June 26, 1951 G. L. ROCK 2,558,158

SAFETY TOOL HANDLE

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Fig. 1.

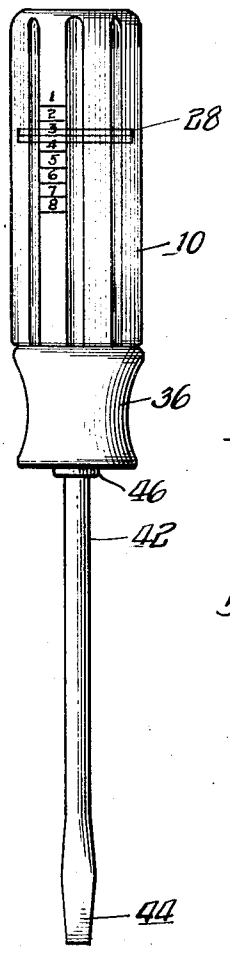


Fig. 2.

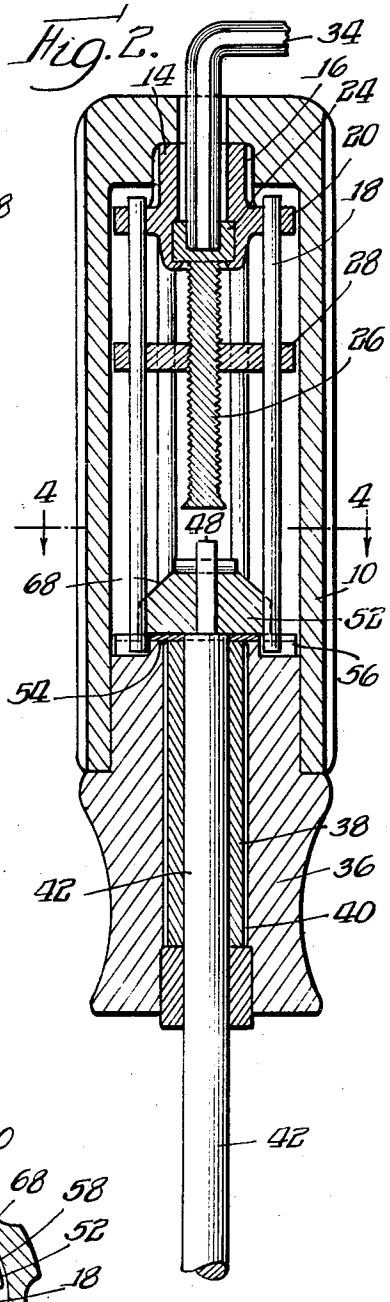


Fig. 3

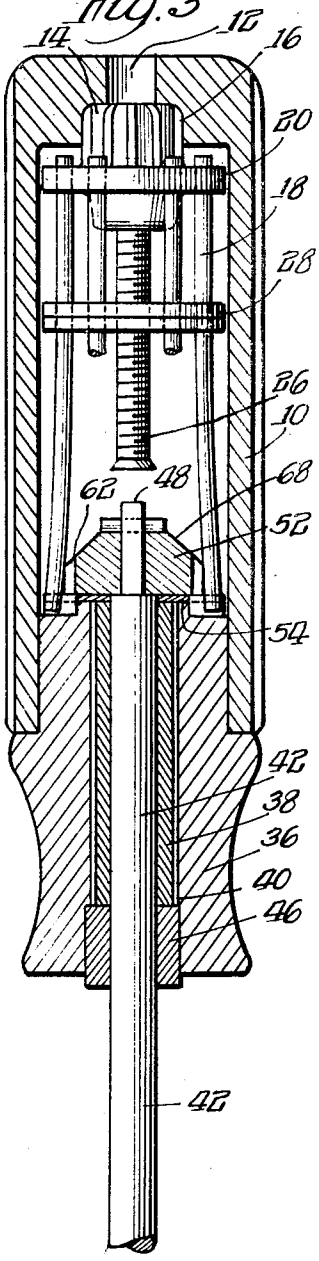
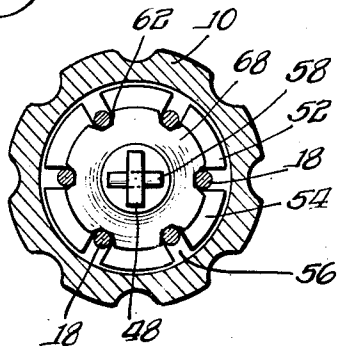


Fig. 4.



