March 3, 1970 G. Z. EDWARDS ET AL 3,498,351

SCREWDRIVER WITH SCREW-GRIPPING JAWS

Filed Dec. 1, 1967

FIG. 1.

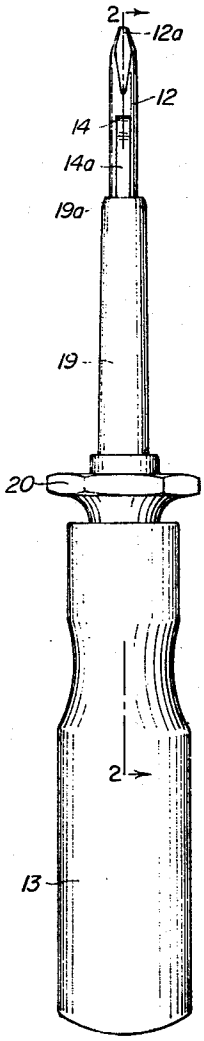


FIG. 2.

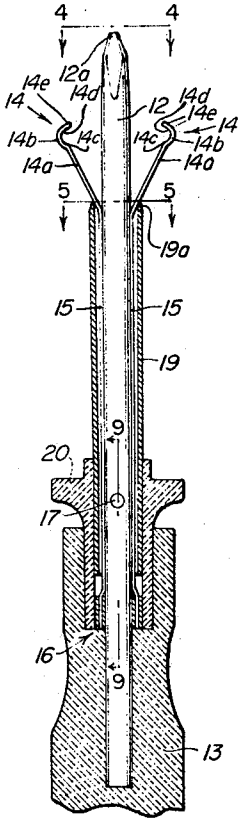


FIG. 3.

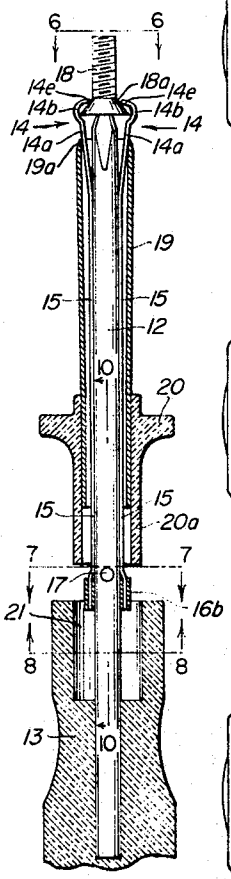


FIG. 4.

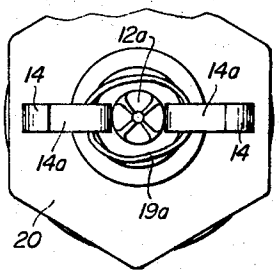


FIG. 5.

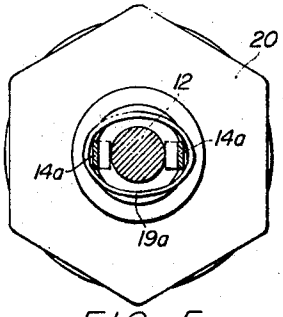


FIG. 6.

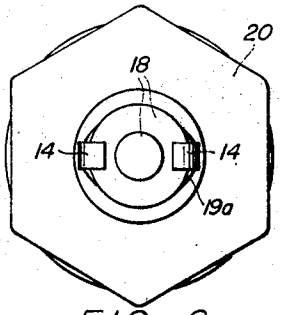


FIG. 8.

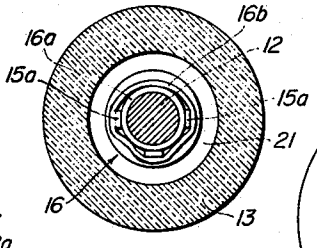


FIG. 7.

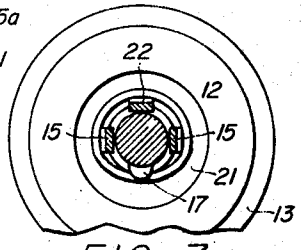


FIG. 10.

