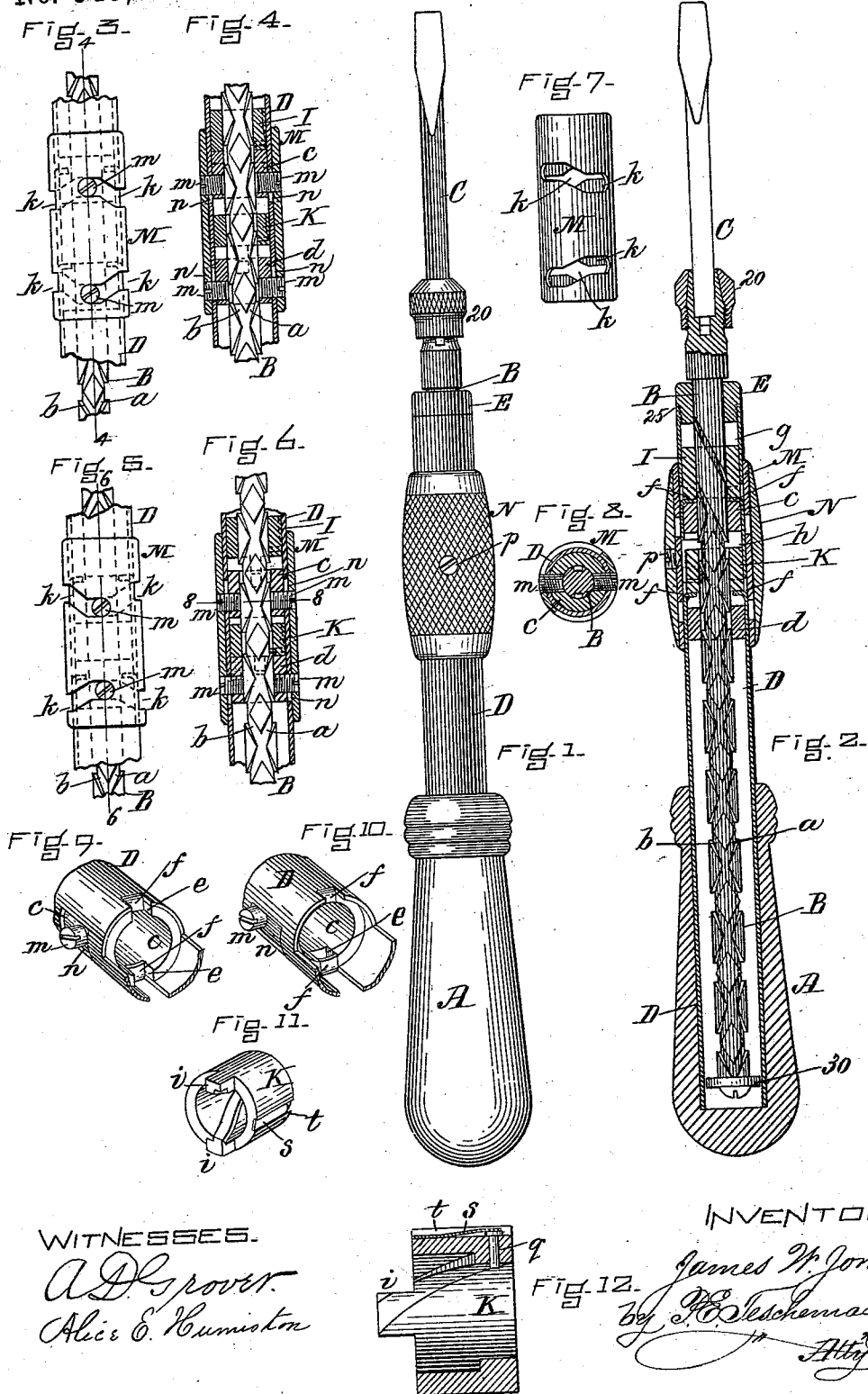


J. W. JONES.
SCREW DRIVER.

Patented July 23, 1895.



WITNESSES.

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JAMES W. JONES, OF BELFAST, MAINE.

SCREWDRIVER.

