No. 841,975. PATENTED JAN. 22, 1907.

R. P. IRVING.

ELECTRICALLY OPERATED HAMMER.

APPLICATION FILED MAY 21, 1906.

2 SHEETS—SHEET 1.

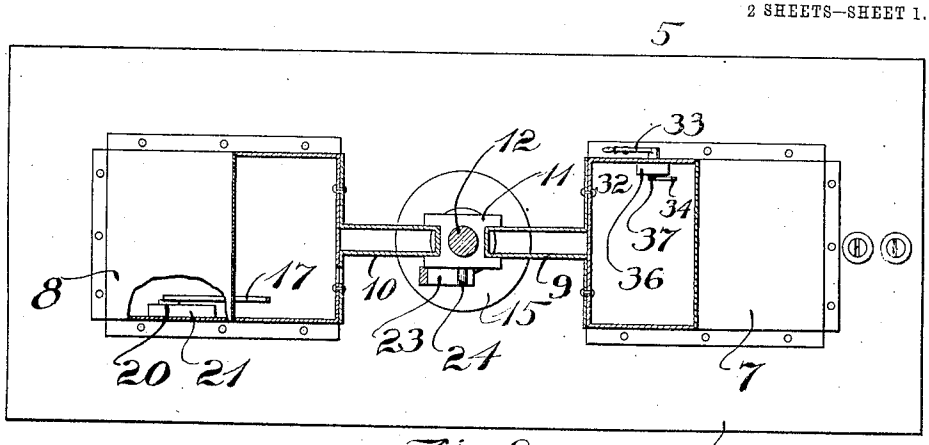


Fig. 2.

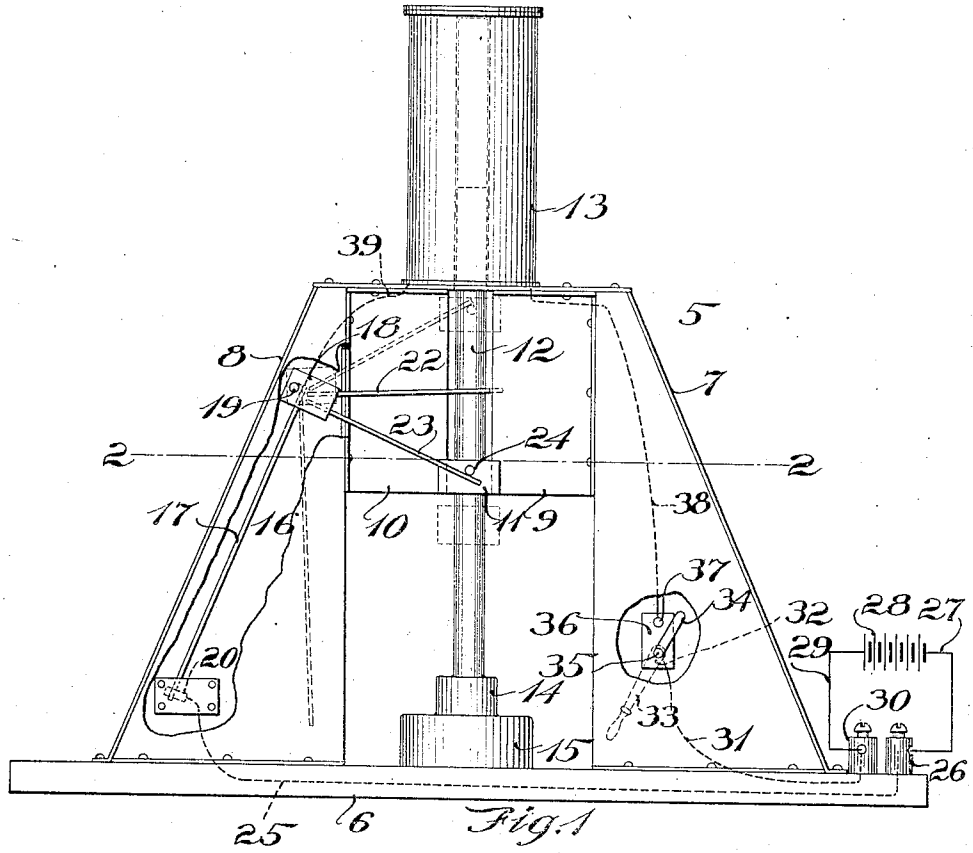


Fig. 1.

Witnesses.
Percy F. Wolfe.
Sydney C. Taft.