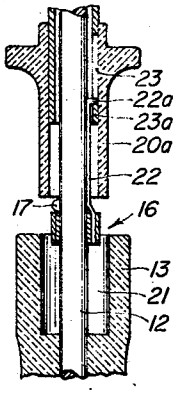
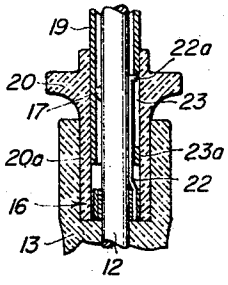


FIG. 9.



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SCREWDRIVER WITH SCREW-GRIPPING JAWS

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Int. Cl. B25b *23/10, 15/02*

U.S. Cl. 145—52 6 Claims

ABSTRACT OF THE DISCLOSURE

A screw-holding screwdriver of the type equipped with gripping jaws for holding screws during driving and removal thereof. Resilient gripping jaws have elongate flat strip extensions, whose ends are secured by means of a press fit between inner and outer collars encircling the shank of the screwdriver and arranged for limited sliding movement therealong. A cylindrical actuator tube slidably encircles the screwdriver shank and the jaw extensions for back and forth movement therealong. The jaw-actuating end of such tube is flattened to approximately elliptical formation for accommodating outwardly sloped portions of the jaws when forcing jaw contracting. A strip corresponding to but shorter than the jaw extensions and similarly mounted is outwardly turned and received as a stop by a keeper slot in the cylindrical end portion of the actuator tube for limiting movement of such tube in the direction of the gripping jaws.

BACKGROUND OF THE INVENTION

Field

The invention is concerned with a special type of screwdriver that utilizes gripping jaws to engage and securely hold screws of all kinds, especially Phillips head screws, so that they can be driven and removed at locations inaccessible to the hands, without danger of being dropped.

Problems of the art

Many different constructions have been proposed heretofore for screwdrivers of this type, but for one reason or another none has met any significant commercial success. Some of these proposed constructions are complex and cannot be economically manufactured; others are difficult to operate, or do not function satisfactorily.

SUMMARY OF THE INVENTION

In accordance with the invention, an easily manufactured and very satisfactory construction is provided. Resilient gripping jaws have elongate flat strip extensions that reach along the shank of the screwdriver from outwardly bowed portions of the jaws adjacent the screw-driving tip to securement in a sliding collar encircling the screwdriver shank adjacent the handle. The collar is preferably composite, having an inner collar member against which ends of the extensions of the jaws are tightly held in a simple and effective manner by an outer collar member pressed onto the inner collar member.

A limit stop for the collar is provided on the screwdriver shank a predetermined distance along the length thereof toward the driving tip to control the location of the jaws in their gripping position.

Encircling the shank of the screwdriver and the flat strip jaw extensions is a cylindrical tube, whose end portion adjacent the driving tip is flattened to approximately elliptical form so as to accommodate outwardly sloped portions of the jaws as such jaws are forced closed about a screw head by movement of the tube toward the driving tip.

Although careful handling of this actuator tube will

insure its complete retention on the screwdriver shank, it is preferred to provide a stop positively limiting the extent of movement of the tube toward the driving tip. This advantageously takes the form of a relatively short flat strip held in the composite collar as are the jaw extensions, and having its far end outwardly turned and extending into a keeper slot in the cylindrical end portion of the tube as a limit stop for such tube.

DESCRIPTION OF THE DRAWING

There is shown in the accompanying drawing a screwdriver representing what is presently contemplated as the best mode of carrying out the invention.

