No. 766,810. PATENTED AUG. 9, 1904.

J. CHAMBERS & C. L. COLE.

ELECTRIC HAMMER.

APPLICATION FILED APR. 25, 1904.

NO MODEL.

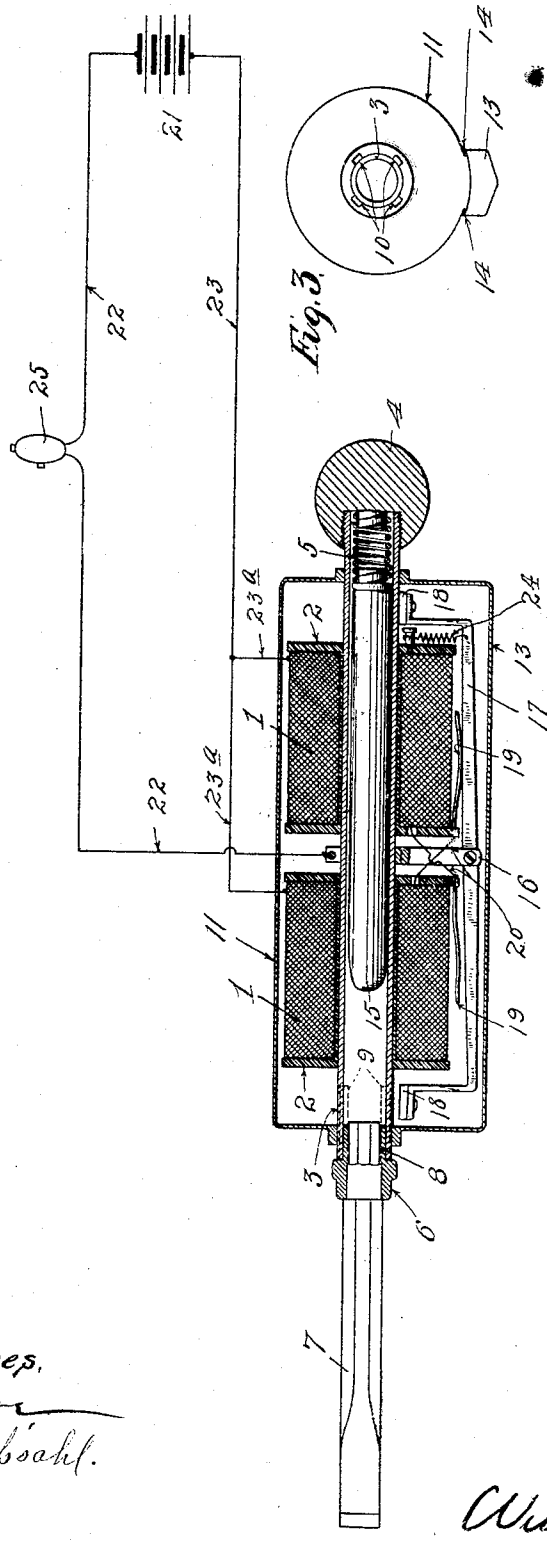


Fig. 1.

Fig. 3.

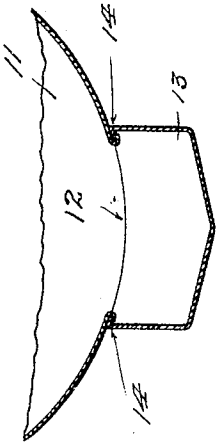


Fig. 5.

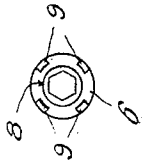


Fig. 4.

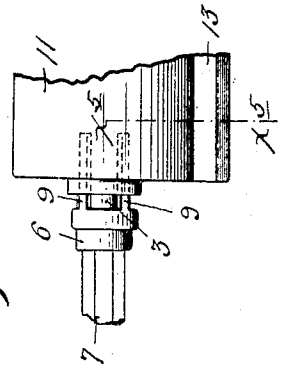


Fig. 2.

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No. 766,810. Patented August 9, 1904.

UNITED STATES PATENT OFFICE.

JOSEPH CHAMBERS AND CORYDON L. COLE, OF MINNEAPOLIS, MINNESOTA; SAID COLE ASSIGNOR TO GEORGE J. BACKUS, OF MINNEAPOLIS, MINNESOTA.

ELECTRIC HAMMER.

SPECIFICATION forming part of Letters Patent No. 766,810, dated August 9, 1904.

Application filed April 25, 1904. Serial No. 204,893. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH CHAMBERS and CORYDON L. COLE, citizens of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Electric Hammers; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to an electric appliance for imparting reciprocating movements to a plunger or other form of hammer, and has for its especial object to provide a portable electric hammer of improved construction.

