No. 631,769. Patented Aug. 29, 1899.

J. ANDERSON.

ELECTRIC HAMMER.

(Application filed Sept. 19, 1898.)

(No Model.) 2 Sheets—Sheet 1.

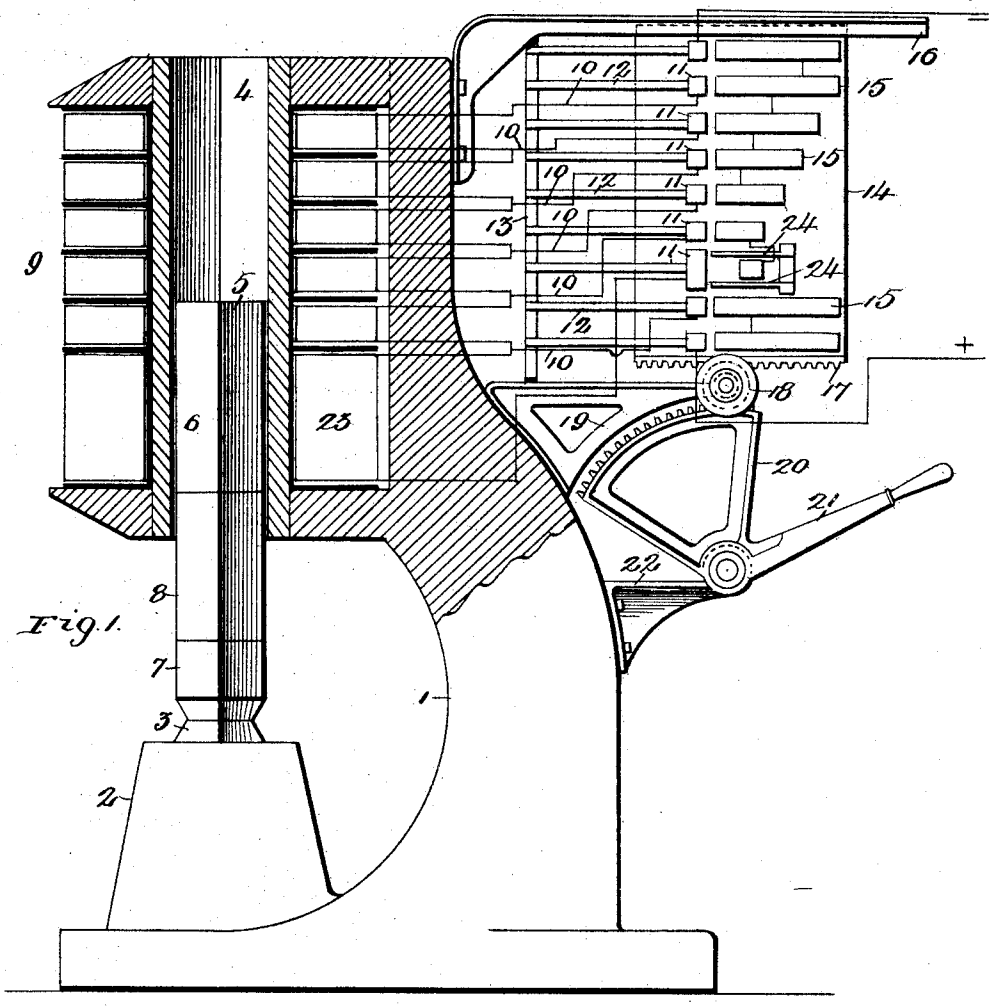


Fig. 1.