In the drawing:

FIG. 1 is a view in side elevation of a Phillips-type screwdriver having screw-holding jaws in accordance with the invention;

FIG. 2, a fragmentary vertical section taken along the line **2—2** in FIG. 1;

FIG. 3, a view corresponding to that of FIG. 2, but showing the position of the parts when the jaws are in screw-holding position;

FIG. 4, an end elevation looking from the line **4—4**, FIG. 2, and drawn to a larger scale;

FIG. 5, a horizontal section taken on the line **5—5** of FIG. 2;

FIG. 6, an end elevation looking from the line **6—6**, FIG. 3;

FIG. 7, a horizontal section taken on the line **7—7**, FIG. 3, with a portion broken away for convenience of illustration;

FIG. 8, a horizontal section taken on the line **8—8**, FIG. 3, and drawn to a scale larger than used for FIGS. 4–7;

FIG. 9, a fragmentary vertical section taken on the line **9—9** of FIG. 2; and

FIG. 10, a similar view taken on the line **10—10** of FIG. 3.

DETAILED DESCRIPTION OF ILLUSTRATED EMBODIMENT

In the form illustrated, a Phillips-type screwdriver, having a shank **12**, driving tip **12***a*, and a handle **13**, is provided with a pair of screw-gripping jaws **14**, respectively, which have portions **14***a* sloping outwardly from flat strip extensions **15** that reach along the shank **12** to securement in a sliding collar **16** encircling the shank adjacent handle **13**.

The jaws **14**, including the outwardly sloping portions **14***a* thereof, and the extensions **15** are advantageously bent to shape from elongate flat strips of metal that are tempered to provide resiliency. The extensions **15** are conveniently and very effectively secured to collar **16** by reason of the composite nature of such collar. Thus, the ends **15***a* of such extensions are merely interposed between inner and outer collar members **16***a* and **16***b*, respectively, and secured therebetween by pressing outer collar member **16***b* tightly against inner collar member **16***a*.

Collar **16** is adapted to be slid along shank **12** in the screw gripping and screw releasing operation of the screwdriver. Means for limiting its forward movement and the accompanying forward movement of jaws **14** along shank **12**, see FIG. 3, is provided in the form of a protuberance **17** on such shank, formed, for example, either by upsetting the metal of the shank or by installing a pin thereinto. Backward movement is limited by screwdriver handle **13**, see FIG. 2.

The jaws **14** are contracted about the head **18***a* of a screw **18**, FIG. 3, by manually operating an actuator in the form of a cylindrical tube **19** mounted at one of its ends in a knob **20**. The handle **13** and knob **20** are con-

veniently molded from plastic material, the handle being recessed at **21** to receive a backwardly extending, reduced diameter portion **20***a* of the knob when the actuator tube **19** is pulled backwardly to open the jaws and release the screw, see FIG. 2.

In order to accommodate the outwardly sloped portions **14***a* of the jaws in the forward, jaw-contracting position of actuator tube **19**, the opposite end portion **19***a* of such tube is flattened into substantially elliptical shape, FIGS. 4 and 5. This enables the jaws to be tightly held in screw-gripping position, as shown in FIG. 3. Moreover, in order to properly grip the head of the screws, the jaws **14** should be curved outwardly from the portions **14***a*, respectively, and then back, as shown. This prevents camming action of the head of the screw.

In operation, the handle **13** is held by one hand of the user, and actuator tube **19** is operated either by the fingers of this same hand or of his other hand. For engaging a screw, knob **20** is pulled backwardly to its limit position, so the jaws **14** are retracted into fully open position, back from the driving tip **12***a* of the screwdriver, see FIG. 2. After the tip is positioned in the customary receiving recess of the screw, knob **20** is pushed forwardly to cause the elliptical end **19***a* of actuator tube **19** to engage the outwardly sloped portions **14***a* of jaws **14** and carry such jaws forwardly until collar **16** contacts its limit stop **17**, whereupon continued pushing of actuator tube **19** forwardly contracts jaws **14** about the head of the screw, see FIG. 3. It should be noted that limit stop **17** is positioned at a location on shank **12** predetermined to place jaws **14** in advance of driving tip **12***a* just far enough to properly engage the underside of the head of the screw.