Inventor:
Ruvald P. Irving
by his attorneys, Charles S. Goodeve

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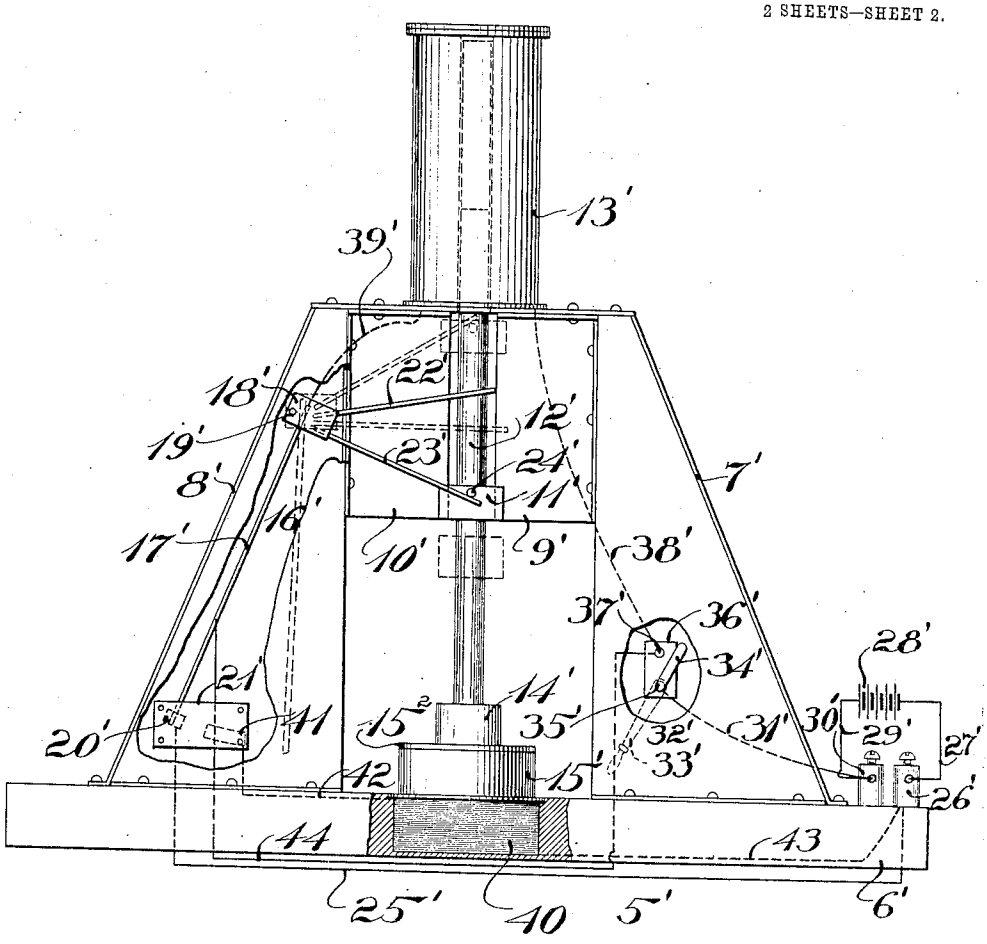


Fig. 3.

Witnesses.
Percy F. Wolfe.
Sydney E. Taft

Inventor:
Ronald P. Irving
by his attorney, Charles S. Goodwin.

UNITED STATES PATENT OFFICE.

RONALD P. IRVING, OF QUINCY, MASSACHUSETTS.

ELECTRICALLY-OPERATED HAMMER.

No. 841,975. Specification of Letters Patent. Patented Jan. 22, 1907.

Application filed May 21, 1906. Serial No. 317,897.

To all whom it may concern:

Be it known that I, RONALD P. IRVING, a citizen of the United States, residing at Quincy, in the county of Norfolk and State of Massachusetts, have invented new and useful Improvements in Electrically-Operated Hammers, of which the following is a specification.

The object of this invention is to provide a hammer operated by one or more electromagnets, the same being particularly adapted for use as a toy.

The invention consists in the combination and arrangement of parts set forth in the following specification and particularly pointed out in the claim thereof.

Referring to the drawings, Figure 1 is a front elevation, partly broken away, of my improved electrically-operated hammer employing one electromagnet. Fig. 2 is a section, partly in plan, taken on line 2 2 of Fig. 1. Fig. 3 is a front elevation, partly broken away and shown in section, of a modified form of my invention employing two electromagnets.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, Figs. 1 and 2, 5 is a frame consisting of a base 6 of insulating material, preferably wood, and side standards 7 8, fastened to said base. The standards 7 and 8 are formed of non-magnetic sheet metal and have fastened thereto guide-blocks 9 and 10, respectively. These guide-blocks are also formed of non-magnetic sheet-metal and have mounted thereon between their adjacent ends a slide-block 11, adapted to slide on the guide blocks or ways 9 and 10. The slide-block 11 is fastened to a core 12, which is slidable within an electromagnet 13 and has integral therewith or fastened thereto, as may be desired, a hammer 14. The hammer 14 when in its lowermost position, as in Fig. 1, strikes against an anvil 15, fast to the base 6.