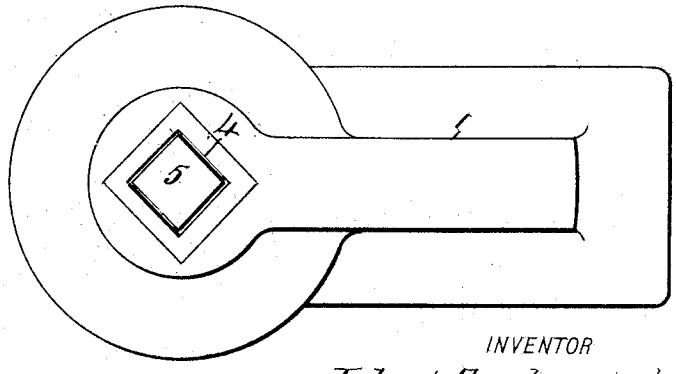


Fig. 2.

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Fig. 3.

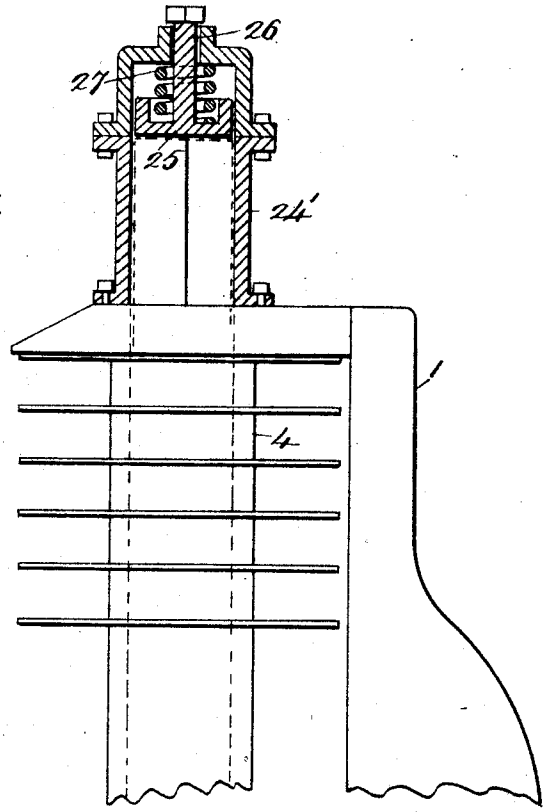


Fig. 4.

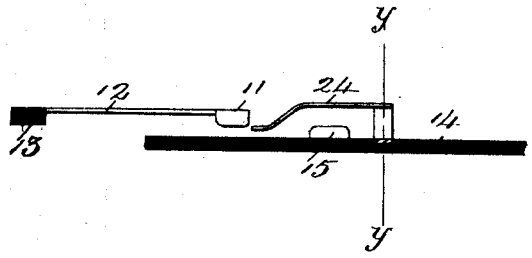
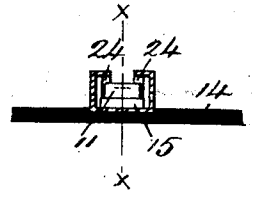


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN ANDERSON, OF ST. LOUIS, MISSOURI, ASSIGNOR OF ONE-HALF TO PATRICK H. CLARKE, OF SAME PLACE.

ELECTRIC HAMMER.

SPECIFICATION forming part of Letters Patent No. 631,769, dated August 29, 1899.

Application filed September 19, 1898. Serial No. 691,379. (No model.)

To all whom it may concern:

Be it known that I, JOHN ANDERSON, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Electric Hammers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to improvements in electric hammers; and it consists in the novel combination and arrangement of parts, as will be hereinafter more particularly described, and pointed out in the claims.

In the drawings, Figure 1 is a combined section and side elevation of my complete invention. Fig. 2 is a top plan view of the same with the switchboard and electrical connections removed. Fig. 3 is a side elevation of the upper end of the framework, showing in vertical section a buffer attachment, against which the upper end of the hammer is adapted to come in contact. Fig. 4 is a section taken on the line $x\ x$ of Fig. 5, and Fig. 5 is a section taken on the line $y\ y$ of Fig. 4.

