P. E. EDELMAN.

SAFETY DRILL AND TOOL HOLDER.

APPLICATION FILED AUG. 19, 1912.

1,158,190. Patented Oct. 26, 1915.

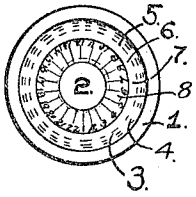


FIG. 2.

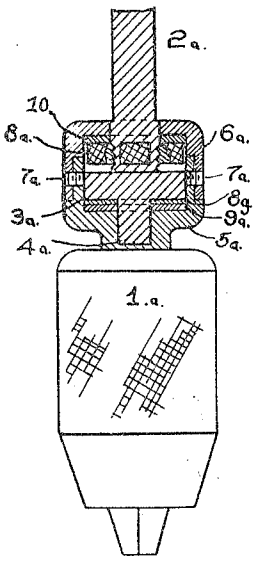


FIG. 3.

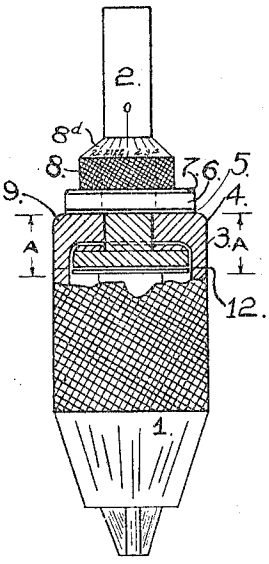


FIG. 1.

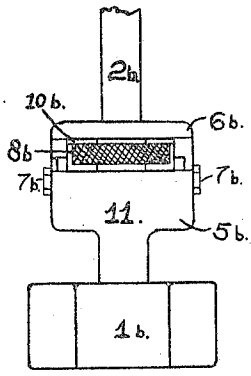


FIG. 4.

WITNESSES.

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SAFETY DRILL AND TOOL HOLDER.

1,158,190. Specification of Letters Patent. Patented Oct. 26, 1915.

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To all whom it may concern:

Be it known that I, PHILIP E. EDELMAN, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented a new and useful Safety Drill and Tool Holder, of which the following is a specification.

My present invention relates to drills and similar tools and more particularly to power tools such as pneumatic and electrical drills, bolt tighteners, and the like.

One of the objects of this invention is to prevent drills from breaking, nuts or bolt heads from twisting off, and the like, when the said tools are in use.

My invention makes the use of rapid power drills possible in the assembling of parts of machinery, such as the bolting of automobile frames together, and so on.

A further object of my invention is to provide means which will indicate when a given operation is completed and will then automatically release the tool member.

Other objects will presently appear.

Ordinary power drills have the disadvantage of causing the drill to break if the material being worked is of uneven composition. This is particularly the case when small twist drills are used. Thus when the drill reaches a tempered portion in a piece of cast iron, it breaks under the strain which results in many cases. Such hard portions cannot generally be predetermined and the drill is thus fed and revolved with undiminished force, resulting in serious injuries in many cases. Aside from the cost of new drills, a further disadvantage arises, in that the broken portion of the drill which remains in the work is often difficult to remove. Again, ordinary power drills are not adapted for use in forcing bolts into place, tightening nuts, driving screws, and similar operations because there is no method of predetermining or regulating the amount of force necessary for each operation. Further, there is no method of immediately stopping the tool when the nut or the like is fully tightened, and no method of knowing that the nut or the like is tight until it is too late. As a result the tool either twists it off or else it is suddenly stopped with a jolt which results in injury of one kind or another. As far as I am aware all such assembling operations have heretofore been carried out by hand, generally in two operations. The bolt is ordinarily started with a small hand operated brace and then finished with a large hand operated lever tightener, the operations requiring considerable time and labor.

My invention provides a safety drill or the like which overcomes these and similar difficulties, and is particularly adapted to small power drills, drivers, and tighteners. It is also applicable to all forms of hand and power operated braces, drills, drivers, tighteners, and similar tools. In accordance with my invention I provide an adjustable mechanism which is normally locked when the tool is in use. Any strain or overload causes it to disengage, thus freeing the twist drill, or nut, or the like from further strain. In this manner the point at which a nut is tight is automatically determined and the driving force is stopped just at the right time. The said mechanism thus acts as an overload indicator as well as means for relieving the drill, nut tightener, or like tool, and the work, from excessive strain. I prefer to make the said mechanism adjustable to operate with different sizes of drills and materials or in tightening different sizes of bolts and the like. Thus, for a small drill the mechanism may be adjusted by a simple operation to release at a less strain than for a larger drill.

