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Z. T. FURBISH.

PUSH SCREW DRIVER OR DRILL.

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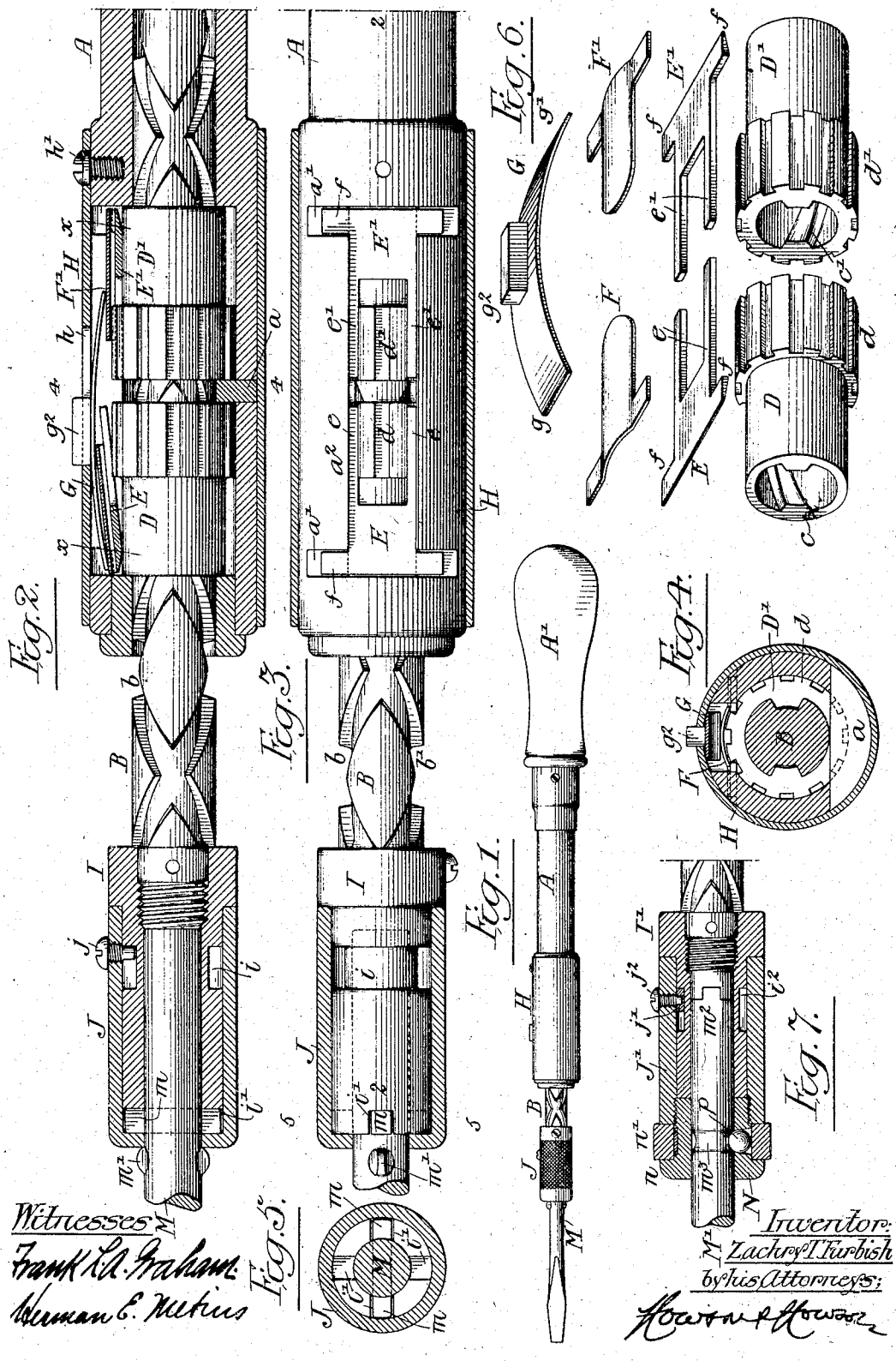

Witnesses
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No. 791,766. Patented June 6, 1905.

UNITED STATES PATENT OFFICE.

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PUSH SCREW-DRIVER OR DRILL.

SPECIFICATION forming part of Letters Patent No. 791,766, dated June 6, 1905.

