April 19, 1955 M. WAGNER 2,706,506

SCREW DRIVER WITH SCREW HOLDING JAWS

Filed June 25, 1949

FIG. 1.

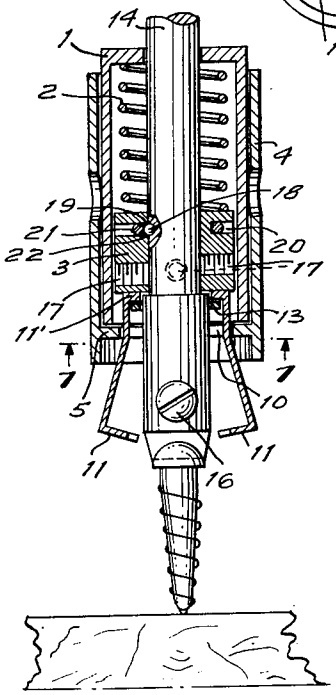


FIG. 6.

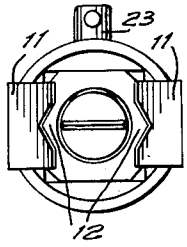
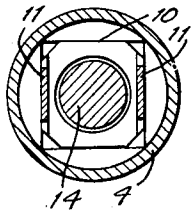


FIG. 7.



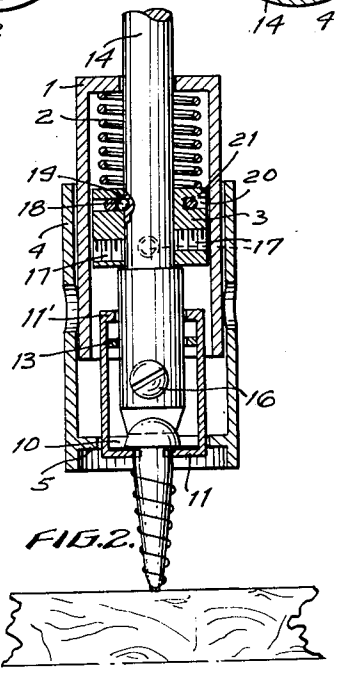


FIG. 2.

FIG. 3.

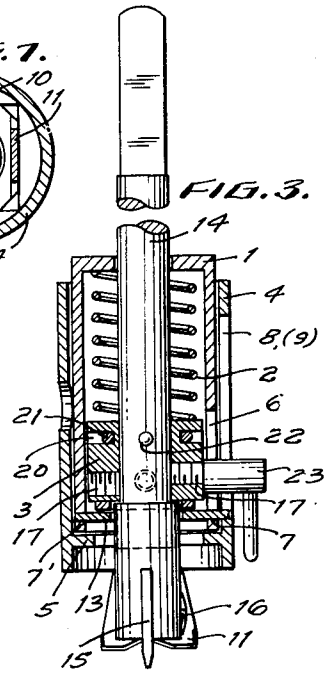


FIG. 4.

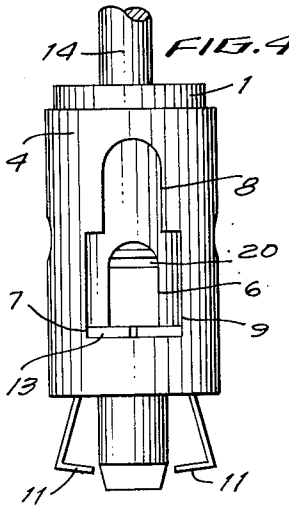


FIG. 5.

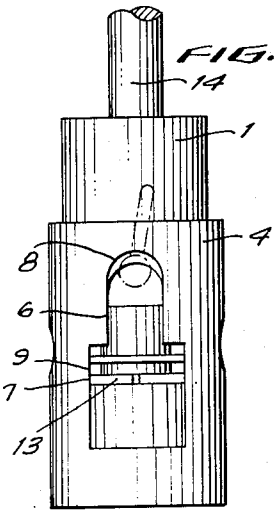
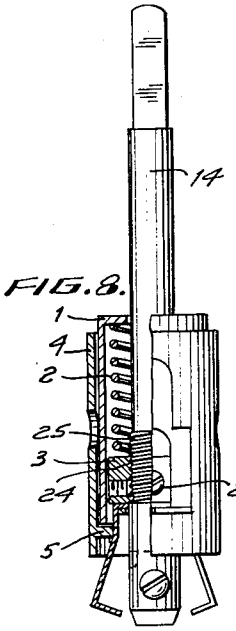


FIG. 8.