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Fig. 5.

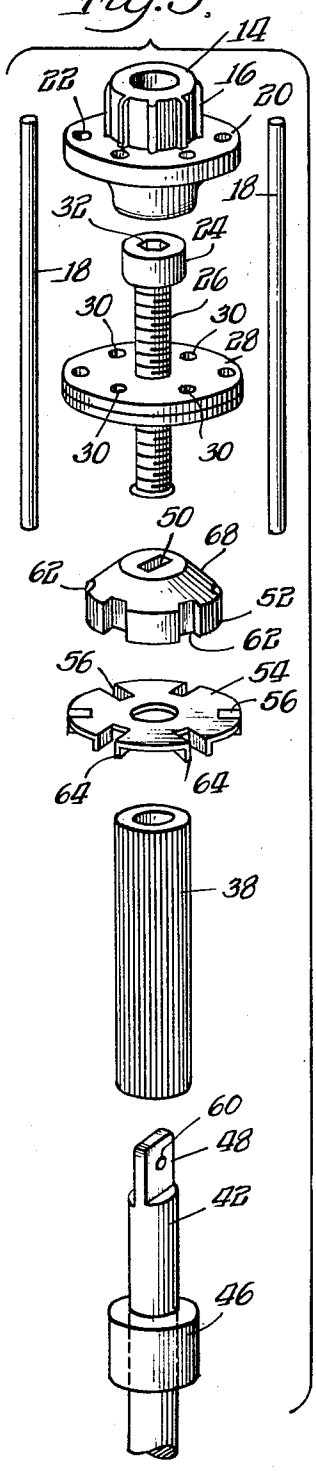


Fig. 6.

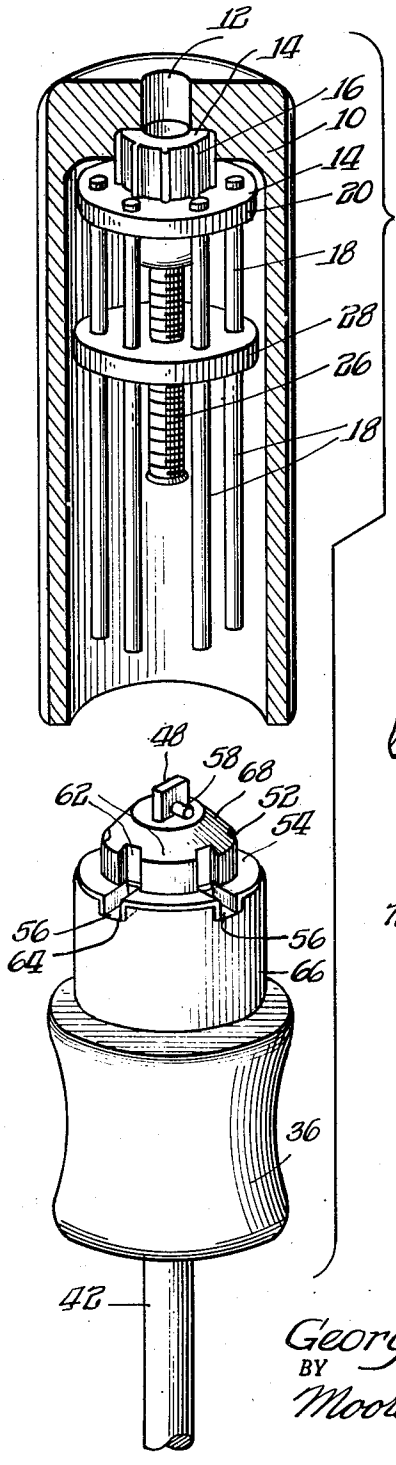
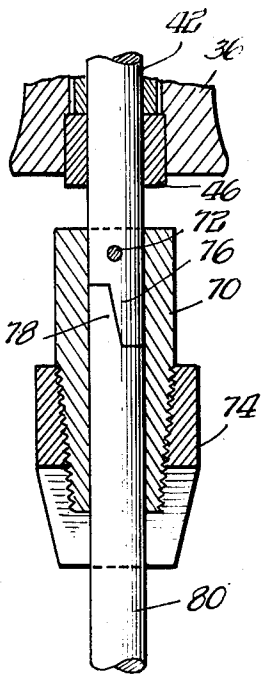


