W. SCRIBNER.

ELECTRIC POWER HAMMER.

APPLICATION FILED JAN. 22, 1908.

924,195. Patented June 8, 1909.

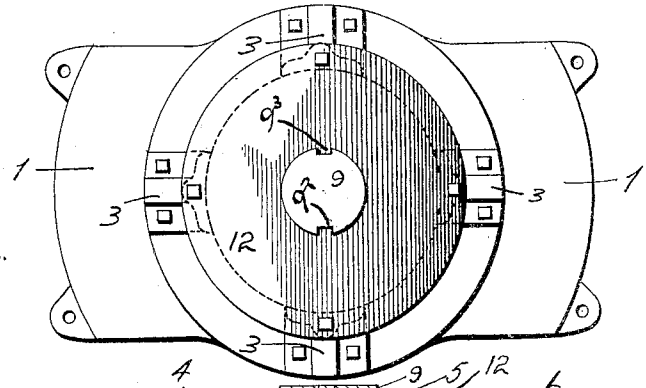

Fig. 2.

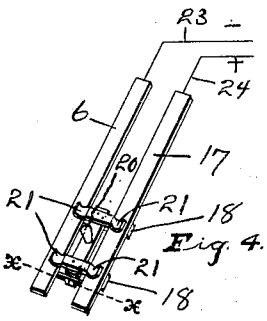

Fig. 4.

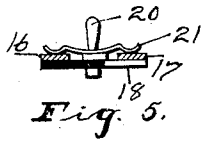

Fig. 5.

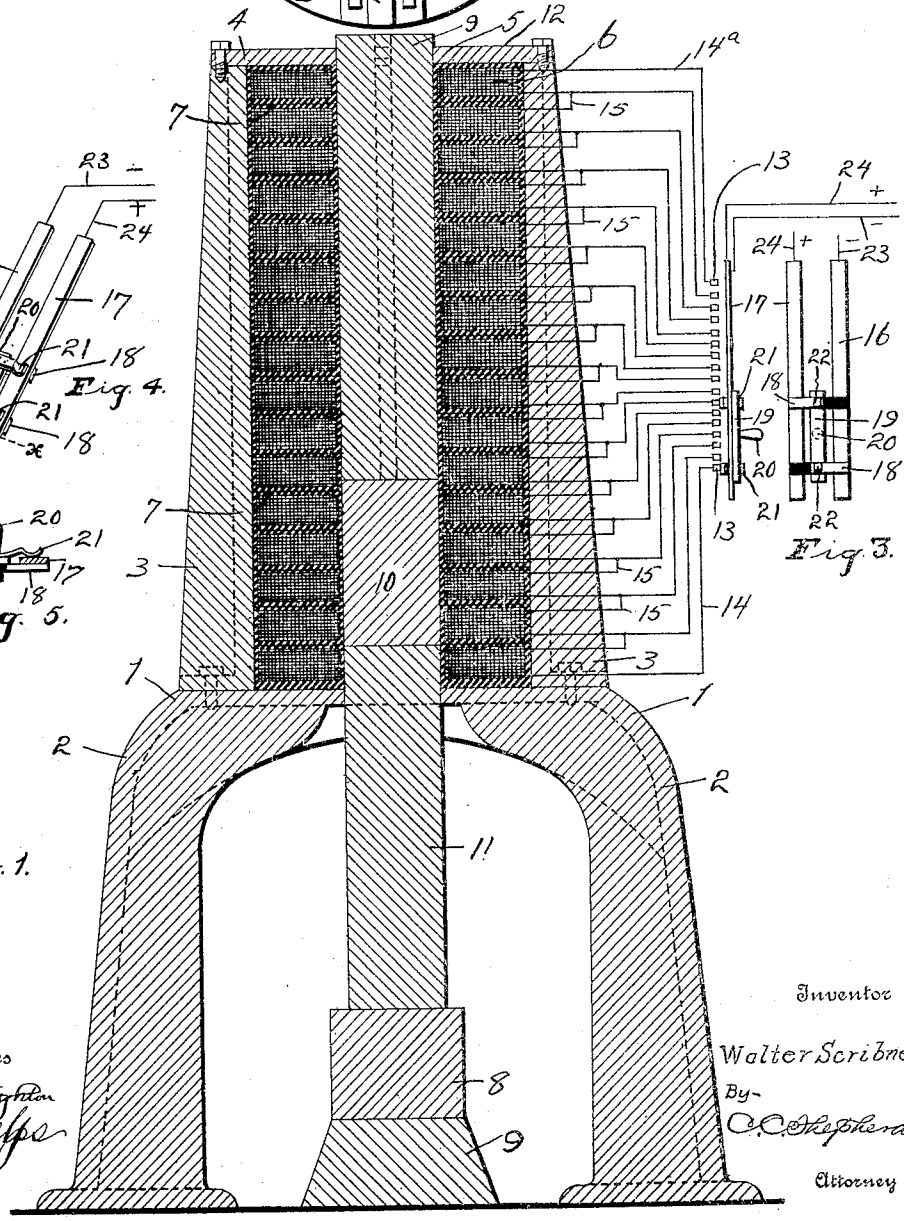

Fig. 1.

