G. F. & L. E. HOCHRIEM.

MOTOR DRILL.

APPLICATION FILED JULY 26, 1915.

1,214,680.

Patented Feb. 6, 1917

2 SHEETS—SHEET 1.

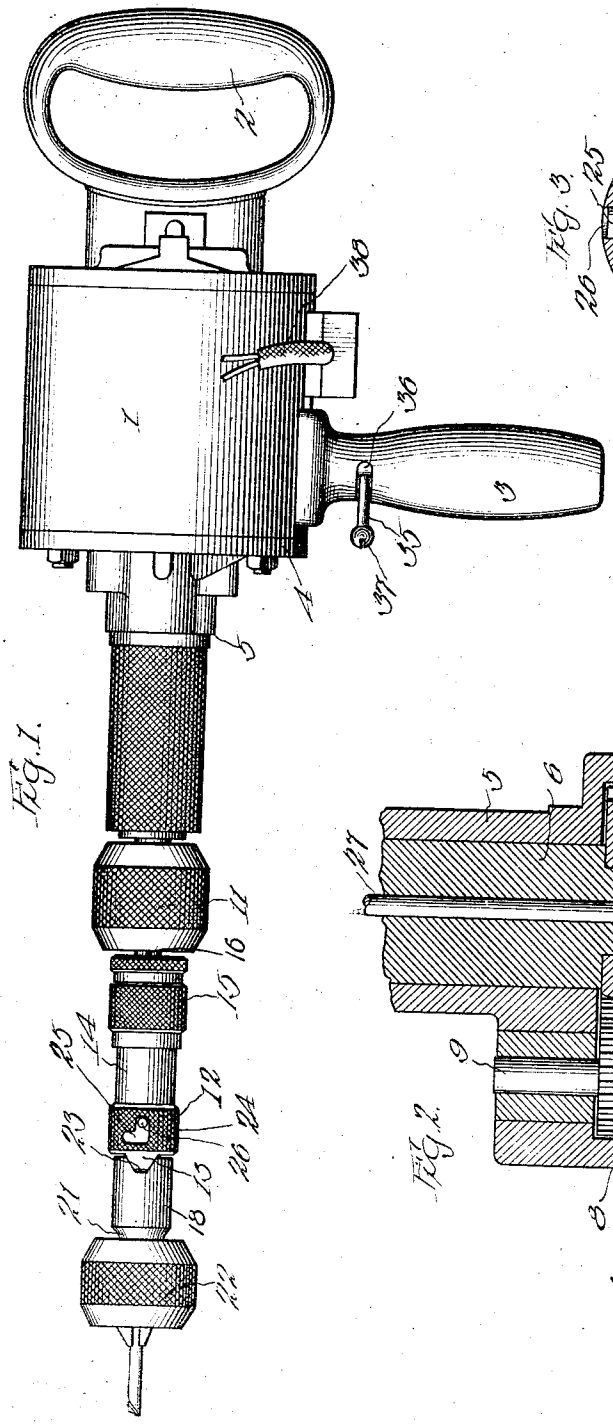


Fig. 1.

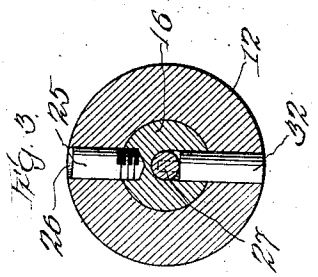


Fig. 3.

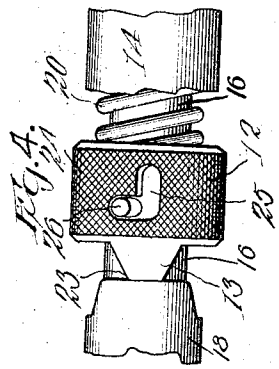


Fig. 4.

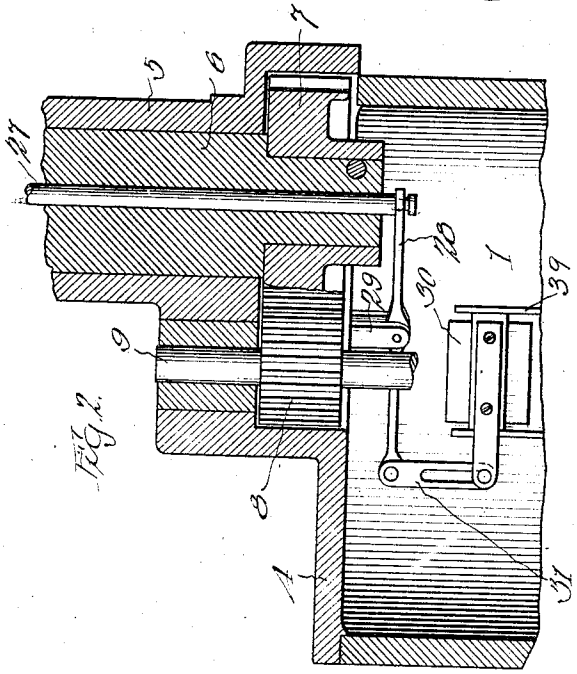


Fig. 2.