The object of my invention is to construct an electric forging-hammer in such a manner that the same may be conveniently placed and operated in car and other shops and works where electric current or power is available, thereby dispensing with expensive steam plants usually employed for this purpose; and it consists of a standard, the upper portion of which comprises a hollow-core electromagnet, an armature adapted to be received snugly but loosely by said hollow core and capable of being operated or reciprocated vertically, said armature forming a hammer, the lower end of which is brought in contact with the metal laid upon the lower or fixed die of the bed of the machine, a suitable switchboard or controller for controlling the electrical energy or current through the electromagnet, and other details in the construction of the device to be hereinafter more fully described.

Referring to the drawings, 1 represents a standard having a pedestal 2, the upper surface of which forms a bed for the lower fixed die 3, upon which the metal to be operated upon is laid or placed. The upper portion of the standard 1 comprises an electromagnet and consists of a hollow core of suitable metal, and is preferably rectangular in cross-section, and is adapted to receive snugly but loosely the vertically-reciprocating hammer 5, it being understood that the cross-section of the latter is of the same shape as the core 4, and the parts being so arranged that two of the opposite edges of the hammer will be located on opposite sides of the machine. The upper portion of the hammer or that part which forms the armature is constructed of soft iron 6, and located between the same and the steel die 7, forming the lower end of the said hammer, is suitable insulating or non-conducting material 8.

The electromagnet 9 may be of any suitable design and divided into sections, which receive the coils of insulated wire, the lower section, however, being much larger and adapted to contain more wire than the remaining sections, all of said coils located within the several sections, however, being coupled together either by using a continuous wire or by electrically connecting them by a separate wire, as may be found most desirable. Leading from each coil of the electromagnet is a branch wire 10, the ends of which are in electrical contact or are connected to contacts 11, supported at the ends of spring-arms 12, forming a rigid part of a vertical insulated bar 13, which is properly insulated from the remaining parts of the machine.

The movable switchboard or controller 14 which I employ is provided with metallic contacts 15, the number of which correspond in number to the contacts 11, the length of the former being such as to properly conduct the current of electricity through the several coils comprising the electromagnet and further electrically coupled to accomplish the desired result. The upper edge of the switchboard 14 is guided by a track 16, forming a rigid part of the standard, and its lower edge being guided and held by providing the same with a rack-bar 17, which coöperates with a pinion 18, journaled in a bracket 19, secured to the said standard.

In order to operate the controller 14 or cause the contacts located thereon to coöperate with the contacts 11, a segmental gear 20

is employed which engages with the pinion 18 and is provided with a hand-lever 21 for manipulating the same, the said gear 20 having its bearing in the end of a bracket 22, also attached to the machine.

In order to control the electrical current through the lower or large coil 23 of the electromagnet 9, I employ the mechanism now to be described. Secured to the switchboard 14 are two spring-arms 24, the free ends of which are bent downwardly in order to allow the contact in line with the same (which is wider than the remaining ones) to ride upon said arms and thereby prevent the said contact from coming in contact with the contact 15 located between the said arms as the switchboard is operated in one direction or toward the machine for raising the hammer; but after the contact 11 has passed the spring-arms the same will come in a position to cooperate with the short contact 15 as the said switchboard is operated in the reverse direction.

Forming a continuation of the core 4 of the electromagnet and secured to the top of the standard of the machine is a cylindrical extension 24', within which is located near its upper end a spring-actuated head 25, having a stem 26 passing loosely through an opening formed in the top of said cylinder, and encircling said stem and interposed between the top and the head is a coiled spring 27, whereby should the upper end of the hammer come in contact with said head a yielding buffer is produced and the said hammer always held in its proper position within the hollow core of the electromagnet.

From the foregoing description it will be seen that when the hand-lever 21 is pulled down the switchboard 14 will be moved toward the machine and the contacts 15 of the switchboard will be moved under the contacts 11, making electrical contact, in which instance the lower small coil of the electromagnet will first be energized, causing the hammer or armature to partially rise, and as the said hand-lever is further moved the remaining small coils will be successively and collectively energized, causing the said armature to continue to rise, and as the hand-lever is operated in the reverse direction the lower or large coil of the electromagnet will be energized, causing the hammer to render a sufficient blow.