Fig. 3.

Witnesses

Carl Stoughton

A. L. Phelps

Inventor

Walter Scribner

By C. C. Shepherd.

Attorney

UNITED STATES PATENT OFFICE.

WALTER SCRIBNER, OF COLUMBUS, OHIO.

ELECTRIC-POWER HAMMER.

No. 924,195. Specification of Letters Patent. Patented June 8, 1909.

Application filed January 22, 1908. Serial No. 412,137.

To all whom it may concern:

Be it known that I, WALTER SCRIBNER, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Electric-Power Hammers, of which the following is a specification.

My invention relates to the improvement of electric power hammers and the objects of my invention are to provide an electrically operated and controlled hammer of this class which is adapted to perform the offices of the usual steam power hammer; to so construct and operate my improved power hammer as to reduce the expense incident to the construction and operation of a steam power hammer; to provide a hammer of this class having desirable flexibility of movement and the striking force of which can be absolutely controlled at the will of the operator; to otherwise produce a strong, durable and economical power hammer, and to provide other improvements in details of construction and operation which will be more fully pointed out hereinafter. These objects I accomplish in the manner illustrated in the accompanying drawing, in which:

Figure 1 is a central vertical section of my improved hammer showing in conjunction therewith a diagrammatical view of the hammer controlling means, Fig. 2 is a plan view, Fig. 3 is an inner face view of a simple form of the circuit controlling device which is shown in side elevation in Fig. 1, Fig. 4 is a detail view in perspective of the circuit controlling device, and, Fig. 5 is a transverse section on line x—x of Fig. 4.

Similar numerals refer to similar parts throughout the several views.

My invention comprises a suitable supporting base 1 from which depend supporting legs 2. Bolted or otherwise secured to the base are upwardly extending vertical standards 3 the latter being arranged at equidistant points in the path of a circle. Upon the supporting base and within the standards 3 is supported a solenoid electric magnet, which comprises the desired number of magnet coils which are indicated at 6 and which are arranged one upon the other, these coils being separated as shown in the drawing at 7 by suitable insulating material. Adapted to be reciprocated within said magnet, is the stem of a hammer 8 which is limited in its downward movement by contact with a fixed die block 9. This hammer stem comprises three sections which are shown respectively at 9′, 10 and 11. The intermediate or comparatively short section 10 which is united with the upper section 9′ and lower section 11, is composed of magnetic metal, while the upper and lower sections are composed of non-magnetic metal. Section 9′ has keyways 9^2 grooved out on opposite sides into which keys 9^3 extend to prevent the hammer stem from turning.

12 represents a horizontal top plate having a central opening through which the upper core section 9′ reciprocates thereby forming a guide, said plate being united in its outer portions to the upper ends of the standards 3, thereby rigidly fastening the top ends of said standards.

The central opening of the base 1 forms a guide for the lower core section 11.

Suitably supported and arranged in proper alinement are a plurality of electric contact segments 13. These contact segments are respectively connected to the magnet coils 6 in series in such maner that if the two extreme segments thereof were connected with the magnet coils at the extreme upper and lower ends of the solenoid, the current would pass through each of the magnet sections 6 one after the other in series, thereby converting said sections into one large magnet. However, as will be understood from the operation hereinafter described, my invention contemplates the magnetizing of only a certain number of said magnet coils at one time. The wires which connect the contact segments 13 with the lower terminal wires of the coils are indicated at 14, all of said contact segments being thus connected with the lower terminals of the coils with the exception of the extreme upper contact segment, the wire 14^a of which is connected with the upper terminal wire of the upper coil.

15 are upper terminals of each of the coils and are connected to the wires 14 which are the lower terminal wires of the next higher coil.

In order to illustrate a means of magnetizing the coils of the solenoid in successive groups, I have shown a simple form of circuit closing and controlling device which

comprises two parallel bars 16 and 17 against the inner surfaces of which are suitably held and are adapted to be moved, transverse bars 13 which are connected by a central vertical bar 19 having a suitable handle projection 20 on its outer side. As shown more clearly in Figs. 4 and 5 of the drawing, I provide the outer sides of the bars 16 and 17 with transverse pressure fingers or strips 21 which may be in the nature of spring strips and which are also connected centrally with the connecting bar 19, said spring strips being suitably insulated from the bars 16 and 17 and serving to hold the bars 18 in proper contact with said bars 16 and 17.

As indicated in Fig. 3 of the drawing, that portion of the upper bar 18 which contacts with the bar 16 is of non-conductive material, while that portion of the upper bar 18 which contacts with the bar 17, is of conductive material and that portion of the lower bar 18 which contacts with the bar 16 is of conductive material while that portion of the lower bar 18 which contacts with the bar 17, is of non-conductive material. On the inner end of the conductive portion of each of the bars 18, is a contact projection 22, this upper and lower contact projection being designed, as shown, to contact simultaneously with two of the contact segments 13. As indicated at 23 and 24, the bars 16 and 17 have leading thereto positive and negative wires from a suitable source of electricity.

