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J. CONDOR
EXTENSIBLE TOOL SHANK
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2,438,633

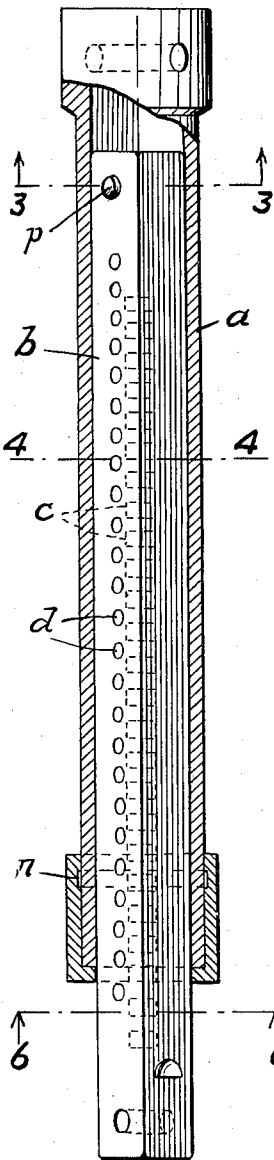


FIG. 1.

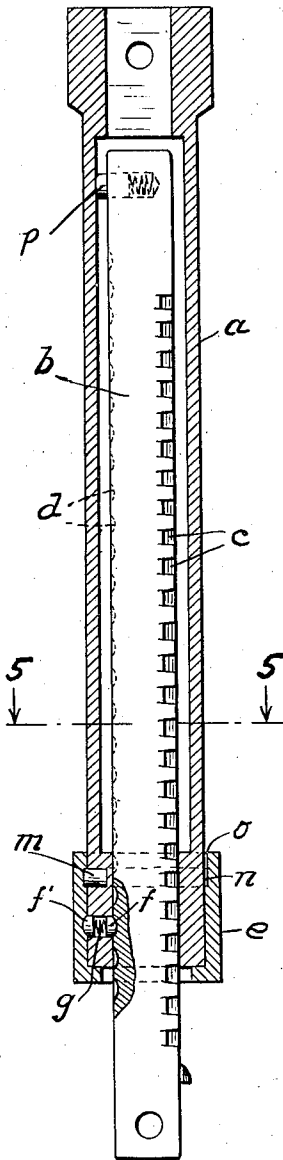


FIG. 2.

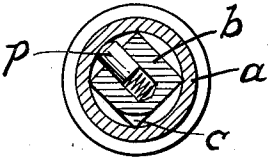


FIG. 3.

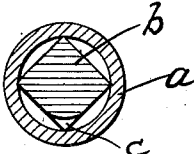


FIG. 4.

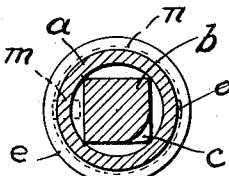


FIG. 5.

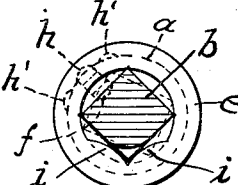


FIG. 6.

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EXTENSIBLE TOOL SHANK

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9 Claims. (Cl. 287—58)

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The object of my invention is to provide a tool shank which, by a simple manipulation, may be so lengthened or shortened that it may have any desired length between definite minimum and maximum lengths. The class of tools to which my invention relates is that class which comprises a shank to one end of which is secured the tool proper, which may be, for example, a wrench, and to the other end of which is secured a handle that may have any suitable operative connection, such, for example, as a pawl and ratchet, with the shank.

It is customary, in such tools, to have the handle, or tool proper, or both, detachable from the shank, and to provide a number of shanks of different length, any one of which may form part of the assembly. Such variations in shank length are essential in order to gain access to machine parts at different distances from, or at variable locations relative to, the outer surface of the machine. One objection to such tools is that it is necessary for the user to have on hand shanks of different length which he must attach and detach to afford the desired length of tool shaft. Another objection to such tools is that it is impracticable and uneconomical to have a considerable number of shanks of different lengths, so that in practice no fine length-adjustment is possible.

The object of my invention is to provide a tool whose shank can be adjusted, within wide limits, to any desired length within a small fraction of an inch and without the necessity of disconnecting the shank from the handle or tool proper and dispensing, therefore, with the necessity of providing a multitude of separate shanks of different lengths.

In the drawings, which illustrate a preferred embodiment of the invention—

Fig. 1 is a longitudinal section through the tool shank.

Fig. 2 is a longitudinal section through the tool shank taken at an angle of 45° to Fig. 1.

Figs. 3, 4 and 6 are cross-sections on the lines 3—3, 4—4 and 6—6 of Fig. 1.