Application filed April 4, 1903. Serial No. 151,108.

To all whom it may concern:

Be it known that I, ZACHRY T. FURBISH, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Push Screw-Drivers or Drills, of which the following is a specification.

The object of my invention is to construct a push screw-driver or drill in a simple manner, so that the mechanism can be shifted to turn the tool either to the right or left in the forward movement and allow the handle to return without rotating the tool in either direction. This object I attain in the following manner, reference being had to the accompanying drawings, in which—

Figure 1 is a side view of the spiral screw-driver, illustrating my invention. Fig. 2 is an enlarged longitudinal sectional view on the line 2 2, Fig. 3. Fig. 3 is a plan view of Fig. 2 with the casing removed. Fig. 4 is a transverse section on the line 4 4, Fig. 2. Fig. 5 is a transverse section on the line 5 5, Fig. 3. Fig. 6 is a perspective view of parts of the mechanism detached, and Fig. 7 is a view of a modification.

A is the body of the screw-driver, having a suitable handle A′.

B is a spindle having reverse spiral grooves *b b′*, clearly shown in the drawings. Mounted on the spindle within the body A are two nuts D D′, confined longitudinally within the body, as shown clearly in Fig. 2, and separated by means of a segmental division-plate *a*, so that while the nuts are free to rotate within the body portion they are prevented from moving longitudinally.

In the portion *d* of the nut D is cut a series of longitudinal grooves, forming teeth, and in the portion *d′* of the nut D′ similar grooves are cut, forming teeth. On the nut D is an internal spiral rib *c*, arranged to travel in the spiral groove *b*, and on the nut D′ is an internal spiral rib *c′*, arranged to travel in a groove *b′* of the spindle. It will thus be seen that by holding one of the nuts and allowing the other to be free the spindle in the forward movement of the body portion will move in one direction and when the other nut is held the spindle will be turned in the reverse direction when the body portion is moved forward.

The body portion is recessed for the reception of two locking-pawls E E′. The pawl E has two arms *e*, and the pawl E′ has two arms *e′*. The pawl E is arranged to engage the nut D and locks it to the casing, and the pawl E′ is arranged to engage and lock the nut D′ to the casing. The pawls in the present instance have trunnions *f*, which extend into transverse slots *a′* in the body portion, as shown clearly in Fig. 3. It will be noticed that the arms of the pawls are confined between the walls a^2 of the body portion and the teeth on the nuts D D′, so that there is no tendency to strip or bend the arms of the pawls; but the arms are subjected to a crushing action, which they can readily withstand. In order to throw the pawls into and out of engagement with their respective nuts, I mount a shifter G within the slotted portion of the body above the pawls, one end of the shifter *g* resting above the pawl E, and the other end *g′* of the shifter resting above the pawl E′. It will be noticed in referring to Figs. 2 and 6 that the rear ends of the pawls at the pivots are beveled, so that when the shifter passes beyond the lines *x* it will turn the pawl on the pivot and raise the arms out of engagement with its nut. The shifter has a projection g^2, which extends through a slot *h* in the casing H, which in the present instance snugly fits the body portion A and is secured thereto by a screw *h′*. In the present instance between the shifter and the pawls E E′ are pressure-plates F F′, shaped somewhat like the pawls E E′, with the exception that the shifter is solid instead of forked and the center portion of each pressure-plate is slightly curved, so as to clear the toothed portions of the pawls. By providing these pressure-plates the shifter can have more of an extended movement and the engaging arms can be longer than if the pressure-plates were not used.

While I have shown particular mechanism for locking the nuts to the casing, it will be understood that the pawl mechanism may be

modified without departing from my invention, and the clutch mechanism may also be modified.

The clutch is made as follows: On the end of the spindle B is secured a shell I, in which is an annular groove i, and on the shell is a sleeve J, confined thereto by a pin j, which enters the annular groove i. The end of the shell I is notched at i' to receive pins m, carried by the tool M, and the sleeve is confined to the tool M by the pins and by projections m', struck up from the tool, as clearly shown, so that when the body portion of the driver is forced forward the clutch is in engagement with the pins m, and the tool will be turned with the spindle; but when the body portion A is returned the shell I is drawn away from the pins m on the tool, and the tool M is therefore out of engagement with the spindle, allowing the spindle to turn freely without turning the tool.