In the drawing, I have shown the contact projections 22 in contact with the lower contact point 13 and the seventh contact point counting from the lower end of the series. This connection as will readily be understood, will operate to close a circuit through the first six coils counting from the bottom coil upward of the solenoid, thus magnetizing these coils and holding the soft iron core section 10 at the height or substantially the height indicated in the drawing. By moving the bar 19 and its connections upward until the contact projections 22 are in contact with the next higher contact segments 13, it is obvious that the lower coil 6 will have been cut out and become demagnetized while an additional upper coil is magnetized. It will therefore be understood that an upward sliding movement of the bar 19 of the controller, will not only result in retaining a group of six of the coils in a magnetized condition and the remaining coils demagnetized, but as said groups of coils are successively magnetized, the hammer stem and hammer will be elevated accordingly.

Assuming now that the upper group of coils is magnetized and that the hammer stem has been elevated until the soft core 10 is in the upper portion of the solenoid, a full strength effective downward blow of the hammer may be imparted by moving the bar 19 rapidly downward to its lowest position. It is obvious that in this downward movement of the bar, the upper coils will be successively cut out of the group of magnetized coils and the coils below will be successively included in said groups.

It is apparent that the number of coils magnetized at any given time may be determined by moving the bars 18 toward or from each other to thereby include a greater or less number of contacting segments.

While I have shown and described means for magnetizing a group of six of the solenoid coils at one time, it is obvious that the magnetized group may consist of two or more adjacent coils in accordance with the number of contact segments 13 included in the circuit. It will also be understood that although I have shown said contact segments 13 in vertical arrangement, the same might be employed in a circular or semi-circular form in connection with suitable rotary means for producing the necessary contacts therewith.

Attention is called to the fact that the construction which I have shown and described herein, obviates the necessity of employing a central solenoid tube within which the hammer stem may reciprocate, said stem being as described maintained in its proper vertical position by the top plate 12 and base plate 1. By thus dispensing with the use of a central tube of insulating material such as has been employed in solenoid construction, it is obvious that the resistance to the magnetism which such a tube ordinarily offers, is dispensed with, resulting in a more direct action of the magnetic force of the coils on the section 10 of the hammer, thereby greatly increasing the efficiency of the coils as a magnet. It will also be seen that by the employment of the vertical standards 3 hereinbefore described, the necessity of employing a separate external casing for the coils is avoided inasmuch as said supporting standards will serve to retain the coils in their proper relative positions.

From the operation described, it will readily be seen that the force of the blow to be struck by the hammer, may be regulated by the height to which the bar 19 is raised, thus providing for an absolute control of the velocity of the hammer and its force.

While my invention does not contemplate the dropping of the hammer by gravity, it is obvious that a gravity blow of the hammer could be attained by raising the hammer stem to the desired height in the manner heretofore described and then cutting off the supply of current to the bars 23 and 24.

From the construction and operation described, it will be seen that a comparatively simple form of electrically operated hammer is provided which may be produced and

operated at a comparatively low cost and which may be readily and accurately controlled by the operator.

What I claim, is:

An electrically actuated power hammer comprising a plurality of similarly wound solenoid magnet coils arranged one above the other and so connected as to form a divisible solenoid magnet, a hammer stem which forms the core of said magnet, said hammer stem comprising upper and lower non-magnetic portions and an intermediate magnetic portion adapted to reciprocate within said solenoid magnet, a hammer head made of non-magnetic metal and attached to the lower section of said hammer stem, a supporting base forming a hammer stem guide upon which the coils lie, vertical standards attached to said base, said standards extending upwardly along the outer peripheries of the coils to thereby permanently secure said coils in position, a guide plate having a central opening formed therein for the passage of the hammer stem, said plate having integral, inwardly projecting keys formed thereon and said plate being permanently secured to the upper ends of said standards, said plate serving to guide the upper end of the hammer stem and said hammer stem having slots or key ways formed therein into which the keys of the plate extend to thereby prevent the hammer stem from turning with relation to said plate, an anvil arranged beneath the hammer head, a controller, means for supplying a current of electricity to said controller, said controller being so arranged and connected to the magnet coils that when operated there will be a specific number of consecutively energized magnet coils in series circuit, said controller being so arranged as to be shiftable with relation to the magnet coil connections in such a manner that the current of electricity is caused to energize various groups of coils either toward one end or the other of the main magnet and said controller being adjustable in relation to the number of coils included in a group by it, and said controller also being so arranged as to break the circuit of electricity to the coil from which it recedes as it is shifted, substantially as set forth.

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

WALTER SCRIBNER.

Witnesses:

C. C. SHEPHERD,

L. CARL STOUGHTON.