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SCREW DRIVER WITH SCREW HOLDING JAWS

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4 Claims. (Cl. 145—52)

The present invention relates to a screw-driver provided with a plier system for the secure positioning of the screws during their screwing and unscrewing, respectively.

It is one object of the present invention to provide a screw-driver which allows holding a screw fast by means of a spring provided in a sleeve carried by its spindle being urged against the head of the screw and the rear surface being pressed against the jaws of the tongs rigid with the sleeve and projecting downwardly beyond the latter.

It is another object of the present invention to provide a screw-driver which permits of closing of said jaws by means of a shifting of a second sleeve supported by a first sleeve.

It is still another object of the present invention to provide a screw-driver an outer sleeve of which is provided inwardly with a projecting flange acting on tongs and disposed far enough from the lower edge of the outer sleeve, so that when the latter bears against the support into which the screw is screwed, the tongs are released and open before the jaws of the latter can be clamped between the support and the screw-head.

It is yet a further object of the present invention to provide a screw-driver which permits of a tong arrangement which brings about complete screwing of the screw into its support and which permits of execution of the screwing operation without any interruption, that is, without the removal from time to time of the screw-driver from the screw.

With these and other objects in view which will become apparent in the following detailed description, the present invention will be clearly understood in connection with the accompanying drawing in which:

Figure 1 is an axial section through the screw-driver in inoperative position;

Fig. 2 is an axial section of the same screw-driver in operative position;

Fig. 3 is an axial section of the screw-driver shown 90° turned over that of Fig. 2;

Fig. 4 is a front elevational view of the screw-driver in inoperative position;

Fig. 5 is a front elevational view of the screw-driver shown in a differently set position compared with that of Fig. 4;

Fig. 6 is a bottom plan view of the screw-driver shown in Fig. 1;

Fig. 7 is a section along the lines 7—7 of Fig. 1; and

Fig. 8 is an axial section of another embodiment of the screw-driver in inoperative position.

Referring now to the drawings and particularly to Figs. 1 to 7, the screw-driver comprises a sleeve **1** having at its upper end an inwardly directed flange and carrying slidingly a cylindrical member **3** inserted from below into the sleeve **1** and acting on a coil spring **2** disposed in the sleeve **1**. The sleeve **1** is inserted with some play inside a second sleeve **4**, having a projecting flange **5** which extends inwardly and slightly above its lower end and which supports the lower edge of the inner sleeve **1**. The sleeve **1** is further provided in its front wall and in its lower half with an opening which is formed as a wide axially disposed slot **6** the upper end of which terminates into a semi-circle, while its lower end forms a narrow transversal slot **7** extending to either side beyond the axially disposed slot. A second slot **7'** corresponding to the transversal slot **7** is arranged at a point of the sleeve **1** that is diametrically opposed to the slot **7**. The outer sleeve **4** is also provided in its front wall with an

opening which is formed by an upper longitudinal slot **8** the shape and size of which corresponds with that of the slot **6** of the inner sleeve **1** and by a lower rectangular opening **9** the width of which is the same as that of the slot **7** of the sleeve **1**.

The flange **5** on the outer sleeve defines a square or rectangular opening **10** serving as a guide for a cross-member of the stirrup-shaped tongs **11**. The two arms of the stirrup-shaped tongs are arranged vertically and extend in downward direction from a supporting cross-member **11'**, but are then flared outwardly and their lower ends are bent inwardly and terminate into an edge provided with a triangular recess, so that the oppositely disposed edges form a square opening **12**. Immediately underneath the cross-member of the stirrup-shaped tongs **11** is provided a sliding strip **13** engaging the slots **7** and **7'** of the sleeve **1** and the front edge of which strip **13** registers with the outer periphery of the outer sleeve **4**. In order to allow the introduction of the strip **13** into the slots **7** and **7'**, it is necessary to urge slightly upwards the tongs **11** and cylindrical member **3** through a slight compression of the coil spring **2**. The introduction of the strip **13** holds the two sleeves together inasmuch as the two sleeves are allowed to assume an axial movement relative to each other but no relative rotary movement and at the same time it secures the tongs **11**.

The inner cross-member **11'** of the tongs is provided with a central bore the diameter of which is slightly greater than that provided in the upper bent flange of the sleeve **1**. These bores allow the tool spindle **14** to be inserted to a point in which it bears through its lower enlarged end against the cylindrical slider **3** while it projects freely at its upper end out of the sleeve **1**. The upper end of the spindle forms a square for receiving a key, a winch or the like, while its lower end is provided with a slot **15** adapted to receive a double edge blade of alloy steel. The latter is secured in the slot **15** through a screw **16** and the two edges have preferably different sizes so as to permit of operation of two different sizes of screws.