This device may be modified, as shown in Fig. 7, and the tool may be removable, so that other tools may be substituted for it, by simply providing a chuck on the end of the clutch, so that the tool when mounted enters the notch in the spindle and the ball of the chuck enters an annular groove in the tool. The same action takes place as in the chuck mentioned above. In this figure the shell I' is secured to the end of the spindle, which is slotted to receive a projection m^2 on the end of the removable tool or blade M'. A sleeve J' is mounted on the shell and has a limited longitudinal movement. A block j' is secured to the sleeve by a screw j^2, and this block slides in the annular groove i^2 in the shell I. Screwed into the end of the sleeve is a head N, and mounted between a flange n on the head and the end of the sleeve is a cam-ring n'. Resting in a socket in the head N is a ball p. This ball when projected by the cam-ring n', as in Fig. 7, extends into a groove m^3 in the tool M', the whole forming a chuck. By this means the tool is held to the sleeve J'; but the spindle can be drawn away from the tool when the body A is retracted.

The chuck above described is illustrated and claimed in an application for patent filed by me on the 31st day of December, 1902, Serial No. 137,259. The chuck may be applied to the body A to hold it to the spindle B in some instances, as mentioned in the aforesaid application for patent.

By the locking mechanism above described the direction of rotation of the spindle can be reversed on the forward movement; but without the clutch mechanism the tool would be rotated first in one direction as the body portion moved forward and rotated in the opposite direction as it returns; but by providing the clutch mechanism, which throws the tool out of engagement with the spindle on the return movement, the tool is driven only on the forward movement of the body portion. It will be seen, therefore, by the above arrangement that the spindle when the shifter is in one position can be driven to the right, when the body portion is moved forward, and as the clutch is in engagement it will turn the tool to the right. On the return movement the clutch is immediately disengaged, allowing the spindle to turn to the left as the body portion is returned; but the tool will remain stationary. If the shifter is moved to the opposite position, then the spindle and tool are turned to the left on the forward movement of the body portion, and on the return movement of the body portion the spindle is turned to the right; but the clutch is disengaged and the tool remains stationary.

The arrangement shown is very compact, and the parts are comparatively light, but sufficiently strong to stand the strain to which the tool is liable to be subjected.

I claim as my invention—

1. The combination in a tool of a body portion, a grooved spindle, a toothed nut having a portion engaging the groove of the spindle, a pawl having arms extending longitudinally of the spindle and supported by the body portion so as to be free to engage the teeth of the nut, one of said arms being formed to prevent motion of the nut in one direction and the other being formed to prevent its motion in an opposite direction, substantially as described.

2. The combination in a tool, of a body portion, a grooved spindle, a toothed nut having a portion engaging the groove of the spindle, a pawl having arms extending longitudinally to the spindle and supported in a recess of the body portion so as engage the teeth of the nut, one of said arms being placed so that it is confined between one of the sides of said recess and a tooth of the nut, and the other arm being placed so that it is confined between a tooth and another side of the recess, substantially as described.

3. The combination in a push-tool of a body portion, a spindle having right and left hand spiral grooves, nuts on the spindle confined longitudinally by the body portion, said nuts each having a projection arranged to travel respectively in the grooves of the spindle, teeth on the nuts, pawls pivotally mounted on the body portion, each pawl having a plurality of projecting arms extending longitudinally of the tool and placed to engage the teeth of their respective nuts at different points upon the periphery thereof to lock the same to the body portion, with means for shifting the pawls so as to throw either one or the other out of engagement with its nut, one arm of each pawl being placed to be confined between a tooth of the nut and a part of the body portion, and another arm being placed to be confined between another tooth of the nut and another part of the body portion, substantially as described.

4. The combination of a spindle, a shell, having an annular groove, secured thereto, a flanged sleeve mounted on the shell having a pin extending within the groove, a tool having projections, certain of the same being on one side and others on the opposite side of the flange of said sleeve, the end of the shell being notched to receive the projections from the tool within the sleeve, the width of the annular groove within the shell being sufficient to allow the two parts of the clutch to uncouple, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ZACHRY T. FURBISH.

Witnesses:
WILL. A. BARR,
JOS. H. KLEIN.