Witnesses:
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2 SHEETS—SHEET 2.

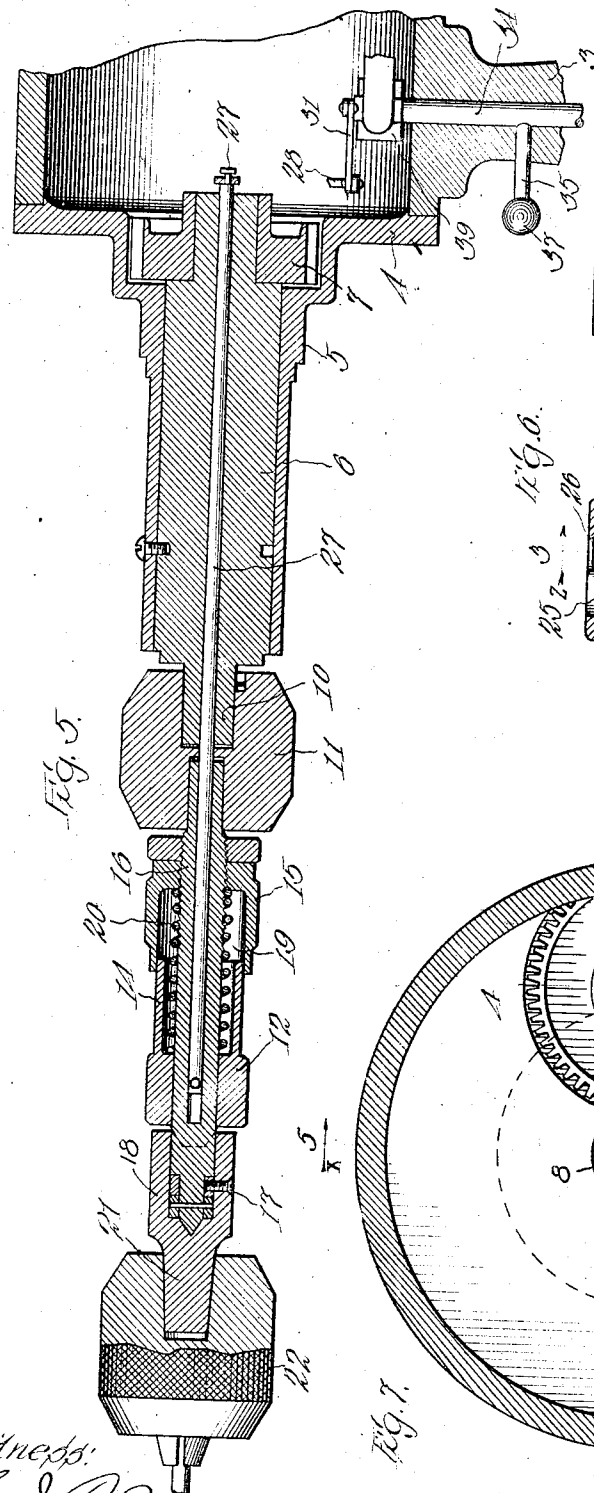


Fig. 5.

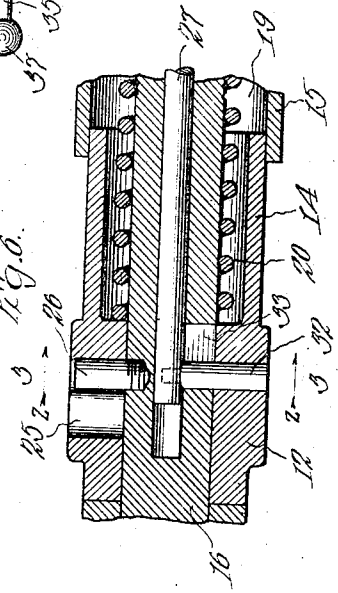


Fig. 6.

