included a socket adapted to be placed over the nut, and power means for driving the socket. Such devices are characterized by several serious objections. In the first place, the socket must be accurately aligned with the nut before it can be placed thereon. In the second place, the socket obscures the operator's view of the nut so that it is impossible to tell when the nut has been fully screwed home or fully turned off of the bolt. It is necessary, furthermore, to have sockets of different sizes to accommodate each different size of nut to be applied or removed. Finally, nut applying devices as previously made have usually been operated at relatively low speed.

I have invented a novel apparatus for applying or removing nuts which operates on a new principle and wholly overcomes the aforementioned objections.

In a preferred embodiment of the invention, I provide a rotary hammer having spaced projections or heads adapted to engage the corners of a nut threaded on a stud bolt and apply a turning force thereto by repeated impact. The hammer is preferably journaled in a housing provided with a fork adapted loosely to embrace the nut to be turned. The hammer is driven by a disc mounted for rotation in the housing having peripheral recesses accommodating impact members adapted to strike the projections or heads of the hammer and cause rotation thereof with the disc. I provide a reversing gear in the housing for driving the disc in either direction. The housing is so constructed adjacent the point at which the impact members engage the hammer heads that the former are displaced and pass by the latter in case the hammer is stalled.

Further details, novel features and advantages of the invention will become apparent during the following complete description and explanation which refer to the accompanying drawings illustrating the aforementioned preferred embodiment. In the drawings,

Figure 1 is a plan view;

Figure 2 is a side elevation;

Figure 3 is a view partly in plan and partly in section along the plane of line 3—3 of Figure 2, with a part removed;

Figure 4 is a longitudinal section taken along the plane of line 4—4 of Figure 1;

Figure 5 is a horizontal section taken along the plane of line 5—5 of Figure 4; and

Figure 6 is a transverse section taken along the plane of line 6—6 of Figure 5.

Referring now in detail to the drawings, the apparatus of my invention comprises a housing 10 including a lower portion 11 having a bottom 12 and sides 13 and an upper portion 14 fitting down within the sides 13 and having a cover 15 thereon. A sleeve 16 is threaded into a boss 17 at the rear side of the housing. A shaft 17' is journaled in bearings in the sleeve 16 and upper portion 14 of the housing. The shaft projects rearwardly from the sleeve for the purpose of making connection with a flexible shaft or any other driving means. Thrust collars 18 and 19 prevent longitudinal movement of the shaft in its bearings. Bevel gears 20 and 21 are splined on the shaft 17' and are adapted to be moved by a shifter yoke 22. A pin 23 extends through a slot in the side of the upper portion 14 of the housing and through the yoke 22 whereby the latter may be moved longitudinally of the shaft 17'. The pin 23 has a knob 24 on the outer end thereof.

A shaft 25 is journaled vertically in the bottom of the lower portion 11 of the housing. A bevel gear 26 on the upper end of the shaft is adapted to be engaged by one or the other of the gears 20 and 21 to drive the shaft 25 from the shaft 17'. The upper end of the shaft 25 has a bearing in a hub 27 formed integral with the upper portion 14 of the housing and connected thereto by radial ribs.

A disc 28 keyed on the shaft 25 has peripheral holes 29 therethrough in which balls 30 are received. As shown in Figure 4, the balls rest on the bottom 12 of the lower portion 11 of the housing. The balls thus travel around with the disc when the latter is driven by either of the gears 20 and 21 meshing with the gear 26.

A rotary hammer 31 is jouraled on a vertical shaft 32 secured adjacent the forward side of the lower portion 11 of the housing. The latter is slotted as shown at 33 to permit radial projections or heads 34 on the hammer to emerge successively from the housing and then re-enter it. As shown in Figure 5, the heads 34 are engaged successively by the balls 30 on rotation of the disc 28. The balls constitute impact members which drive the hammer by blows imparted successively to the several heads thereof. The lower side of the upper portion 14 of the housing is recessed at 35 adjacent the point at which the balls engage the heads 34; thus if the hammer is stalled, the ball about to strike the inwardly disposed head rides up over the latter and passes by it, as shown in Figure 6. The sides of the heads are beveled at 36 to facilitate this action. The displaceable balls thus provide a yieldable connection between the driving disc 28 and the rotary hammer 31.

A fork 37 projects forwardly from the bottom 12 of the lower portion 11 of the housing and is adapted loosely to embrace a nut to be operated by the driving device of my invention, as shown in Figures 1 and 2. In using the device, it is grasped by the sleeve 16 which affords a convenient handle, and caused to approach the nut to be turned until the hammer heads engage

the corners of the nut, as shown in Figure 1. The shifter pin 23, of course, is first positioned to cause the reversing gear constituted by the three bevel gears to drive the hammer in the desired direction. Repeated blows of the hammer heads on the nut corners exert a turning force on the nut and rapidly screw it home or loosen it and turn it off of the bolt.