Fig. 7.



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SAFETY TOOL HANDLE

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9 Claims. (Cl. 64—29)

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This invention relates to safety tool handles, and more particularly to a tool handle for screw drivers, wrenches, and other tools exercising torque whereby only a minimum predetermined torque can be applied through the handle to the tool.

In many applications where machine screws are used to hold plastic, plywood, or other deformable material, or when screws made of soft material such as brass are used, either the deformable material or the screws themselves are injured by the application of too much torque. Then, too, an uneven tightening of screws may result in the warping of parts. The use of too much torque frequently damages the screw heads. Similarly, in the case of wrenches, threads are stripped by the application of torque in excess of a predetermined amount.

One object of this invention is to provide a safety tool handle which will permit the application of a predetermined torque through the handle to the tool employed.

Another object of this invention is to provide a safety tool handle in which the amount of torque may be varied in an accurate, efficient, and simple manner to any predetermined value within wide limits.

Another object of this invention is to provide a safety tool handle which may be easily adjusted to accommodate a predetermined torque which is simple to manufacture and easy to assemble.

Another object of this invention is to provide a safety tool handle of inexpensive construction but which is dependable in use.

Other and further objects of this invention will appear from the following description.

For purposes of convenience and clarity, this invention will be described with the tool as a screw driver though it is to be understood that any suitable tool, such as a socket wrench, augur, reamer, drill, or the like, may be employed.

In general, this invention contemplates the provision of a handle having contained therein longitudinally extending spring members supported at one end and free at the other. The longitudinally extending spring members are yieldable at their free ends in a direction transverse to the axis of the handle. The fingers are adapted to embrace a clutch member formed with means to cooperate with the fingers so that the torque may be transmitted from the handle to the fingers to the clutch member and thence to the tool which is secured to the clutch member for rotation therewith. A relative movement between the fingers and the clutch member can

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take place only when the fingers are cammed outwardly. Means are provided for varying the stiffness of the fingers in a simple, convenient, and expeditious manner whereby a wide range of torques may be transmitted by the handle. The means for adjusting the stiffness of the spring fingers acts at once as an indicator to show the user the limiting torque which may be applied through the handle for the setting involved.

In the accompanying drawings, which form part of the instant specification and which are to be read in conjunction therewith, and in which like reference numerals are used to indicate like parts in the various views,

Fig. 1 is a front elevation of the safety tool handle of this invention carrying a screw driver as the tool.

Fig. 2 is a longitudinal sectional elevation on a large scale of the safety tool handle shown in Fig. 1 showing the parts in torque-transmitting position.

Fig. 3 is a sectional view similar to Fig. 2 showing the parts at the moment of over-running or slipping to permit relative movement between the handle and the tool thus preventing the transmission of excessive torque.

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 2.

Fig. 5 is an exploded view showing details of assembly.

Fig. 6 is an exploded view showing the details of assembly at a later stage thereof.

Fig. 7 is a fragmentary detailed view showing a tool-holding chuck adapted to be used in connection with the safety tool holder of this invention.

