Dec. 13, 1949 G. E. McVEY 2,491,325

RELEASABLE SCREW DRIVER

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Fig. 1.

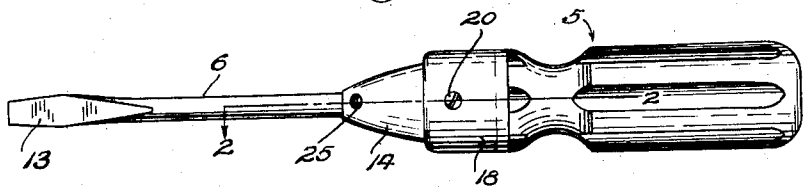


Fig. 2.

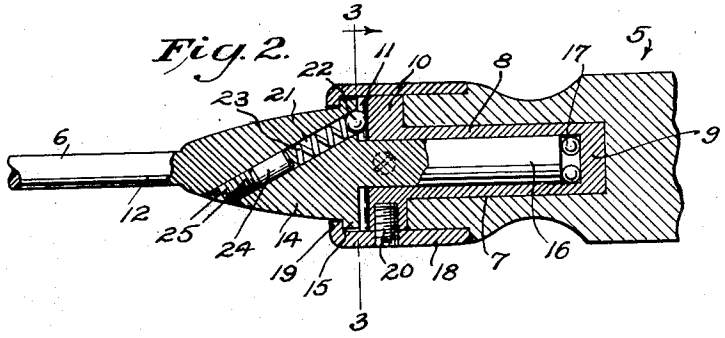
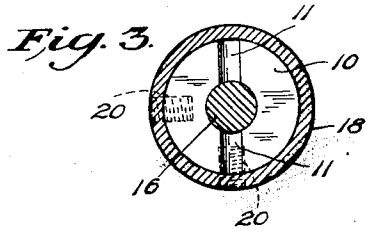


Fig. 3.



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RELEASABLE SCREW DRIVER

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4 Claims. (Cl. 64—29)

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This invention relates to screw drivers and has for its object to provide a novel type of screw driver in which the shank of the screw-engaging bit element is rotatably mounted in the receiving socket therefor provided in the handle member, there being a spring-pressed clutch device arranged between the bit element and one of the walls of the handle member socket operative upon the application of a predetermined rotating force to the handle member to release the bit element to preclude rotation thereof until such rotating force is diminished.

In the ordinary screw driver, the shank of the bit element is fixed to the handle member to rotate in unison therewith under all conditions. Under certain conditions of screw driver usage, this conventional construction is undesirable. Often, when too great a rotating force is applied to a screw driver when threading a screw into an applied position, the force so exercised results in damaging the work into which the screw is being driven. Therefore, the present invention provides a screw driver in which the bit element thereof is formed with a bore adapted for the reception of a spring-pressed ball, a portion of the latter being normally seated in a socket or depression provided in the handle member of the tool, the spring-pressed ball acting as a slip clutch in uniting the bit element with the handle member, in that when rotating forces are applied to the handle member below a given value, the bit element will rotate in unison with said handle member, but when such forces reach or exceed said value, the clutch-like ball is displaced from its normally seated position, allowing the handle member to turn freely with respect to the bit element and thereby interrupting rotation of the latter.

For an undersanding of other objects and advantages of the invention, reference is to be had to the following description and accompanying drawings, wherein:

Fig. 1 is a side elevational view of a screw driver formed in accordance with the present invention;

Fig. 2 is a longitudinal sectional view taken through the screw driver on the plane indicated by the line 2—2 of Fig. 1;

Fig. 3 is a transverse sectional view on the plane disclosed by the line 3—3 of Fig. 2.

Referring more particularly to the drawings, the numeral 5 designates the handle member of my improved screw driver and the numeral 6 the bit element thereof. The handle member, at its bit-receiving end, is formed with an axial

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socket 7, in which is tightly driven a metallic sleeve 8, one end of the latter being closed as at 9 while the other end thereof is formed with an annular outwardly extending flange 10, the outer face of the latter being formed with a substantially semicircular depression 11.

The bit element provides a shank 12, the outer portion of which terminates in a screw-engaging extremity 13 shaped to enter the head slots of standard or special type screws. The shank 12, intermediately of its length, is provided with an enlarged head 14, which is annularly flanged as at 15 for engagement with the flange 10 of the socket 7, and beyond the head 14 the bit element includes a cylindrical extension 16 which is received in the bore of the sleeve 8, the end of the extension 16 preferably engaging with an anti-friction thrust bearing 17 confined in the sleeve 8 adjacent to the closed end 9 thereof. The bit element is held in connection with the handle member by providing the latter with a ferrule 18, the latter having one end thereof formed with an inturned circular flange 19 which receives and confines the flange 15 of the bit element head 14. The ferrule is non-rotatably secured to the flange portion 10 of the sleeve 8 by means of one or more set screws, shown at 20.