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To all whom it may concern:

Be it known that I, JAMES W. JONES, a citizen of the United States, residing at Belfast, in the county of Waldo and State of Maine, have invented certain Improvements in Screwdrivers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a side view of a reversible screwdriver constructed in accordance with my invention. Fig. 2 is a longitudinal central section of the same. Fig. 3 is an elevation of a portion of the screwdriver with the outer milled covering-sleeve removed to show the slotted sleeve beneath. Fig. 4 is a section on the line 4 4 of Fig. 3. Fig. 5 is an elevation of the same portion of the screwdriver as is shown in Fig. 3 with the slotted sleeve turned to change the position of the parts controlled thereby. Fig. 6 is a section on the line 6 6 of Fig. 5. Fig. 7 is an elevation of the slotted sleeve which actuates the clutch-collars. Fig. 8 is a transverse section on the line 8 8 of Fig. 6. Fig. 9 is a perspective view of a portion of the tubular socket or sleeve, showing one of the clutch-collars within the same and the lugs or projections on the inside of the tubular socket which fit within the notches of the said clutch-collar. Fig. 10 is a similar view showing the clutch-collar drawn back to close its notches for the purpose of preventing the engagement of the rotary nut therewith. Fig. 11 is a view of one of the rotary nuts by which the spindle or bit is revolved when pushed into the handle. Fig. 12 is an enlarged section through one of the rotary nuts, showing the friction-pin and its spring.

My invention relates to that class of screwdrivers having a spirally-grooved spindle or bit adapted to be rotated when pushed into the handle by means of a sliding rotary nut, which when said spindle is to be revolved is caused to engage with a clutch or stop by which it is locked and held stationary, said nut being disengaged from the clutch and permitted to rotate within its chambers while the spindle is being drawn out or extended for the next operation.

My invention, furthermore, has special reference to a screwdriver of this description in which the direction of motion of the spirally-

grooved spindle or bit can be reversed to enable it to either drive or back out a screw. To simplify and improve the construction of the mechanism for reversing the direction of motion of the spindle and render it more durable, effective, and reliable in its action and at the same time avoid the liability of its getting out of order, is the object of my invention, which consists in certain novel combinations of parts and details of construction, as will be hereinafter fully described, and specifically pointed out in the claims.

In the said drawings, A represents the handle of the screwdriver, which is formed hollow nearly its entire length to receive the spindle B, which is provided with right and left hand spiral grooves *a b*, intersecting each other, as shown, the outer end of said spindle B carrying the screw-driving bit C, which is detachably secured therein by means of a suitable chuck 20.

D is a tubular metallic socket or sleeve, which is immovably secured to the handle A to prevent it from turning therein when the screwdriver is in use. The outer end of the socket D is screw-threaded in its interior to receive a correspondingly-threaded cap E, having a shoulder 25, which rests upon the end of the socket, making a flush joint, said cap having a central aperture through which the spirally-grooved spindle B is free to slide. Within the tubular socket D are placed two short clutch collars or sleeves *c d*, which fit the interior of the socket and are adapted to be moved or slid longitudinally therein by means of cam-slots and studs, as will be hereinafter described, said collars being provided at one end with rectangular notches *e e*, into which fit lugs or projections *f* on the inside of the socket D, said lugs being preferably formed integral with the socket by cutting or punching through the same and forcing the metal inward, as shown in Figs. 2, 9, and 10. These collars *c d*, through which the spindle B is free to slide, divide the front portion of the socket D into two separate and independent chambers *g h*, within which are placed two rotary nuts I K, which are free to slide a short distance longitudinally within said chambers, said nuts being each provided at the rear end with teeth or projections *i i*, as shown in Figs. 11 and 12, which are adapted

to engage with the notches *e* of the clutch-collar opposite thereto when the latter is moved forward, as hereinafter described, whereby the spindle or bit is rotated in either direction 5 to turn or drive a screw or back it out, as may be desired.