More particularly, referring now to the drawings, the handle is formed with a housing 10 which may be made of transparent material such as a cellulose acetate plastic. It will be understood, of course, that any suitable material may be used. Opaque material, if used, should be provided with a window so that the setting of the torque may be observed. The housing 10 is provided with an opening 12 at its upper end through which a torque adjusting tool is adapted to pass, as will be hereinafter more fully described. Adjacent the upper end of the handle, there is positioned a support member 14 which is provided with ribs 16 adapted to engage the material of the handle in order to prevent relative rotation between the member 14 and the handle 10. The support member carries a plurality of longitudinally extending spring steel rods 18 which are secured to the support member in any suitable manner. In the

drawings the support member is formed with a flange 20 provided with a plurality of holes 22. The upper ends of the rods 18 are slightly tapered so that they are wedged in the holes 22. The lower end of the support member 14 is provided with a bearing carrying the rotatable head 24 of a longitudinally extending screw 26. A disk 28 provided with holes 30 is centrally threaded to cooperate with the screw threads of the screw 26. The rotatable head 24 is provided with a socket 32 adapted to receive the end of a wrench 34 which may be inserted through aperture 12. Rotation of the screw 26 through the wrench 34 and the rotatable head 24 will move the disk 28 longitudinally of the handle. It will be observed that when the disk 28 is moved downwardly as viewed in the drawings, the lower ends of the spring rods or fingers 18 will have shorter lengths unsupported. This will make the spring action much stiffer as the stiffness of a straight spring is a function of its length. The lower end of the handle housing 10 is adapted to be closed by a member 36 which is provided with a longitudinally extending aperture in which a bushing 38 is lodged. The bushing 38 may be provided with corrugations 40 to prevent relative movement between the bushing and the closure member 36. Positioned within the bushing 38 there is a shaft 42 which may be the shaft of the tool such as a screw driver blade 44 as shown in Fig. 1, or the shaft terminating in a tool-holding chuck as shown in Fig. 7. A rotatable bushing 46 may be secured to the shaft 42 in any suitable manner. The upper end of the shaft 42 terminates in a blade-like portion 48 adapted to enter the slot 50 of a clutch member 52. Loosely positioned around the shaft 42 there is provided a guide plate 54 provided with guide notches 56. A pin passes through a hole 60 in the blade portion 48 and secures the clutch member 52 to the shaft 42 for rotation therewith. The clutch member 52 is provided with re-entrant portions 62 in which the free ends of the spring fingers 18 are adapted to lodge. The guide member 54 is provided with projections 64 adapted to cooperate with notches formed in the upper end of the closure member 36. In this manner the guide plate is secured to the closure member and prevented from relative rotation therewith. The closure member is provided with a cylindrical portion 66 adapted to fit into the lower end of the handle housing 10 as can readily be seen by reference to Figs. 2, 3, and 6. In assembling, the cylindrical portion 66 is telescoped within the handle housing 10 and secured in any suitable manner by an adhesive or by chemical or heat treatment. It will be observed that the clutch member 52 is provided with a tapered surface 68 for ease in assembly. The tapered surface will cam the lower ends of the spring fingers 18 outwardly, permitting ready assembly.

Referring now to Fig. 7, the shaft 42 carries a threaded bushing 70 secured to the shaft by pin 72 or in any other suitable manner. The bushing 70 threadedly engages a nut 74. The lower portion of the bushing 70 is formed with threads and is tapered and may be of resilient construction. The lower end of the shaft 42 has a scarfed portion 76 with which a corresponding scarfed portion 78 formed on the end of shaft 80 is adapted to coact. The shaft 80 may be the shaft of any suitable tool of any desired nature which is operated through the transmission of torque. By loosening nut 74 the tools may be readily interchanged so that the handle may be employed with a variety of tools and sizes of tools.

The use of a transparent handle housing enables the calibration of the handle to be made so that the user may set the disk opposite calibration marks. These are shown in Fig. 1. The calibration may be arbitrary or may be in foot pounds of torque if desired, it being understood that in the form shown in the drawings, the lowering of the disk 28 increases the torque transmitted by the tool handle.