The cylindrical slider **3** also includes a number, for instance, four, of tapped openings **17** (two of which are shown in Figs. 1 and 2), perpendicular to its axis and disposed equally apart at its periphery, each of said openings being located at a different level and furthermore, the cylindrical slider **3** has a transversal bore **18** which receives a ball **19**, subjected to the action of an annular spring **21** lying in an annular groove **20**, said spring urging the ball **19** inwardly into engagement with the said bore **18**. A recess **22** is provided for this ball **19** in the spindle **14**. As soon as the ball **19** enters said recess **22**, the shaft **14** and slider **3** are elastically coupled.

The operation of the screw-driver is performed in the following manner: The suitably carried screw-head is urged against the tool spindle **14** after the tool edge has engaged the slot in the screw-head. At the same time, while this pressure is maintained, the two sleeves **1** and **4** are urged forwardly towards the screw by thumb pressure. As soon as the two jaws of the tongs **11** have moved somewhat beyond the head of the screw, it is possible, while retaining the pressure exerted on the spindle and the counter-pressure on the sleeve **1**, to urge further in the same direction the outer sleeve **4** alone. Thereby the two arms or jaws of the tongs close over the stem of the screw behind the head of the latter under the action of the inner shoulder or flange **5** of the sleeve **4**. This provides for an accurate centering of the screw through the symmetrical action of the jaws of the tongs. Its clamping is provided on the other hand through the fact that the screw-driver spindle is urged by the spring **2** against the head of the screw lying over the inner ends of said jaws, said spring **2** being tensioned through the above-described sliding movement of the sleeve **1**. This being done, the spindle **14** is then rotated relative to the sleeves until the ball **19** in the cylindrical slider **3** snaps into engagement with the corresponding recess **22** of the spindle **14** which provides for the coupling of the cylindrical slider **3** with the spindle **14**.

The above stages of operation may be executed substantially in one step and require an exceedingly short time.

Now it is necessary to limit the upward movement of the spindle axially with reference to the sleeve **1**, so that these two parts cannot slide relative to each other during the operation of the screw-driver. For this reason the spindle **14** is turned until one of the tappings **17** in the cylindrical slider **3** registers with the slot **6** of the sleeve **1**, this tapping **17** being the one which is nearest to the rounded edge of the slot **6**. A small screw **23** is then screwed into the tapped opening **17**, which screw **23** is provided with a lever and with a stem disposed eccentrically relative to the axis of the screw **23**. This is brought about in the position where the slots **6** and **8** of the respective sleeves **1** and **4** cover each other completely. It is then sufficient, as soon as a screw is taken hold of, to turn said lever-operated screw until its eccentric stem engages the upper edge of the slot **6** in the sleeve, so as to obtain thus the desired limiting of the downward movement of the sleeve **1**.

The screw-driver is now ready for operation and, in case it is intended for executing mass operation for which the same type of screw is being used constantly, no further adjustment is required.

It is thus possible to take hold in succession of the different screws to bring them into the desired location and to screw them in, for which operation it is of advantage to use a key, a winch or any similar suitable arrangement fitted over the upper end of the spindle **14** of rectangular cross-section. As soon as the edge of the sleeve **4** projecting beyond the flange **5** of the sleeve **4** is held up by the support in which the screw is to be screwed, the sleeve **4** moves automatically backward and releases the tongs from the screw-head. This takes place without the spindle **14** leaving the latter, so that the screw is further screwed into the support without any interruption until the head of the screw engages securely the support.

Referring now to Fig. 8, which discloses a second embodiment, the cylindrical slider **3** is not connected to the spindle **4** by means of an elastic coupling but by means of a screw connection. The cylindrical slider is provided in this case with an inner thread **24** and the spindle **14** with a threaded portion **25** while the eccentric screw **23** is replaced simply by an ordinary headed screw **26** that ensures the locking of the tool. Otherwise, the operation and the control are the same as in the first embodiment with the slight difference, however, that each time after the screwing of the screw is completed, the spindle must be screwed back in order to provide again for the contact between its enlarged end and the cylindrical slider **3**.

In order to dismantle the tool, it is sufficient to remove the locking screw **23**, to remove the spindle **14** and then the cylindrical slider **3**, to separate the inner sleeve **1** from the outer sleeve **4**, and finally to remove the slider strip **13** and the coil spring **2** from the inner sleeve **1**.