Fig. 5 is a cross-section on the line 5—5 of Fig. 2.

The main elements of the construction are a bar *b* and a surrounding sleeve *a*, the bar projecting from the sleeve at one end and having secured or securable thereto, in any well known manner, the tool proper (not shown), and the sleeve extending beyond the bar at the other end and having secured or securable thereto, in

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any well known manner, an operating handle (not shown).

The bar *b* is square in cross-section throughout its length. The inside wall of the sleeve *a* is circular in cross-section throughout its length except at the lower end, where the wall is square in cross-section to afford a neat sliding fit between it and the bar *b*.

Throughout nearly its entire length the bar is provided with a series of notches *c* spaced apart (preferably) a minor fraction of an inch. These notches are formed by cutting away, at intervals, the bar at one of its corners.

Throughout nearly its entire length the bar is also provided with a series of shallow recesses *d*. These recesses are shown as corresponding in number to the notches *c* and may be arranged alternately thereto.

Applied to the end of the sleeve is a cap *e* having thereon spaced-apart projections *i*, *i*, as shown in Fig. 6.

Carried by the lower end of sleeve *a* are two detents *f*, *f'*, separated by a spring *g*. In any adjusted longitudinal position of the bar the detent *f* engages one of the recesses *d* in the bar *b* (see Fig. 2) while the other detent *f'* engages one of three recesses *h*, *h'*, *h'* (see Fig. 6) in the sleeve *a* dependent upon whether the cap is in its central position, as shown in Fig. 6, or is turned, for instance, at an angle of 30° from its central position. When the cap is in its central position the detent *f'* engages the recess *h* in the cap. When the cap is turned to either side of its central position the detent *f'* engages one of the two recesses *h'*, *h'* in the cap. The described engagements between detents and recesses do not prevent the cap *e* from turning on the sleeve *a* or the bar *b* from sliding longitudinally in the sleeve *a*. However, the bar *b* cannot be moved longitudinally of the sleeve *a* except when the cap *e* is in its central position. When the cap is turned from its central position in either direction, one of the projections *i*, *i* on the cap engages that one of the notches *c* which was brought into transverse alignment therewith and positively locks the bar *b* in its longitudinally adjusted position.

It will thus be understood that in order to lengthen or shorten the shank of the tool the cap is turned to the central position shown in full lines in Fig. 6; and the bar is then slid longitudinally, the detent *f* clicking over the recesses *d* until, at the end of the adjustment, it settles into one of the recesses. The projections *i*, *i* are now in transverse alignment with one of

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the notches *c* in the bar *b*. The cap *e* is now turned from the central position in either direction, snapping the detent *f'* out of the notch *h* in the cap *e* until the detent engages one of the notches *h'* in the cap, thereby moving one of the projections *i* into the aligning notch *c* in the bar *b* and thus locking the bar in its adjusted position in the sleeve.

It will be understood that the device would be operative if there were provided only one projection *i* and one recess *h'*. This would require, to effect locking, the turning of the cap in only one direction and would make it desirable to provide some means to prevent the cap from turning in the opposite direction. The provision of two projections *i* and two recesses *h'* is distinctly advantageous.

Near its upper end a pin *m* on the sleeve *a* extends into a circumferential groove *n* in the cap *e*, thus permitting the cap *e* to turn on the sleeve but preventing it from moving longitudinally thereon. To allow the cap to be slipped onto the sleeve in assembling the parts, the inner face of the cap is provided with a vertical groove *o* extending from the upper edge of the cap to the groove *n*. In assembling, the pin *m* is aligned with the groove *n* to allow the cap to engage the sleeve throughout its entire length, after which the sleeve is turned (the pin *m* riding in the groove *n*) until it is brought into an operative position.

At the upper end of the bar a spring-pressed pin *p* projects laterally from the bar and limits the longitudinal movement of the bar in both directions. The pin is held into operative position by a spring in order to allow, in assembling the parts, the bar to be inserted into the sleeve.

If it is desired to lengthen the shank beyond the maximum length which the described structure permits, a separate bar of any length may be secured to the bar *b*. While such an expedient for lengthening the tool shank is common practice, and therefore requires no illustration, it will be obvious that the thus increased effective length of the shank is not a fixed increase but may be adjusted to small fractions of an inch within the greater minimum and maximum limits that the extended length of the bar permits.