To the above ends the invention consists of the novel devices and combinations of devices hereinafter described, and defined in the claims.

The improved hammer is illustrated in the accompanying drawings, wherein like characters indicate like parts throughout the several views.

Figure 1 is a sectional view of the improved hammer, showing diagrammatically the circuit connections thereto. Fig. 2 is a view in side elevation, showing a portion of the hammer and a portion of the tool which is operated thereby. Fig. 3 is a front elevation of said hammer. Fig. 4 is a detail in end elevation, showing the so-called "tool-socket;" and Fig. 5 is a transverse section through a portion of the hammer-inclosing case, sectioned on the line x^5 x^5 of Fig. 2.

In carrying out our invention we employ a pair of solenoids or electromagnetic coils 1, which are preferably contained on insulating-spools 2, which spools are axially alined and rigidly secured on a bearing-sleeve 3, advisably of brass. A knob or handpiece 4, which may be of any suitable form, but is shown in the form of a ball, is screwed onto the rear end of the sleeve 3, and a buffer or cushioning spring 5 is placed within the said sleeve, with its base of reaction against the said handpiece 4.

A tool-receiving socket 6 is mounted for limited axial movements in the front end of the sleeve 3 and is provided with a seat which is adapted to receive the shank of a chisel 7 or tool of other form. Said socket is provided with a reduced sleeve portion 8, which telescopes into said sleeve 3, and it is, as shown, also provided with a plurality of parallel circumferentially-disposed guide-fingers 9, that surround the end of the sleeve 3 and work loosely through notches 10, formed in the forward end hub of a metallic case or shell 11, which case is rigidly secured to said sleeve 3 and incloses the solenoids or magnets 1. At its lower portion the case 11 is open, as shown at 12, and is provided with a detachable supplemental section 13, which, as shown, is held thereto by tongue-and-groove joints 14.

Working loosely within the sleeve 3 is a reciprocating plunger 15, preferably of steel, which operates as a hammer when reciprocated by the solenoids, as hereinafter described.

Rigidly secured to the sleeve 3, between the solenoids, is a fulcrum-bracket 16, to which is pivoted the intermediate portion of a switch-lever 17. This switch-lever 17 is preferably constructed of brass or other non-magnetic metal, which is an electric conductor, and at its free ends is provided with iron or steel armatures 18, which lie close to the end of the sleeve 3, but engage said sleeve one at a time. It is not necessary that said armatures 18 engage the said sleeve, but the said sleeve serves as a convenient stop for limiting the movements of the switch-lever 17. The said armatures 18 should, however, be brought as closely as possible to the plunger 15, for a reason which will presently appear.

For coöperation with the portions of the switch-lever 17 a pair of spring-contacts 19 are provided, the same being conveniently supported at one end, one from each of the solenoid-spools 2. One or the other of these contacts 19, but only one at a time, will engage with the switch-lever 17. Said contacts 19 are connected by short wires 20 to the solenoids 1, that lie on the opposite sides of the

fulcrum of the said switch-lever 17. Otherwise stated, the right-hand contact 19 is connected to one terminal of the left-hand solenoid 1, while the left-hand contact 19 is connected to one terminal of the right-hand solenoid 1.

The numeral 21 indicates a source of electrical energy, having leads 22 and 23. The lead 22 is electrically connected to the metallic fulcrum-bracket 16, while the lead 23 is connected by branch leads 23ª to the terminals of both of the solenoids 1.

To insure the engagement of one of the contacts 19 with the switch-lever 17 when the actuating-circuit is broken, one end—to wit, as shown, the right-hand end—of said switch-lever is connected by a light spring 24 to the right-hand solenoid-spool 2. The numeral 25 indicates a push-button circuit maker and breaker of usual construction, which, as shown, is interposed in the lead 22.

The hammering-plunger 15 at the forward limit of its reciprocating movement strikes against the shank of the tool 7 and at the other limit of its movement strikes the buffer-spring 5. When the right-hand solenoid 1 is energized and the left-hand solenoid is deenergized, the plunger 5, acting as the needle of the solenoid, will be thrown to the right, with respect to Fig. 1, against the buffer-spring 5 and will be there held as long as the said right-hand solenoid is energized.

When the left-hand solenoid is energized and the right-hand solenoid is deënergized, the said plunger will be drawn toward the left with a sudden impulse and will be caused to deliver a blow to the tool 7.