Some suitable embodiments of my invention are shown in the accompanying drawing.

Figure 1. shows a vertical view sectioned at A A, of my invention as embodied in a chuck. Fig. 2. is a plan view of the same. Fig. 3. shows a vertical view partially in section of another embodiment of my invention. Fig. 4. shows a vertical view of my invention embodied in a nut tightener.

Similar reference numerals refer to similar parts throughout the several views.

In Figs. 1 and 2, which show my invention suitably embodied in a chuck, 1 indicates the chuck. 2, indicates a shaft which may be either a part of the drill shaft, an extension thereof, or else adapted to fit into a sleeve or into the regular chuck of a drill. This embodiment allows my invention to be used with an ordinary drill and interchangeably with the regular chuck, or in addition to the regular chuck. The shell of the chuck 1, is preferably divided into two parts as at 12. 9, indicates the rear portion of the shell which has an opening for the shaft 2. The shaft 2 is provided with an inner flange 3, and carries a hand knob 8 on a thread.

7, 5, and 4 indicate suitable washers and are intended to take up the wear and also to prevent objectionable friction. 6, indicates a washer of resilient material such as leather. It is desirable to have the piece 2, 3, with the knob 8 accurately fitted so that it is centered in the opening of the shell 9. In operation the piece 2, 3, being free to move within the shell 9, is tightened by means of the knob 8, thus compressing the washer 6, and also affecting 7, 5, and 4. The pressure can be regulated by the knob 8. Now if the work presents sudden resistance, as when a drill reaches a tempered spot in cast iron, the member 2, 3, will be released and slip. The force on the chuck 1, is thus relieved and damage is prevented. The knob 8 allows the pressure to be regulated so that the member 2, 3, will be released in accordance with the maximum strain allowable for the given work. This knob 8 is preferably provided with a bevel scale 8^d as shown, a coöperating match line being provided upon 2. This scale 8^d is preferably constructed to be visible in some suitable manner as that shown in Figs. 1 and 2.

Fig. 3. shows my invention embodied on the shaft 2^a which may be the drill shaft or a short piece adapted to fit into a sleeve or chuck. 1^a indicates the tool holder in the form of a chuck and is not necessarily in direct relation with the release mechanism. 5^a and 6^a indicate the two respective portions of a suitable shell and may be independent of the chuck 1^a as already mentioned. It is preferably located near the chuck for convenience. The shaft 2^a is provided with an inner flange 3^a and centering portion 4^a, and also with a knob 8^a carried on a thread. Washers 10, 8^g, and 9^a, are provided for purposes previously set forth in describing Figs. 1 and 2. 7^a indicates means in the form of threaded holes for fastening the shell together after the parts have been arranged together. This arrangement also permits the easy removal of the parts if necessary. It is understood that the shell 6^a, 5^a, and shaft 2^a, 3^a, 4^a, must be accurately arranged for the best results.

The operation of this embodiment is similar to that already described for the embodiment of Figs. 1 and 2. The knob 8^a can be tightened against the washer 10, thus forcing the shaft 2^a, 3^a, 4^a, into a lock with the shell and with a desired friction. An excessive strain on the chuck will release this lock in the manner already shown and described. This embodiment also allows another method of use. Thus, if the knob 8^a, is turned so that the shaft 2^a, 3^a, 4^a, is loose and free, the necessary friction to operate the chuck and tool is obtained by the pressure of the drill against the work. The portion 4^a maintains the shaft in alinement. It is obvious that any excessive strain on the chuck will cause the shaft to slip and thus protect the work.

In Fig. 4, a similar embodiment of my invention is shown in an exterior view as embodied in a nut tightener. 1^b represents the nut tightener member. 11 indicates the shell of the mechanism of which 6^b and 5^b are the respective parts fastened together as shown by screws 7^b. 10^b is a washer and 8^b the screw knob. I may provide a scale to indicate the pressures or degree of friction for different work or drills, on the outside of the shell or on the knob 8, or both.