To rotatably unite the handle member 5 with the bit element 6 so that the same normally rotate together, but to permit the handle member to rotate independently of the bit element when predetermined torque effort is applied thereto, the head 14 of the bit element is formed with a diagonally extending bore 21 intersecting the longitudinal axis thereof. Adapted to be received in the inner end of this bore is a releasable clutch ball 22. A part of this ball is normally seated in the depression 11 of the sleeve flange 10, and to maintain the ball thus seated use is made of an expansion type coil spring 23, the latter being positioned in the bore 21, with one end engaging the ball 22 and the opposite end in contact with a slidable plunger 24. One or more set screws 25 are threaded in the outer end of the bore 21, and through adjustment of these screws, the desired degree of spring pressure may be exerted on the ball 22.

From the foregoing, it will be seen that the present invention provides a torque-type screw driver which is adapted for use in the same manner as a conventional screw driver having the bit element and handle members immovably united. However, with the screw driver formed as above described, it will be evident that when a predetermined amount of rotating energy is imparted to the handle member, the ball 22, by

compressing the spring 23, will be forced out of the depression 11, thereby rotatably disconnecting the bit element 6 from the handle member 5. This is done in order that the rotating force applied to the screw driver will not be so great as to cause injury to the work in which a screw is being driven. By adjusting the set screws 25, the force necessary to unseat the ball may be varied within practicable limits. While I have disclosed the screw driver as being of the hand-operated type, nevertheless, it will be understood that the principles thereof are applicable to tools driven by electric motors or the like.

Having thus described my invention, I claim:

1. A safety slip clutch comprising a driving member formed at one end with an axially disposed socket, a sleeve stationarily positioned in said socket, said sleeve being closed at one end and having its opposite end formed with a laterally directed annular flange, a driven element having a shank extension rotatably received within said sleeve, a thrust bearing positioned between one end of said extension and the closed end of said sleeve, said driven element being formed intermediately of its length with a flanged head enlargement, the flange of said enlargement being disposed for engagement with the flanged end of said sleeve, a ferrule removably secured to said sleeve and cooperative with the flange of said driven element enlargement to retain said element in connection with said driving member, said enlargement being formed with a bore diagonally intersecting the longitudinal axis of the enlargement, a ball device positioned in one end of said bore for engagement with a depression provided in the flanged end of said sleeve, an expansion spring positioned in said bore for maintaining said ball device normally in engagement with said depression, and threaded means positioned in said bore for regulating the force exercised by said spring on said ball device.

2. A safety slip clutch comprising a driving member formed at one end with an axially disposed socket, a driven element having a shank extension rotatably received within said socket, said driven element intermediately of its ends being formed with a head enlargement having a bore diagonally intersecting in its length the longitudinal axis of the driven element, a ball device positioned in said bore for engagement with a depression provided in said driving member to cause rotation of the driven element in unison with said driving member upon predetermined torque conditions, a spring positioned in said bore in engagement with said ball device, threaded means positioned in said bore for varying the force exercised by said spring on said ball device, and a ball-type thrust bearing arranged between said

shank extension and the closed end of said driving member socket, said bearing relieving said ball device of thrust loads.

3. A safety slip clutch comprising a driving member formed at one end with an axially disposed socket, a driven element having a shank extension rotatably received within said socket, said driven element intermediately of its ends being formed with a head enlargement having a bore diagonally intersecting in its length the longitudinal axis of the driven element, a ball device positioned in said bore for engagement with a depression provided in said member to cause rotation of the driven element in unison with said driving member under determined torque conditions, a spring positioned in said bore in engagement with said ball device, and threaded means positioned in said bore for varying the force exercised by said spring on said ball device.

4. A safety slip clutch comprising a driving member formed at one end with an axially disposed socket, a sleeve stationarily positioned in said socket, said sleeve being closed at one end and open at its other, the open end of said sleeve being provided with an annular flange, a driven element having a shank extension rotatably received within said sleeve, an antifriction thrust bearing positioned between one end of said extension and the closed end of said sleeve, said driven element being formed intermediately of its length with a flanged head-forming enlargement, the latter being provided with a bore which in the length thereof diagonally intersects the longitudinal axis of the enlargement, a detent positioned in one end of said bore for engagement with a depression provided in the flanged end of said sleeve, a spring means positioned in said bore for maintaining said detent normally in engagement with said depression, and threaded means positioned in said bore cooperative with said spring means for regulating the force exercised by the latter on said detent.

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