When the switch-lever 17 is in the position indicated in Fig. 1, it is evident that the circuit is broken through the right-hand solenoid and is closed through the left-hand solenoid, so that the said left-hand solenoid at such time becomes operative to throw the plunger 15 again toward the left and against the shank of the tool. The said plunger being constructed of steel or iron when acted upon by one or the other of the solenoids of course becomes a magnet. When this magnetized plunger is in the position shown in Fig. 1, it is thrown to the right of the left-hand armature 18 and over the right-hand armature 18 of the said switch-lever 17, so that at such time, even if the spring 24 were not provided, the said plunger acting on the said right-hand armature 18 would hold the switch-lever 17 in the position shown in Fig. 1. When, however, the magnetized plunger 15 is thrown toward the left and against the shank of the tool by the left-hand solenoid 1, which is then energized, said plunger passes beyond the right-hand armature 18 and over the left-hand armature 18 of the switch-lever 17 and, acting thereon, moves said lever into a position in which it will be disengaged from the right-hand contact 19 and be brought into a contact with the left-hand contact 19, thereby breaking the circuit through the left-hand solenoid 1 and closing the circuit through the right-hand solenoid. This movement of the said switch-lever reverses the conditions illustrated in the position of said lever shown in Fig. 1, and by energizing the right-hand solenoid while the left-hand solenoid is deënergized causes the plunger 15 to be thrown back toward the right against the buffer-spring 5. It will thus be seen that the two solenoids are by the action of the magnetically-operated switch-lever alternately energized and deënergized in reverse order and as rapidly as the hammering-plunger is caused to reciprocate and that this is accomplished without requiring contact or impact between the said plunger and the said switch-lever. Furthermore, it will be noted that the switch-lever is moved so as to close the circuit through the solenoid, which is to produce the reverse movement of the plunger at a time slightly before the said plunger reaches the extreme limit of its movement. In this way time is saved by causing the solenoid to be completely energized by the time the said plunger has been brought to a stop at the extreme limit of its movement. The energized magnet, therefore, catches the hammering-plunger at the very instant that it has delivered its hammering blow or made its complete working stroke and takes advantage of any recoil or rebound of the plunger, thereby saving both energy and time.

By actual practice the hammer above described has been found efficient for the purposes had in view. It is adapted to be carried in the hands, and the leads or electric circuit connections permit the hammer to be carried to places far remote from the source of electrical energy and may be instantly thrown into or out of action by the manipulation of the push-button 25 or other circuit making and breaking device.

The tool when used as a hammer is, as is evident, adapted for a great many different uses. In general, it is adapted for use wherever a rapidly-reciprocating hammer is required. The said hammer may therefore be used for a great many different purposes—such, for instance, as sounding gongs or electric bells.

The magnetically-actuated circuit-controlling switch in contradistinction to one which is operated by impact from or direct contact with the reciprocating plunger or hammer we consider a broadly new feature in this class of mechanism and desire to claim the same from the broadest possible point of view. It will therefore be understood that the mechanism described is capable of many modifications within the scope of our invention as herein set forth and claimed.

What we claim, and desire to secure by Letters Patent of the United States, is as follows:

1. In a device of the character described, the combination with a pair of solenoids, and circuit connections thereto, of a reciprocating hammer, subject to said solenoids, and a magnetically-actuated switch for cutting said solenoids into and out of circuit, in alternate order, substantially as described.

2. In a device of the character described, the combination with a pair of axially-alined solenoids, and a hammering-plunger working axially therethrough, said plunger being constructed of magnetic metal and subject to said solenoids, and circuit connections to said solenoids, including a switch which is magnetically actuated by said plunger, and operates to cut said solenoids into and out of circuit, in alternate order, substantially as described.

3. In a device of the character described, the combination with a guide-sleeve of non-magnetic material, of a pair of solenoids secured in axial alinement on said sleeve, a magnetic metallic plunger mounted to reciprocate within said sleeve, under the action of said solenoids, and circuit connections to said solenoids, including a magnetic switch subject to the magnetic action of said plunger and arranged to cut said solenoids into and out of circuit, in alternate order, substantially as described.

4. In a device of the character described, the combination with a pair of axially-alined solenoids, and a hammering-plunger arranged to reciprocate axially through said solenoids, circuit connections to said solenoids, including a switch-lever, pivoted at its intermediate portion and having armatures at its ends subject to the magnetic action of said plunger, said switch-lever operating to cut said solenoids into and out of circuit, in alternate order, and a spring normally holding said switch-lever in one extreme position, substantially as described.

5. In a device of the character described, the combination with a non-magnetic sleeve and a pair of solenoids secured thereon, said sleeve having a buffer at one end and a tool-receiving socket at the other end, of a magnetic metallic hammering-plunger mounted to reciprocate in said sleeve, under the action of said solenoids, circuit connections to said solenoids, and a magnetic switch-lever actuated by said hammering-plunger, and operating to cut said solenoids into and out of circuit, in alternate order, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

JOSEPH CHAMBERS.
CORYDON L. COLE.

Witnesses:
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