It will be seen that this invention accomplishes its objects. A safety tool handle is provided which will permit the application of a predetermined torque and will relieve the excess when the predetermined amount is past. The amount of the torque transmitted may be varied in an accurate, efficient, and simple manner to any predetermined value over wide limits. The safety tool handle is easy to manufacture and inexpensive to produce inasmuch as all of the parts may be made by simple machine shop operations. There are no expensive machined parts which would tend to increase the cost of production. The adjustment of torque transmission can be made very simply by the insertion of the wrench through the aperture 12. It is understood, of course, that if desired a permanent adjusting means may be connected to the screw 26. The tool handle is dependable inasmuch as the connection between the tool and handle may be relied upon to transmit the torque desired and to relieve the torque when an excess is reached.

It will be understood that many changes may be made in details without departing from the spirit of this invention. This is contemplated by the claims and it is, therefore, to be understood that this invention is not to be limited to the particular details shown and described except within the ambit of the appended claims. Having thus described this invention, what is claimed is:

1. A safety tool handle including in combination a handle housing, a plurality of longitudinally extending elongated spring members mounted in and secured to said housing against rotation relative thereto, a tool-receiving holder extending into said housing and rotatable with respect thereto but mounted in said housing against movement longitudinally of the housing, a clutch member secured to said holder within said housing, said clutch member having means cooperating with said spring members to prevent rotation of said holder relative to said handle housing at torques below a predetermined amount, the construction being such that when a torque in excess of said predetermined amount is applied, said spring members will yield to permit rotation of said holder relative to said handle housing, and means engaging said spring members and mounted in said housing for adjustment longitudinally of said spring members to vary the tension of said spring members thereby adjustably to determine the amount of torque at which said spring members will yield to permit such relative rotation of said tool-receiving holder and said handle housing.

2. A safety tool handle including in combination a housing, a support positioned within said housing and secured thereto against relative rotation therewith, a plurality of longitudinally extending spring members secured to said support adjacent their ends, an apertured disk within said housing and through which said spring members pass, said disk being mounted for adjustment longitudinally of said members and said housing,

a tool-receiving holder rotatably supported by said handle housing, a clutch member carried by said holder for rotation therewith, means formed on said clutch member for cooperation with said spring members adjacent their opposite ends to prevent relative rotation between said holder and said handle housing at torques below a predetermined amount, and to permit relative rotation of said holder and housing on application of a torque above said amount, and means for adjusting said disk longitudinally of said housing and spring members to vary the amount of torque at which said holder and housing may rotate relatively.

3. A safety tool handle including in combination a housing, a support positioned within said housing and secured thereto against relative rotation therewith, a plurality of longitudinally extending spring members carried by said support adjacent their ends, an apertured disk within said housing positioned with said spring members extending through the apertures, a tool-holding shaft rotatably supported by said handle housing, a clutch member carried by said shaft for rotation therewith, means formed on said clutch member for cooperation with said spring members to prevent relative rotation between said shaft and said handle housing at torques below a predetermined amount, guide means within said housing for guiding the unsupported ends of said spring members for motion in a radial direction, and means for moving said apertured disk longitudinally of said handle housing whereby to vary the stiffness of said spring members.

4. A safety tool handle as in claim 3 in which said means for moving said apertured disk comprises a longitudinally extending screw and screw threads formed centrally of said disk for coaction therewith.

5. A safety tool handle as in claim 3 in which the upper surface of said clutch member is tapered.

6. A safety tool handle as in claim 3 in which the means formed on said clutch member for cooperation with said spring members comprises a plurality of re-entrant portions receiving said spring members.

7. A safety tool handle as in claim 3 in which said handle is formed of transparent material to permit the user to observe the position of said apertured disk.

8. A safety tool handle as in claim 3 including means for providing a view of the position of said apertured disk.

9. A safety toolhandle as in claim 3 including means for indicating the position of said apertured disk.

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The following references are of record in the file of this patent:

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