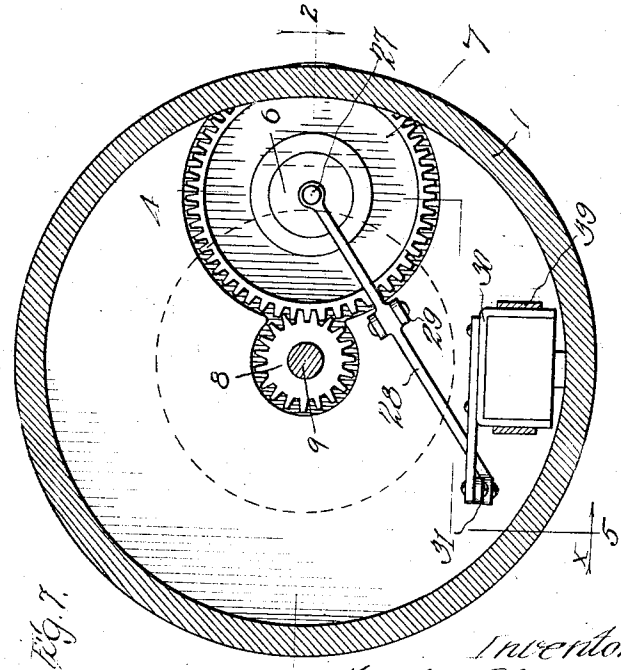


Fig. 7.

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UNITED STATES PATENT OFFICE.

GUSTAV F. HOCHRIEM AND LUDWIG E. HOCHRIEM, OF CHICAGO, ILLINOIS.

MOTOR-DRILL.

1,214,680. Specification of Letters Patent. Patented Feb. 6, 1917.

Application filed July 26, 1915. Serial No. 42,089.

To all whom it may concern:

Be it known that we, GUSTAV F. HOCHRIEM, a citizen of the United States, and LUDWIG E. HOCHRIEM, a subject of the Emperor of Germany, residing at 4426 Sheridan road, in the city of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Motor-Drills, of which the following is a specification.

Our invention relates to improvements in motor drills and more particularly to safety devices therefor.

The objects of our invention are to so arrange a safety mechanism that in the event of an abnormal strain being placed upon the drill or the drill becoming stuck or otherwise stopped, the motor shall be automatically disengaged therefrom thereby obviating any possibility of the fuse blowing out, to employ means in connection with the motor disengaging device for breaking the electric circuit and thereby automatically stopping the motor and to provide separate manually controlled means for starting or stopping the motor. These and other objects we accomplish as hereinafter described in the following specification and as particularly pointed out in the appended claims, reference being had to the accompanying drawings in which an embodiment of our invention is shown.

In the drawings: Figure 1, represents a side elevation of our improved motor drill. Fig. 2 is an enlarged fragmentary central vertical section to illustrate the circuit breaking mechanism, taken on line 2—2 Fig. 7, and looking in the direction of the arrows X—X in said Fig. 7. Fig. 3, is a transverse section taken on line 3—3 Fig. 6 and looking in the direction of the arrows *z*—*z* in said Fig. 6. Fig. 4, is a fragmentary view to illustrate the clutch members in their disengaged position. Fig. 5, is an enlarged fragmentary longitudinal section taken through the drill on line 5—5 Fig. 7, and looking in the direction of the arrows W—W Fig. 6. Fig. 6, is an enlarged central longitudinal section through a fragment of the intermediate portion of the drill stem. Fig. 7, is an enlarged transverse section through the upper inclosing casing of the drill to show the interior construction thereof in top plan.

In referring to the adaptation or embodiment of our improvement shown in the accompanying drawings in detail, like numerals designate corresponding parts.

We have illustrated our improvement as attached to a motor drill of the electric type in the accompanying drawings, but desire to state that it may be fitted to other styles of drills and as will be hereinafter described is adapted to be employed in connection with various other tools and machines.

As shown the electric motor which may be of any of the well known forms is arranged within a housing 1, from the top of which a slotted handle 2, extends that is adapted to be grasped by one hand of the operator. A lateral handle 3, also extends from the side of the housing which can be held in the other hand of the operator. An end plate 4, is bolted or otherwise secured to the lower portion of the housing from which a tubular extension 5, depends. Within the extension 5, is rotatably mounted a shaft 6, which carries a gear wheel 7, at its upper extremity that meshes with a similar gear wheel 8 on the driving shaft 9, of the motor as shown in Fig. 2. The shaft 6 has a reduced lower extremity 10, which fits in the upper portion of a knurled and tubular block 11.

What is perhaps the principal feature of our invention has reference to a safety clutch mechanism which is interposed between the motor and the drill or chuck and is self-releasing to enable the drill to disengage itself automatically, when subjected to a severe or abnormal strain or when stuck, from the rotating power. This prevents breakage of the drill and relieves any undue or heavy torsional strain on the driving shaft and operating mechanism.

The clutch mechanism is interposed between the block 11, and the chuck in which the drill is supported and preferably comprises a lower clutch member, an upper clutch member, and means for maintaining said members in clutching engagement.