This scale may take such suitable form for example as that shown in Fig. 1, 8^d. As the knob 8 is turned to adjust the pressure on the member 6, successive marks on 8^d come by the zero mark on 2 and these marks on 8^d serve as an indication of the strain at which the shaft 2 will slip. The operator can set the scale at a predetermined point for any class of work. For example, a foreman may want a quantity of cap screws driven. After determining quickly the proper friction by trying a sample, say 9 on the scale, he need only instruct the workman to drive all the screws while the knob 8 is set at 9. Or again, a hundred $\frac{1}{4}$ inch holes may be bored in a number of brass pieces while the indicator remains set at 11. This arrangement makes the indicator suited to all classes of work for it is well known that the resistance of different metals to the same size of drill varies greatly according to its composition, the driving speed, lubrication, condition of the drill, and the hardness of the material cut. Attempts to calibrate an indicator direct in drill sizes are useless for this reason and also because of the fact that the wear on the parts is bound to make such pre-calibration unreliable. In my device this difficulty is obviated by making the determination from the scale just before each desired operation is to be carried out and irregularities for each case are thus compensated for. For instance when large holes are drilled slowly into cast iron pieces, machinists often attend to other duties during the drilling. Even if the safety device remains unnoticed for some time after the shaft revolves, with the work causing the shell 9 to remain fixed, no harm will result and the friction member 6 will not wear out.

In all the embodiments it should be noted that the drive shaft revolves freely while the shell or tool holder does not, when undesired resistance is offered to the tool by the work, thus enabling the operator to observe the fact at once. It should be noted too, that the resilient washer 6 used in my invention is subject to wear only when undesired resistance to the work is encountered. It has the advantage of a positive grip until the undesired strain is met, after

which the release is substantially instantaneous. In any case, these washers are inexpensive and if necessary can be readily renewed. It is characteristic of this invention that the parts are extremely simple, compact, and accessible. The knob 8 being carried on the shaft 2 in each case is very convenient for quick adjustments and is protected from the tool holder proper when the said holder refuses to rotate by reason of undesired friction. The adjustment parts are thus protected from the rough handling ordinarily accorded to the tool holder proper and in the cases utilizing a scale as set forth, this scale is preferably combined on the knob 8. It should be noted too, that in each modification, the shoulder or stop 3, 3^a, and the clamping means 8, 8^a, etc. are both carried on the rotating shaft 2, 2^a, etc. and are independent of the shell 9 when the latter is prevented from rotating. It is thus clear that hot boxes and similar difficulties are avoided and that the working parts are at all times both accessible and provided with a free cooling surface when subjected to slippage. The condition of the parts can be noted at any time. Then too, the parts are very cheap to manufacture and the user does not have to purchase expensive new holders, for old ones may be utilized. The tools may be inserted and removed in any case, without disturbing the working parts of my device. It is also obvious that the tool will always be driven true with my device regardless of the degree of friction to which the knob 8 is set, this being assured by the novel arrangement of the parts. It should be noted that all of the embodiments have an advantage in that their lengths are not excessive, thus keeping the total length from the work to the live shaft within a limit that affords a strong spindle which runs true.

It will be observed that my invention is very simple and that it is applicable to old as well as specially constructed tools. It is obvious that my invention is not limited to the applications shown and described and that various changes may be made within the scope of the appended claims.

I have now described and shown suitable embodiments of my invention.

I claim, and these Letters Patent are granted for:

1. In a tool of the class described, a tool holder, a shaft entering it, friction members operatively engaging between the tool holder and shaft, and a knob threaded on said shaft to adjust the operative friction between the said tool holder and shaft.

2. In a tool of the class described, a tool holder, a shaft entering it, friction members operatively engaging between the tool holder and shaft, and a calibrated knob threaded on said shaft to adjust the operative friction between the said tool holder and shaft.

3. In a tool of the class described, a tool holder, a shaft entering and engaging it, and a knob threaded on said shaft and frictionally connecting said shaft and tool holder.

4. In a tool of the class described, a tool holder, a shaft entering and engaging it, and a calibrated knob threaded on said shaft and frictionally connecting said shaft and tool holder.

5. In a tool of the class described, a tool holder, a shaft entering and engaging it, and an external knob threaded on said shaft and frictionally connecting said shaft and tool holder.

6. In a tool of the class described, a tool holder, a shaft entering and engaging it, and an external calibrated knob threaded on said shaft and frictionally connecting said shaft and tool holder.

Signed in the presence of witnesses, this 14th day of August, 1912, at Minneapolis, Minn.

PHILIP E. EDELMAN.

Witnesses:
M. I. EDELMAN,
ANNETTA MARTINSON.