The right-hand or inner nut *K*, which fits the right-hand spiral groove *a* of the spindle *B*, is placed within the inner chamber *h* and is free 10 to slide therein between the two clutch-collars *c* *d*, the latter limiting the inward movement of the nut, while the left-hand or outer nut *I*, which fits the left-hand spiral groove *b* of the spindle, is free to slide in the outer chamber 15 *g* between the collar *c* and the cap *E*, which limits its movement in that direction. To the inner end of the spindle *B* is secured a stop-washer 30, which is adapted to come into contact with the inner clutch-collar *d*, and thus 20 prevent the spindle from being pulled out of the tubular socket *D*.

Upon the outside of the tubular socket *D* is fitted a sleeve *M*, which is provided with four cam-slots *k*, two on each side, as shown 25 in Fig. 7, and within these slots fit studs *m*, projecting outwardly from the clutch-collars *c* *d* through longitudinal guide-slots *n* in the tubular socket *D*, the arrangement being such that when the sleeve *M* is partially rotated around the socket *D* the cam-slots *k*, 30 acting on the studs *m*, will cause one of the clutch-collars to be slid forward, as shown in Fig. 9, and the other clutch-collar to be simultaneously drawn back, as shown in Fig. 10. 35 The sliding back of either clutch-collar *c* or *d* by turning the sleeve *M* brings the two lugs or projections *f*, which fit within its notches *e*, flush with the end of the collar and causes them to close the said notches, as shown in Fig. 40 10, thus preventing the teeth *i* of the rotary nut opposite thereto from engaging therewith, while the simultaneous forward movement of the other clutch-collar will project its notches *e* beyond the lugs *f*, which lie therein, leaving them open, as shown in Fig. 9, and ready 45 to receive the teeth of the rotary nut opposite thereto when said nut is slid backward by the action of the spindle *B* as the latter commences to be forced inward after having been 50 extended and its outer end inserted into the nick of the screw to be driven or backed out.

The length of each chamber *g* or *h* is such that whichever rotary nut is locked stationary by engagement with its clutch-collar it 55 will have sufficient space to recede out of engagement therewith when the spindle is drawn outward and again advance to engage said clutch-collar when the spindle first commences to be forced inward for the purpose of rotating 60 it.

Over the sleeve *M* is snugly fitted an outer or covering sleeve *N*, which forms a handle and is secured in place thereupon by a screw *p*, said sleeve *N* concealing the cam-slots *k* 65 and serving to exclude dust and dirt from the interior of the tool, thus preventing the working parts from becoming clogged or ob-

structed. The outer surface of the sleeve *N* is roughened or milled, as shown in Fig. 1, to afford a firm hold for the hand and thus enable the slotted sleeve *M* to be conveniently 70 turned for the purpose of shifting the clutch-collars, as above described.

Each of the nuts *I* *K* is provided with a hardened-steel friction-pin *q*, which passes 75 through a hole in said nut, as shown in Fig. 12, and is adapted to bear upon the bottom of one of the spiral grooves of the spindle *B*, said pin being acted upon by a flat spring *s*, which lies within a longitudinal groove *t* in the rotary 80 nut, the pressure of the spring on the pin causing it to create sufficient friction upon the spindle to prevent the latter from suddenly running out of the handle by its own gravity when held point down, which 85 might occasion damage to finished work around the screw to be driven, and also to prevent said spindle from running back into the handle when held point upward for the purpose of driving a screw overhead and it 90 becomes necessary to hold the work with one hand, and by thus preventing the spindle from running in or out of the handle by its own gravity the annoyance and inconvenience hitherto experienced in this class of 95 screwdrivers from this cause, together with the liability of marring the work, are entirely avoided.

In operating the above-described screwdriver, when it is desired to drive a screw the 100 sleeve *M* is partially rotated to the right on the tubular socket *D* into the position shown in Fig. 3 by taking hold of the outer sleeve *N* with one hand and grasping the handle *A* with the other hand, which causes the front 105 or outer clutch-collar *c* to be advanced, as shown in Fig. 9, thereby opening its notches *e* to permit the outer or left-hand nut *I* to engage therewith, when the spindle, after having been extended, is forced inward by the pressure 110 upon the handle, and thus causing the spindle to be rotated in the desired direction to turn in or drive a screw. This partial rotation of the sleeve *M* simultaneously draws back the rear or inner clutch-collar *d*, thus 115 closing its notches *e* and disengaging it from the inner or right-hand nut *K*, which is then free to rotate with the spindle while the latter is being rotated by the other nut *I* to drive the screw. 120

When it is desired to withdraw or back out a screw the sleeve *M* is rotated to the left into the position shown in Fig. 5, when the outer collar *c* will be drawn back and the inner collar *d* pushed forward. This will release the 125 outer nut *I* and cause the inner nut *K* to engage the collar *d* when the extended spindle is again forced inward, the latter being then caused by said nut *K* to rotate in the proper direction to withdraw or back out a screw, 130 and in this manner either nut can be readily brought into use, as may be desired.