The upper clutch member has a body 12, provided with substantially V-shaped clutch

lugs 13, and an upper tubular portion 14, which is arranged to telescope or slide within the recess of a knurled sleeve 15. The upper end of the opening in the sleeve is reduced in size and a shaft extension 16, which has its upper end firmly fitted in the lower portion of the opening in the block 11, passes through said sleeve and the upper clutch member, and is fastened by pins 17, at its lower extremity in a top recess in the lower clutch member 18, as shown in Fig. 5.

The openings or recesses in the upper clutch member and the sleeve 15, together form an interior chamber 19, in which a clutch tensioning spring 20 is arranged. We preferably make the lower end 21 of the lower clutch member tapering so that it can be snugly wedged in a tapering recess in the top of a drill chuck, 22 as shown in both Figs. 1 and 5, and thus secure the clutch member and drill chuck together. The lower clutch member is provided with substantially V-shaped top clutch grooves 23, in which the clutch lugs 13 of the upper clutch member fit and seat when the clutch members are in clutching position.

The outer surface of a portion of the upper clutch member is preferably knurled as shown at 24 in Fig. 1, and is also provided with an angular slot 25, one part of which extends transversely and the other part longitudinally of the shaft extension 16. A pin 26 which extends laterally outward from the shaft extension 16, projects through the angular slot 25, as shown in Figs. 1 and 4. The purpose of the pin and slot is to limit the transverse turning and longitudinal sliding movement of the clutch member on the shaft extension. The clutch is so arranged that when an abnormal strain is put upon the drill which is sufficient to overcome the frictional engagement of the tapering surfaces of the clutch members and the tension of the spring 20, the upper clutch member raises and disengages itself from the lower member thereby permitting the motor to run idle. This operation is automatic and provides a safety means to prevent the drill proper being broken.

In addition to the safety automatically disengaging clutch mechanism heretofore described, we may provide a means for stopping the motor and if the motor be of the electric type of breaking the electric circuit to obviate any possibility of the fuse burning out. The preferable form of the means we employ for this purpose is automatically operated from the upper clutch member and comprises a rod 27, which passes centrally through the shaft 6, the block 11, and into a deep central recess in the shaft extension 16, as shown in Fig. 5; a walking beam lever 28, fulcrumed or pivoted at an intermediate portion to raised lugs 29, on the end plate 4, a slide or movable electric terminal 30 and a link 31, connecting the lever 28 to the slide 30.

The lower extremity of the rod 27 is connected to the upper clutch member by a transverse pin 32, which extends through a vertical slot 33 in the shaft extension as shown clearly in Fig. 6, so that when said upper clutch member is raised, the rod 27, is correspondingly raised which rocks the walking beam lever 28, and by means of the link 31, shifts the terminal slide 30 sufficiently to separate the electric terminals and thus break the electric circuit and stop the motor.

The terminal slide 30 is mounted on the inner end of a rock shaft 34, which is journaled in a recess formed in the handle 3, and a lateral arm 35 extends from said rock shaft 34 through a transverse slot 26, in said handle and has a projecting knob 37 on its projecting end which is adapted to be manually manipulated to open and close the electric circuit and thus start and stop the motor. A suitable electric wire 38 is shown in Fig. 1, which extends from any desirable source of power and is connected to a fixed electric terminal 39 within the housing.

While we have illustrated and described preferred forms of construction for carrying our invention into effect, this is capable of a wide range of variation, alteration, modification and change without departing from the scope of the claims, we therefore do not wish to be limited to the construction herein shown and described, but desire to avail ourselves of all such variations, alterations, modifications and changes as fairly fall within the scope of the appended claims or may be construed to be within the scope thereof by involving the doctrine of equivalents.

What we claim as our invention and desire to secure by Letters Patent is:—

1. In a machine of the class described, the combination with an electric-motor and a tool, of a clutch interposed between the motor and tool and connecting means whereby the disengagement of the clutch will automatically stop the motor, comprising a connecting rod, a lever pivoted to the connecting rod, and a movable terminal in the motor circuit linked to the lever.

2. In a machine of the class described, the combination with a motor and a tool, of a clutch interposed between the motor and tool and having a movable member adapted to disengage itself upon the application of abnormal strain upon the tool, a sleeve in which said movable clutch member slides said sleeve and clutch member having recesses which together form a chamber, and a clutch tensioning spring in said chamber.

3. In a machine of the class described, the

combination with an electric-motor and a tool, of a clutch interposed between the motor and tool and having a movable member adapted to disengage itself upon the application of abnormal strain upon the tool, and a motor circuit breaking mechanism including a switch, a lever controlling said switch and a rod connected to the lever and having a lateral pin projecting into connection with the clutch member.

In testimony whereof we affixed our signatures.

GUSTAV F. HOCHRIEM.
LUDWIG E. HOCHRIEM.