A switch-lever 16, consisting of a rod 17, fast to a block of insulating material 18, is adapted to rock upon a pivotal pin 19, fast to the side standard 8. The free end of said rod 17 is adapted to slide in contact with a contact-plate 20, fast to an insulating-block 21, which in turn is fastened to the front side of the standard 8. Two arms 22 and 23 are fastened to the insulating-block 18 and extend outwardly therefrom at an angle to each other, their free ends terminating adjacent to the core 12 and slide-block 11. A pin 24 is fastened to the slide-block 11, and when the hammer is down said pin contacts with the upper side of the arm 23. The contact-plate 20 is connected by a wire 25 to a binding-post 26, said binding-post being connected by a wire 27 to a battery or other source of electrical power 28, the other pole of said battery being connected by a wire 29 to a binding-post 30. The binding-post 30 is connected by a wire 31 to a switch-lever 32. Said switch-lever consists of two arms 33 and 34, fast to a shaft 35, mounted in an insulating-block 36, fast to the back side of the side standard 7. A contact-post 37 is fast to the insulating-block 36 and is connected by a wire 38 to the electromagnet 13. The opposite terminal of the electromagnet is connected by a wire 39 to the rod 17.

It is evident that the enlarged portion forming the hammer proper may be dispensed with and the core 12 continued downwardly in contact with the anvil in the position of the parts illustrated in Fig. 1 without departing from the spirit of my invention.

The general operation of the device hereinbefore specifically described is as follows: Assuming the parts to be in the position illustrated in Fig. 1, the switch-lever 32 is rotated, by means of the handle 33, until the arm 34 contacts with the contact-post 37. This completes the electric circuit through the wire 38, magnet 13, wire 39, rod 17, contact-plate 20, wire 25, binding-post 26, wire 27, battery 28, wire 29, contact-post 30, wire 31, shaft 35, arm 34, and contact-post 37, thus energizing the electromagnet 13 and causing the core 12, with its hammer 14, to be drawn upwardly away from the anvil 15. The pin 24, traveling with said core upon the sliding block 11, strikes the under side of the arm 22 and moves the lever 16, together with the arms 22 and 23, to the position illustrated by dotted lines. The rod 17 being thus moved out of contact with the contact-plate 20, electric circuit is broken and the core 12 and hammer 14 are allowed to drop, the pin 24 striking the arm 23, the hammer finally descending until it strikes the anvil 15, and the lever 16 being moved back from the position illustrated in dotted lines to that illustrated in full lines, Fig. 1. The operation hereinbefore described is then repeated, and thus a continuous reciprocatory motion is imparted to the core 12 and hammer 14, producing a constant series of blows of the hammer upon

the anvil 15 until the switch-lever 32 is moved to the position illustrated in Fig. 1 and the circuit permanently broken.

In Fig. 3 a modified form of my invention is illustrated in which two electromagnets are used, the upper one operating substantially as in the form illustrated in Figs. 1 and 2, hereinbefore described, the lower magnet operating to increase the speed of the downward movement of the hammer. In Figs. 1 and 2, as hereinbefore described, the upward movement is imparted to the hammer by the magnet 13, while the downward movement is imparted to said hammer by gravity alone In the form illustrated in Fig. 3 the upward movement is also imparted to the hammer by the upper magnet; but the latter part of the downward movement of the hammer is increased in speed by the lower magnet.

Referring now to Fig. 3, 5′ is a frame consisting of a base 6′ of insulating material, preferably wood, and side standards 7′ and 8′, fastened to said base. The standards 7′ and 8′ are formed of non-magnetic sheet metal, such as brass, and have fastened thereto guide-blocks 9′ and 10′, respectively. These guide-blocks are also formed of non-magnetic metal, preferably brass, and have mounted thereon between their adjacent ends a slide-block 11′, adapted to slide on the guide blocks or ways 9′ 10′. The slide-block 11′ is fastened to a core 12′, which is slidable within an electromagnet 13′ and has integral therewith or fastened thereto, as may be desired, a hammer 14′.

It is evident that the enlarged portion forming the hammer proper may be dispensed with and the core 12′ continued downwardly as far as the lower end of the hammer 14′, Fig. 3, without departing from the spirit of my invention. The hammer 14′ when in its lowermost position, as in Fig. 3, strikes against a non-magnetic plate of sheet metal 15^2, fast to the upper side of an anvil 15′ and forming in function a portion thereof, said anvil being fastened to the upper side of an electromagnet 40, said electromagnet being inserted in a recess provided therefor in the base 6′.

