(No Model.) 2 Sheets—Sheet 1.

J. GEARY.

ARMATURE FOR ELECTRO MAGNETS.

No. 401,152. Patented Apr. 9, 1889.

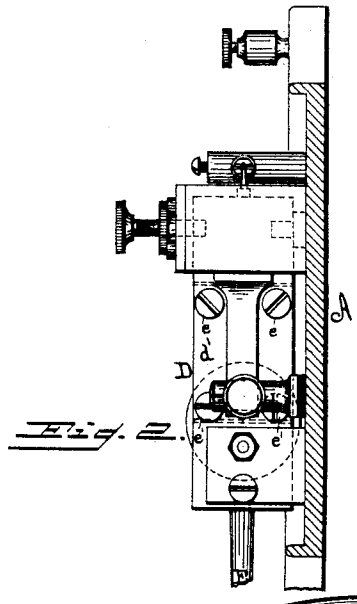


Fig. 2.

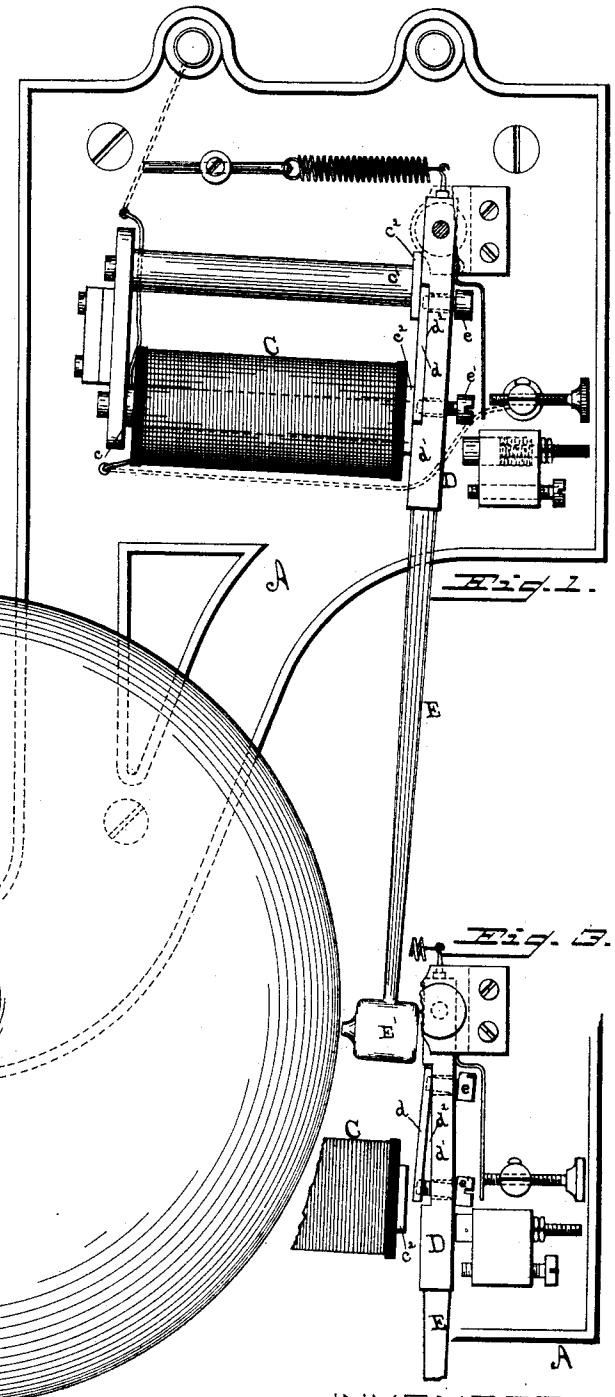


Fig. 1.

Fig. 3.

WITNESSES

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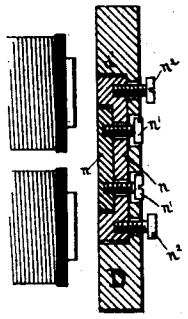


Fig. 4.

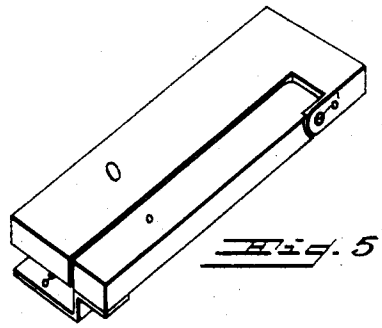


Fig. 5.

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UNITED STATES PATENT OFFICE.

JOHN GEARY, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO J. ELLIOTT SHAW, OF SAME PLACE.

ARMATURE FOR ELECTRO-MAGNETS.

SPECIFICATION forming part of Letters Patent No. 401,152, dated April 9, 1889.

Application filed December 20, 1888. Serial No. 294,204. (No model.)

To all whom it may concern:

Be it known that I, JOHN GEARY, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Armatures for Electro-Magnets; and I do hereby declare that the following is a full, clear, and exact description of the invention, reference being had to the accompanying drawings, wherein—

Figure 1 is a front elevation of my invention in operation with alarm-bell. Fig. 2 is an end elevation of the same, partly broken away. Fig. 3 is a front elevation, partly broken away, of initial position of armature. Figs. 4 and 5 are details of modifications.

My invention has relation to armatures for electro-magnets, and has for its object to provide a construction whereby in cases where the distance between the magnet-poles and armature is great the movement of said armature toward said poles will be more rapid and with considerably greater force with the employment of less magnet-power than has heretofore been required in cases where the armatures and magnets are placed as above suggested—for instance, where it is desired to impart an extended swing to a bell-hammer on said armature and a powerful stroke thereof, or where such armature and magnet are used for the operation of railway-signals. In such cases it has been the custom to employ magnets of increased size; but even with these large magnets the initial movement of the armature, owing to its being in the weakest part of the field of attraction, is sluggish, and gradually increases in force to the end of the stroke, so that the effect is very little better than where magnet and armature are nearer together.