By referring to the drawings it will be seen that the above operation is effected by the length of the contacts 15 of the switchboard 14, which upon the first movement of the latter toward the machine causes the electrical energy to pass first to the contact 11, to the lower contact 15, then to the upper adjacent contact 15, to its corresponding contact 11, to the branch wire 10, connecting the same, through the lower electromagnet 9 of the smaller ones, and out to the fourth contact 11, from the bottom of the switchboard to the corresponding contact 15 of the switchboard, and out to the remaining contacts 15, to the upper contact 11, and through its wire to the ground. On a further movement of the switchboard the same action or direction of the current takes place, with the exception that the fourth contact 11 from the bottom of the switchboard will be cut out by being moved off of its corresponding contact 15, in which instance the current of electricity will be compelled to pass through the fifth contact from the bottom of the switchboard to its corresponding contact 15 and out through the remaining contacts 15 to the ground, as before, in which instance the two lower electromagnets will be energized, and as the switchboard is further moved in the same direction the same action takes place on account of the length of the contacts 15, which in every operation one of the contacts 11 or an additional one will be cut out and the current of electricity thereby compelled to pass through an additional small electromagnet. Should the switchboard be moved to its full extent in the direction previously stated, it will be readily seen that all of the small electromagnets or coils will be entirely cut out, and on the reverse movement of the said switchboard the current of electricity will pass to the lower contact 11, its corresponding contact 15 of the switchboard to the adjacent contact 15, to its corresponding contact 11, through its branch wire 10, through the lower large coil of the electromagnet, to the third contact 11 from the bottom of the switchboard, which had previously been cut out, to its corresponding contact 15 of the switchboard to the ground in the manner before stated, in which instance the smaller coil will not be energized, all of which will cause the armature which forms the hammer to operate, as previously stated.

Of course it will be understood that the strength of the blow of the hammer depends upon the distance the hand-lever is operated, and should it be desired to only strike a light blow the hammer or armature is only partially raised and allowed to drop by its gravitation only, in which instance the lower or large coil would not be energized.

In carrying out my invention, any practical form of wiring may be employed without departing from the nature of the same, and, furthermore, any well-known construction of controller may be used, all of which may be varied and changed by any one skilled in the art to which the invention appertains.

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

1. An electric hammer, comprising a suitable standard, a hollow-core electromagnet, supported by the same, a series of coils comprising said electromagnet, a vertical reciprocating hammer movably located within said core, and forming an armature, and a suitable switchboard, and wires leading from the same to the said coils for controlling the electrical current through the electromagnet,

whereby upon the movement of the switch-board, the upper coils are successively and collectively energized, until the said armature is completely raised, and afterward, the lower coil is energized, causing the hammer to be drawn downwardly and render a sufficient blow, as and for the purpose described.

2. In an electric hammer a suitable controller, a contact-plate carried by the same, spring-arms also secured to the same and out of contact with said contact, the free ends of said arms being bent downwardly, and a second contact adapted to ride over said arms and first-named contact when the controller is operated in one direction and engage with the same when the controller is moved in the opposite direction, as and for the purpose described.

3. An electric hammer, comprising a standard, a hollow-core electromagnet forming the upper portion of the same, a vertical reciprocating hammer located within said core and forming an armature, a buffer secured to the top of the standard against which the upper end of the hammer is adapted to come in contact, a suitable switchboard for controlling the electrical current through the electromagnet, a track for guiding and receiving the upper edge of the board, a rack-bar forming the lower edge of said board, a pinion journaled to the standard with which the rack-bar coöperates, a segmental gear also coöperating with said pinion, a bracket to which the said segmental gear is journaled, and a hand-lever forming a part of the last-named gear, as and for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN ANDERSON.

Witnesses:
C. F. KELLER,
ALFRED A. MATHEY.