It will be apparent from the foregoing that the invention provides a simple yet efficient device for applying and removing nuts. The device has numerous advantages over apparatus known previously for performing a similar function. Since the device applies turning force to a nut by repeated impact engagement with the corners thereof, there is no socket to be placed over the nut requiring accurate alignment therewith. The invention also permits the operator to have a full view of the nut at all times so he can observe the progress onto or off of the bolt. By dispensing with a socket for receiving the nut, I avoid the necessity for a separate socket for each size of nut. My invention is well adapted to high speed operation, in fact, is more efficient at high speeds than at low speeds.

Although I have illustrated and described but a preferred embodiment of the invention, it will be understood that changes in the construction and arrangement of the parts disclosed may be made without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. A device for applying and removing nuts comprising a housing, a rotary hammer having spaced projections journaled in said housing, an opening in the side of the housing through which said projections extend successively on rotation of the hammer to engage the corners of a nut as the housing is moved toward it, to apply a turning force to the nut, and means in the housing for driving the hammer including a reversing gear.

2. A nut-tightening and loosening device comprising a housing, a rotary hammer journaled therein having spaced heads which emerge successively from the housing and then re-enter it to repeatedly strike the corners of a nut adjacent the housing to apply a turning force thereto, means for driving said hammer, and a slip connection between the driving means and the hammer.

3. A nut-tightening and loosening device comprising a housing, a rotary hammer journaled therein having spaced heads which emerge successively from the housing and then re-enter it to repeatedly strike the corners of a nut adjacent the housing to apply a turning force thereto, and means for driving the hammer including a disc rotatably mounted in said housing and displaceable impact members carried by said disc adapted to strike said heads.

4. A nut-tightening and loosening device comprising a housing, a rotary hammer journaled therein having spaced heads which emerge successively from the housing and then re-enter it to repeatedly strike the corners of a nut adjacent the housing to apply a turning force thereto, and means for driving the hammer including a disc rotatably mounted in said housing having circumferentially spaced peripheral recesses with displaceable impact members therein adapted to strike said heads.

5. A nut-tightening and loosening device comprising a housing, a rotary hammer journaled therein having spaced heads which emerge successively from the housing and then re-enter it to repeatedly strike the corners of a nut adjacent the housing to apply a turning force thereto, and means for driving the hammer including a disc rotatably mounted in said housing having circumferentially spaced peripheral recesses with displaceable impact members therein adapted to strike said heads, said housing having means retaining said impact members, said retaining means being relieved in the region in which said members engage said heads.

6. A nut-tightening and loosening device comprising a housing, a rotary hammer journaled therein having spaced heads which emerge successively from the housing and then re-enter it to repeatedly strike the corners of a nut adjacent the housing to apply a turning force thereto, a disc mounted in said housing for rotation about an axis parallel to that of the hammer, said disc having displaceable impact members adapted to strike the hammer heads in turn, said housing having a recess in the region of engagement between said members and the hammer heads permitting the members to move past one of the heads on stalling of the hammer.

7. A nut-tightening and loosening device comprising a housing, a rotary hammer journaled therein having spaced heads which emerge successively from the housing and then re-enter it to repeatedly strike the corners of a nut adjacent the housing to apply a turning force thereto, means for driving said hammer, and a guide fork extending laterally from the housing in the region where the heads emerge therefrom, adapted loosely to embrace a nut being engaged by the heads.

8. A nut-tightening and loosening device comprising a housing, a rotary hammer journaled therein having spaced heads which emerge successively from the housing and then re-enter it to repeatedly strike the corners of a nut adjacent the housing to apply a turning force thereto, a disc mounted in said housing for rotation, the edge of the disc overlying the path of said heads and having displaceable impact members carried thereby adapted successively to strike said heads, and a recess in the housing permitting said members to pass by a head on stalling of the hammer.

9. A device for applying and removing nuts comprising a housing including a bottom and sides, a shaft upstanding on said bottom, a rotary hammer journaled on said shaft having spaced heads, a slot in said side through which said heads emerge successively to strike a nut and re-enter the housing, a second shaft upstanding from said bottom, a driving disc on said second shaft having peripheral holes therethrough, the edge of said disc overlapping the path of said heads, balls in said holes adapted to strike said heads in turn, and a reversible drive for said second shaft.

10. A device for applying and removing nuts comprising a housing, a rotary hammer having spaced projections journaled in said housing, said projections extending beyond the periphery of the housing in a part of their path so that on rotation of the hammer the projections are adapted to strike the corners of a nut to apply a turning force thereto as the housing is advanced toward the nut, and means in said housing for driving said hammer including a drive shaft and a reversing gear.

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