What I claim and desire to protect by Letters Patent is:

1. A tool shank adapted to carry at one end a tool and at the other end an operating handle, comprising a sleeve, a bar, longitudinally slidable but not turnable therein, having a series of spaced apart notches along its length, a cap embracing one end of the sleeve and a projection on the cap adapted to engage any of said notches, the cap being turnable on the sleeve into position to move said projection out of locking engagement with the bar to allow the bar to slide longitudinally and being turnable on the sleeve to move said projection into engagement with one of said notches to thereby lock the bar to the sleeve, concealed means between the sleeve and cap for preventing relative longitudinal movement of the sleeve and cap, and spring actuated means for retaining the cap in either locking or unlocked position.

2. A tool shank adapted to carry at one end a tool and at the other end an operating handle, comprising a sleeve, a bar, longitudinally slidable but not turnable therein, having a series of spaced apart notches along its length, a cap

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embracing one end of the sleeve and spaced apart projections on the cap adapted to engage any of said notches, the cap being turnable on the sleeve into a central position to bring said projections on opposite sides of the longitudinal row of notches and being turnable in either direction from said central position to move one of said projections into engagement with one of said notches to thereby lock the bar to the sleeve.

3. The tool shank defined in claim 2 comprising also a series of recesses along the length of the bar spaced apart correspondingly to the notches and a spring pressed detent carried by the sleeve adapted to engage any of said recesses in the bar and thereby position a corresponding notch for engagement with one of the projections on the cap.

4. The tool shank defined in claim 2 in which the cap is provided with three recesses in circumferential alignment, and a detent carried by the sleeve adapted to engage the central recess when the cap is turned to unlocking position and to engage one of the other recesses when the cap is turned to locking position.

5. A tool shank adapted to carry at one end a tool and at the other end an operating handle, comprising a longitudinally extending outer member, a longitudinally extending inner member slidable longitudinally within the outer member, a third member turnable on the outer member, a locking element on the turnable member, a multiplicity of spaced apart locking elements arranged along the inner member any of which is adapted to be brought into and out of locking relation with the locking element on the turnable member by longitudinally sliding the inner member and turning the turnable member into different angular positions, the longitudinally slidable inner member having a multiplicity of spaced apart recesses corresponding to said multiplicity of spaced apart locking elements, and a device on the outer member adapted to engage any of said recesses and thereby position one of the locking elements on the longitudinally slidable inner member for engagement, by the turning of the turnable member, with the locking element carried thereby.

6. A tool shank adapted to carry at one end a tool and at the other end an operating handle, comprising a sleeve, a bar, longitudinally slidable but not turnable therein, having a series of spaced apart notches along its length, a cap embracing one end of the sleeve and a projection on the cap adapted to engage any of said notches, the cap being turnable on the sleeve into position to move said projection out of locking engagement with the bar to allow the bar to slide longitudinally and being turnable on the sleeve to move said projection into engagement with one of said notches to thereby lock the bar to the sleeve, said bar having also a series of recesses along its length and spaced apart correspondingly to the notches and a spring pressed detent carried by the sleeve adapted to engage any of said recesses in the bar and thereby position a corresponding notch for engagement with said projection on the cap.

7. A tool shank adapted to carry at one end a tool and at the other end an operating handle, comprising a sleeve, a bar, longitudinally slidable but not turnable therein, having a series of spaced apart notches along its length, a cap embracing one end of the sleeve and a projection on the cap adapted to engage any of said notches, the cap being turnable on the sleeve into position to move

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said projection out of locking engagement with the bar to allow the bar to slide longitudinally and being turnable on the sleeve to move said projection into engagement with one of said notches to thereby lock the bar to the sleeve, the cap having a plurality of recesses in circumferential alignment, and a detent carried by the sleeve adapted to engage one of said recesses when the cap is turned to unlocking position and to engage another recess when the cap is turned to locking position.

8. A tool shank adapted to carry at one end a tool and at the other end an operating handle, comprising two longitudinally extending members, one of which is slidable longitudinally along the other, a third member turnable on the other two members, interlocking elements on one of the longitudinally sliding members and the turnable member adapted to be brought into and out of locking relation by the turning of the turnable member to different angular positions, and other mutually engageable elements on the longitudinally extending members adapted, in said relative sliding movement of said members into any of a multiplicity of relative longitudinal positions, to bring said interlocking elements into position to enable their engagement to be effected.

9. A tool shank adapted to carry at one end a tool and at the other end an operating handle, comprising a longitudinally extending outer

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member, a longitudinally extending inner member slidable longitudinally within the outer member, a third member turnable on the outer member, spaced locking elements on the turnable member, a multiplicity of spaced apart locking elements arranged along the inner member any of which is adapted to be brought into locking relation with a locking element on the turnable member by longitudinally sliding the inner member when the locking elements thereon are between the locking elements on the turnable member and turning the turnable member in either direction to engage a locking element on the turnable member into locking engagement with the desired locking element on the inner member.

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