It is advantageous and preferred that means be provided to limit the forward movement of the actuator tube **19**, so there will be no inadvertent disengagement of the actuating end **19***a*, of the tube from jaws **14** forwardly of driving tip **12***a*. A feature of the invention is that such means take the form of a flat resilient strip **22**, FIGS. 7–10, of length predetermined by the maximum distance desirable for forward travel of the actuator tube **19**, the forward end of which strip is turned outwardly as a stop member **22***a* for coaction with the closed, backwardly located end **23***a* of a keeper slot **23** formed in tube **19** and extending longitudinally thereof. Thus, as shown in FIG. 10, when knob **20** is pushed forwardly to an extreme position, stop member **22***a* is caught by the closed end **23***a* of keeper slot **23** and actuator tube **19** is prevented from sliding forwardly any further along screwdriver shank **12**.

It should be noted that, in the extreme forward position of knob **20**, when jaws **14** are clamped about the head **18***a* of screw **18**, see FIG. 3, such jaws clamp below the underside of and accommodate such head of the screw. This is made possible and is insured for any type of screw-head, whether the screw is of standard flat head type, as shown, of oval fillister type, round head type, etc., by reason of the fact that the previously mentioned, outward curve **14***b*, FIG. 2, of each jaw **14**, commenses from a definite bend **14***c* and continues on outwardly and then inwardly to form a rounded concavity **14***d*. The forward terminal portion **14***e* of the jaw slopes forwardly from the curved or rounded portion **14***b* and terminates inwardly of the bend **14***c*.

Whereas this invention is here illustrated and described in detail from the standpoint of a presently preferred specific embodiment thereof, it is to be realized that various changes may be made within that generic preview of the disclosure without departing from the claimed subject matter.

We claim:

1. In combination with a screwdriver that includes a shank having a driving tip at one end and a handle at the opposite end, a screw-holding device comprising

at least two mutually opposed, gripping jaws formed to engage the head of a screw with which the driving tip of the screwdriver is engaged;

said jaws having respective outwardly sloping portions and respective elongate, flat, strip extensions reaching along the shank of the screwdriver toward the handle thereof,

a sliding collar, made up of an inner and an outer collar member, to which ends of the jaw extensions are rigidly secured, said collar encircling the shank of the screwdriver for sliding movement therealong;

means for limiting movement of said collar toward said driving tip beyond a predetermined point; and

a jaw actuator in the form of a cylindrical tube mounted as a sleeve encircling the shank of the screwdriver and the extensions of the jaws and adapted for forward and backward sliding movement therealong to engage said outwardly sloping portions of the jaws and force them to contract the jaws about a screw, and to release said portions of the jaws to permit said jaws to open, respectively, the jaw-engaging end portion of said tube being flattened to substantially elliptical formation to accommodate said jaws.

2. A combination in accordance with claim **1**, wherein the ends of the jaw extensions are rigidly secured between the inner collar member and the outer collar member by means of a press fit by said collar members.

3. A combination in accordance with claim **2**, wherein there is additionally provided a flat strip of predetermined length shorter than the jaws as a limit stop to forward movement of the jaw actuator tube, an end of said strip being secured between the inner and outer collar members of the composite collar by the press fit, and the opposite end of the strip being turned outwardly as a stop member; and a keeper slot in the cylindrical end portion of said tube for receiving and coacting with said stop member to limit forward movement of said tube.

4. A combination in accordance with claim **1**, wherein the means for limiting movement of the collar toward the driving tip is a protuberance at a predetermined location on the shank of the screwdriver.

5. A combination in accordance with claim **1**, additionally including means to limit the forward movement of the actuator tube.

6. A combination in accordance with claim **1**, wherein each of the jaws has an outwardly curved portion commencing at a bend at the forward end of the outwardly sloping portion and continuing outwardly and then inwardly to form a rounded concavity for accommodating the head of a screw, the forward terminal portion of the jaw sloping forwardly from the said concavity and terminating inwardly of the said bend.

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