When the parts are adjusted for the spindle to back out a screw it may be used as an

ordinary screwdriver to turn a screw in, and when the parts are adjusted for the spindle to drive or turn a screw in it can be used as an ordinary screwdriver to back a screw out, thus rendering the tool extremely convenient for various kinds of work.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a reversible screw-driver, the combination with the spindle having right and left hand intersecting spiral grooves, the tubular socket or sleeve and two rotary longitudinally sliding nuts adapted to fit the right and left hand grooves respectively of the spindle, of two clutch-collars provided with notches with which said rotary nuts are adapted to engage, lugs or projections on the inside of the tubular socket fitting within the notches of the clutch-collars and adapted to close the same when said collars are moved within the socket and thereby prevent the engagement of the rotary nuts therewith, and means for moving said clutch-collars within the tubular socket to close or open their notches, substantially as set forth.

2. In a reversible screw-driver, the combination with a tubular socket or sleeve secured to the tool-handle and having two separate and independent chambers, of a spindle having right and left hand intersecting spiral grooves, two rotary longitudinally sliding nuts adapted to fit the right and left hand grooves respectively of the spindle and placed within the two chambers of the socket, said nuts being each provided with clutch-teeth or projections, two sliding clutch-collars located within the tubular socket and provided with notches adapted to respectively engage the projections or teeth of the rotary nuts when the latter are brought into contact therewith, lugs or projections on the interior of the tubular socket fitting within the notches of the clutch-collars, and serving to close the said notches of the clutch-collars when the latter are drawn backward within the socket to prevent the engagement of the rotary nuts with said clutch-collars, a sleeve fitting the exterior of the tubular socket and adapted to be partially rotated thereupon, and provided with cam-slots engaging studs projecting from the clutch-collars, whereby when said sleeve is partially rotated in either direction, one of said clutch-collars is moved forward to enable one of the rotary nuts to engage therewith, and the other clutch-collar

simultaneously moved backward to prevent the other rotary nut from engaging therewith, all operating substantially as and for the purpose described.

3. In a reversible screw-driver, the combination of the spindle having right and left hand intersecting spiral grooves, the tubular socket or sleeve, two rotary longitudinally sliding nuts adapted to fit the right and left hand grooves respectively of the spindle, the two sliding clutch-collars provided with notches with which said rotary nuts are adapted to engage, lugs or projections on the inside of the tubular socket fitting within the notches of the clutch collars and adapted to close the same when said collars are drawn backward within the socket, the sleeve M, fitting the exterior of the tubular socket and adapted to be partially rotated thereupon, and provided with cam-slots engaging studs projecting from the clutch-collars, and the outer sleeve N, fitting over the sleeve M, and detachably secured thereto, and forming a handle for turning said sleeve M, substantially as described.

4. In a screw-driver of the character described, the combination with the spirally grooved spindle and the tubular socket, of the rotary longitudinally sliding nut placed upon the spindle and adapted to engage a clutch within said tubular socket, said nut being provided with a friction device bearing against the said spindle, substantially as and for the purpose described.

5. In a screw-driver of the character described, the combination with the spirally grooved spindle and the tubular socket, of the rotary longitudinally sliding nut placed upon the spindle and adapted to engage a clutch within said tubular socket, said nut being provided with a friction pin extending through a hole therein and bearing against the said spindle, and a spring secured to said nut within a groove therein and exerting an inward pressure on said pin to force the same against the spindle, substantially as and for the purpose described.

Witness my hand this 16th day of February, A. D. 1895.

JAMES W. JONES.

In presence of—

GEO. E. JOHNSON,
SAML. W. JOHNSON.