A switch-lever 16′, consisting of a rod 17′, fast to a block of insulating material 18′, is adapted to rock upon a pivotal pin 19′, fast to the side standard 8′. The free end of said rod 17′ is adapted to slide in contact with two contact-plates 20′ and 41, fast to an insulating-block 21′, which in turn is fastened to the front side of the standard 8′. Two arms 22′ and 23′ are fastened to the insulating-block 18′ and extend outwardly therefrom at an angle to each other, their free ends terminating adjacent to the core 12′ and slide-block 11′, and when the hammer 14′ is down said pin contacts with the upper side of the arm 23′. The contact-plate 20′ is connected by a wire 25′ to a binding-post 26′, said binding-post being connected by a wire 27′ to a battery or other source of electrical power 28′, the other pole of said battery being connected by a wire 29′ to a binding-post 30′. The binding-post 30′ is connected by a wire 31′ to a switch-lever 32′.

The switch-lever 32′ consists of two arms 33′ and 34′, fast to a shaft 35, mounted in an insulating-block 36′, fast to the rear side of the side standard 7′. A contact-post 37′ is fast to the insulating-block 36′ and is connected by a wire 38′ to the electromagnet 13′. The opposite terminal of the electromagnet is connected by a wire 39′ to the rod 17′. The contact-plate 41 is connected by a wire 42 to one terminal of the electromagnet 40, the other terminal of said electromagnet being connected by a wire 43 to the binding-post 26′. A wire 44 connects the rod 17′ to the contact-post 37′.

The general operation of the device hereinbefore specifically described is as follows: Assuming the parts to be in the position illustrated in Fig. 3, the switch-lever 32′ is rotated by means of the handle 33′ until the arm 34′ contacts with the contact-post 37′. This completes the electric circuit through the wire 38′, magnet 13′, wire 39′, rod 17′, contact-plate 20′, wire 25′, binding-post 26′, wire 27′, battery 28′, wire 29′, contact-post 30′, wire 31′, shaft 35′, arm 34′, and contact-post 37′, thus energizing the electromagnet 13′ and causing the core 12′, with its hammer 14′, to be drawn upwardly away from the anvil 15′ and plate 15^2. The pin 24′, traveling with said core upon the sliding block 11′, strikes the under side of the arm 22′ and moves the lever 16′, together with the arms 22′ and 23′, to the position illustrated by dotted lines, the rod 17′ being moved quickly across the contact-plate 41 to the position illustrated in dotted lines, the momentum of the hammer upwardly being of sufficient strength to move said lever to the position shown in dotted lines, thus breaking the circuit with the electromagnet 13′. The core 12′ and hammer 14′ then descend by gravity until the pin 24′ strikes the arm 23′, when said arm is moved, together with the lever 16′, until the rod 17′ contacts with the plate 41. This energizes the magnet 40 by completing the electric circuit from the plate 41 to the wire 42, electromagnet 40, wire 43, binding-post 26′, wire 27′, battery 28′, wire 29′, binding-post 30′, wire 31′, shaft 35′, arm 34′, contact-post 37′, wire 44 to the rod 17′, which at this time is in contact with the plate 41. The magnet 40 thus being energized and the hammer 14′ having descended to within the field of said magnet, said hammer is drawn toward the magnet 13′ with much greater speed during the latter part of its downward movement than it would attain by gravity alone. In the last part of its downward movement the pin 24′ being in contact with the arm 23′

moves the lever 16′ to the position illustrated in full lines, Fig. 3, with the rod 17′ in contact with the plate 20′, thus moving said rod 17′ away from the contact-plate 41 and again completing the circuit from the contact-plate 20′ through the connections hereinbefore described with the magnet 13′, whereupon the magnet 13′ being energized the core 12′ and hammer 14′ move upwardly, as hereinbefore described, a reciprocating motion being imparted to the hammer 14′ and core 12′ by the alternate making and breaking of circuit with the magnets 13′ and 40′, respectively.

Having thus described my invention, what I claim, and desire by Letters Patent to secure, is—

In a device of the character described, a frame consisting of a base formed of insulating material, two hollow standards of sheet metal fast thereto, two guide-blocks constituting ways of sheet metal fast to said standards, a slide-block adapted to slide on said ways, a magnet, a core slidable therein constituting a hammer and fast to said slide-block, a lever in electric circuit with said magnet, a contact-plate with which said lever is adapted to contact, two arms fast to said lever and insulated therefrom, and means fast to said core adapted to alternately engage said arms during the upward and downward movement thereof, respectively, whereby said lever is alternately brought out of and into contact with said plate.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

RONALD P. IRVING.

Witnesses:
LOUIS A. JONES,
ANNIE J. DAILEY.