It will be readily understood that the described arrangements are given only by way of example and that the shape, size and details may be modified in accordance with requirements without modifying the principle underlying the invention, as defined in accompanying claims. In particular, there is also the possibility of using the screw-driver not only for taking hold of and clamping screws, but for operating with the same result on a large number of other removable connecting parts such as rivets, pins with heads, and the like. Obviously, in such cases, the lower end of the actual screw-driver should be given a shape matching the part that is to be clamped.

Finally, it should be also remarked that the fact of removing quickly and easily at any moment the tongs from the spindle, allows the tool to be used without such tongs, i. e., an ordinary tool.

What I claim is:

1. A screw-driver comprising a tool spindle with an enlarged end, a first sleeve with an inwardly projecting flange at one end thereof slidingly fitted over the said spindle, a slider carried on the said spindle adjacent the said enlarged end thereof inside the sleeve, a spring between the cooperating surfaces of the flange of the said sleeve and the said slider, tongs projecting beyond the lower end of said slider and including side walls flaring outwardly and jaws directed inwardly at the end of said walls, means for engaging said tongs with said slider, a second sleeve mounted in axially sliding relationship over the first sleeve and including an inner projection adapted to urge the tong jaws inwardly when the second sleeve is moved outwardly relative to the said first sleeve for engaging the rear surface of the screw head, the lower edge of the said second sleeve extending beyond the location of said projection to meet the support in which the screw is to be screwed during the screwing operation to provide for the relative rearward movement of said second sleeve and consequent release of the tong jaws.

2. A screw-driver comprising a tool spindle with an enlarged end, a first sleeve with an inwardly projecting flange at one end thereof slidingly fitted over the said spindle, a slider carried on the said spindle adjacent the said enlarged end thereof inside the sleeve, a spring between the cooperating surfaces of the flange of the said sleeve and the said slider, tongs projecting beyond the lower end of said slider and including side walls flaring outwardly and jaws directed inwardly at the end of said walls, a second sleeve mounted in axially sliding relationship over the said first sleeve and including an inner projection adapted to urge the said tong jaws inwardly when the said second sleeve is moved outwardly with reference to the said first sleeve for engaging the rear surface of the screw head, the lower edge of the said second sleeve extending beyond the location of said projection to meet the support in which the screw is to be screwed during the screwing operation to provide for the relative rearward movement of said second sleeve and consequent release of the said tong jaws, a transversal strip engaging the said two sleeves for holding them together for relative axial but non-rotative movement and engaging the said tongs for holding the tongs within said sleeves.

3. A screw-driver comprising a tool spindle with an enlarged end, a first sleeve with an inwardly projecting flange at one end thereof slidingly fitted over the said spindle, a slider carried on the said spindle adjacent the said enlarged end thereof inside the sleeve, a spring between the cooperating surfaces of the flange of the said sleeve and the said slider, readily removable means adapted to engage the said spindle with the said first sleeve, tongs projecting beyond the lower end of said slider and including side walls flaring outwardly and jaws directed inwardly at the end of said walls, means for engaging said tongs with said slider, a second sleeve mounted in axially sliding relationship over the said first sleeve and including an inner projection adapted to urge the tong jaws inwardly when the said second sleeve is moved outwardly with reference to the said first sleeve for engaging the rear surface of the screw head, the lower edge of the said second sleeve extending beyond the location of said projection to meet the support in which the screw is to be screwed during the screwing operation to provide for the relative rearward movement of said second sleeve and consequent release of the said tong jaws.

4. A screw-driver comprising a tool spindle with an enlarged end, a first sleeve with an inwardly projecting flange at one end thereof slidingly fitted over the said spindle, a slider carried on the said spindle adjacent the said enlarged end thereof inside the sleeve, a spring between the cooperating surfaces of the flange of the said sleeve and the said slider, readily removable means adapted to connect the said spindle with the said inner sleeve, limiting means for the movement of sliding of the said spindle with reference to the said inner sleeve, tongs projecting beyond the lower end of said slider and including side walls flaring outwardly and jaws directed inwardly at the end of said walls, means for engaging said tongs with said slider, a second sleeve mounted in axially sliding relationship over the said first sleeve and including an inner projection adapted to urge the said tong jaws inwardly when the said second sleeve is moved outwardly with reference to the said first sleeve for engaging the rear surface of the screw head, the lower edge of the said second sleeve extending beyond the location of said projection to meet the support in which the screw is to be screwed during the screwing operation to provide for the relative rearward movement of said second sleeve and consequent release of the tong jaws.

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