In the drawings, for convenience of illustration, I have shown my invention applied to an alarm-bell capable of employment either as a vibrating or a stroke bell, in either case being equally effective.

While I have shown the armature used in the above connection, it is quite obvious that it can be used to great advantage, in conjunction with electro-magnets, in any other construction where great pulling power is required.

My invention consists in constructing an armature of two sections of the same degree of conductivity—a light one hinged or otherwise secured in the face of a heavier section. The lighter section, being in the field of attraction of a single magnet and more sensitive than the heavier one, is drawn to a point very near to the magnet-poles, where the attraction is sufficiently great to cause the lighter section to draw the heavier section into the field and into contact with said poles with very great force, allowing of the movement of said heavier section to a very much greater extent than with the ordinary solid armature. With such a construction an armature composed of several sections opposite the poles of a single magnet will move a distance equal to the multiplied distance traveled by a corresponding number of separate armatures of the usual form when used in conjunction with separate magnets.

Referring to the accompanying drawings, A represents a base-plate supporting a bell, B, magnet C, and their accessories, all of which, excepting armature D, are of usual construction and need not be herein described.

It will be observed that the core *c* of magnet C is wound with the usual amount of wire for a single helix, while core *c'* is left bare. This is done merely for the sake of convenience, it having been found that the use of a single helix with my improved armature renders said armature more powerful than an armature of ordinary construction influenced by a pair of helices of the same size as that of magnet C, the improved construction operating more effectively with half the amount of magnet-power than the old construction with the usual amount of magnet-power. In actual practice a pair of helices half the size of that of magnet C will be employed, equal in power to a single helix of the ordinary size. Cores *c* and *c'* are provided with plates c^2 on their ends for the purpose of increasing the surface of attraction.

D represents the improved armature, composed of two sections, *d d'*, of Norway iron.

Section d, which is the lighter, is of the same width as the heavier section, d', but is only half as long and considerably thinner and rests loosely in a recess, d^2, in the face of section d' midway of its ends, section d being retained in position by screws e e', of diamagnetic material. Screws e, being shorter than screws e', constitute a hinge, while screws e' serve as stops to limit the swing of section d. In the event of its being desirable to have the lighter section move in an angular direction with relation to armature D, the screws will all be of the same length. It might also be found desirable to secure section d to section d' by means of a flat spring in lieu of screws e. Armature D is pivoted on trunnions in the usual manner; but any other convenient means of support may be employed. Said armature has also the usual arm, E, with hammer E′ thereon.

In Fig. 3 of the drawings I have shown the position assumed by section d when the battery-current which passes over the usual circuit is sent through the magnet. As soon as said section reaches this point where the attraction is very great, the result will be the drawing of the heavier section, d', swiftly and powerfully to the magnet-poles, the lighter section performing the initial movement, which takes the place of the sluggish movement of the ordinary armature when placed at a great distance from the magnet, the effect being a very powerful draft of armature D into the field of attraction at the beginning of the stroke and an increase in power and velocity until the completion of said stroke, one half of the surface of attraction of the poles being opposite to section d and the other half to section d'. This, as hereinbefore suggested, allows of the armature proper being a very much greater distance from the magnet than heretofore, and with a very small amount of magnet-power a more powerful blow can be struck when used in conjunction with a bell and a greater weight drawn or lifted a longer distance when used in other constructions.

In Fig. 5 I have shown a further modification, in which the heavier section, d', has set in its face several sections, n n, one within the face of the other, and forming a "nest" of armature-sections. These sections are held in proper relation with each other by diamagnetic screws n' n^2, as in the first-mentioned and preferred form of armature. The screws, of course, may also be all of the same length or of different lengths, as occasion requires.

In Fig. 6 is shown a still further modification, in which O represents the heavy section, with a portion, o, cut out of its side and hinged thereto at o'. Said portion o is provided with a bent projection, o^2, at its lower end, to permit of the movement of portion o a short distance in advance of section O until projection o^2 meets said section O, the result being the drawing of the heavier section, O, by the lighter portion, o, into the field of attraction.

Having thus fully described my invention, what I claim is—

1. In an armature for electro-magnets, the combination of one or more light sections and a heavy section held in operative relation by a hinge or other device in such manner that portions of each section will be opposite the surface of attraction of the poles of a single magnet, said light sections being influenced before the heavier section, traveling in advance of and drawing the said heavier section into the field of attraction, substantially as shown and described.

2. In an armature for electro-magnets, the combination of one or more light sections and a heavy section, each of said sections being set loosely in the face of its contiguous section, and held in operative relation therewith by screws in such manner that portions of each section will be opposite the surface of attraction of the poles of a single magnet, said light sections being influenced before the heavier section, and traveling in advance of and drawing said section into the field of attraction, substantially as shown and described.

3. An armature for electro-magnets, composed of two or more sections secured together in such manner that portions of each section will be opposite the same poles of an electro-magnet, each section being successively influenced by the magnetic attraction and drawing its attached section into the field of attraction, for the purpose described.

4. In an armature for electro-magnets, the combination of light section d, set loosely in recess d^2 in the face of heavy section d', said light section being first influenced by the magnetic attraction, traveling in advance of the heavier section, and operating to draw said heavier section into the field of attraction of a single magnet, C, through the medium of diamagnetic screws e e', substantially as shown and described.

In testimony that I claim the foregoing I have hereunto set my hand this 15th day of December, A. D. 1888.

JOHN GEARY.

Witnesses:
JOB ALBERT DAVIS,
WM. H. POWELL.