No. 743,603. PATENTED NOV. 10, 1903.

C. S. WHITNEY.

ELECTRICAL VIBRATORY MOTOR.

APPLICATION FILED FEB. 25, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

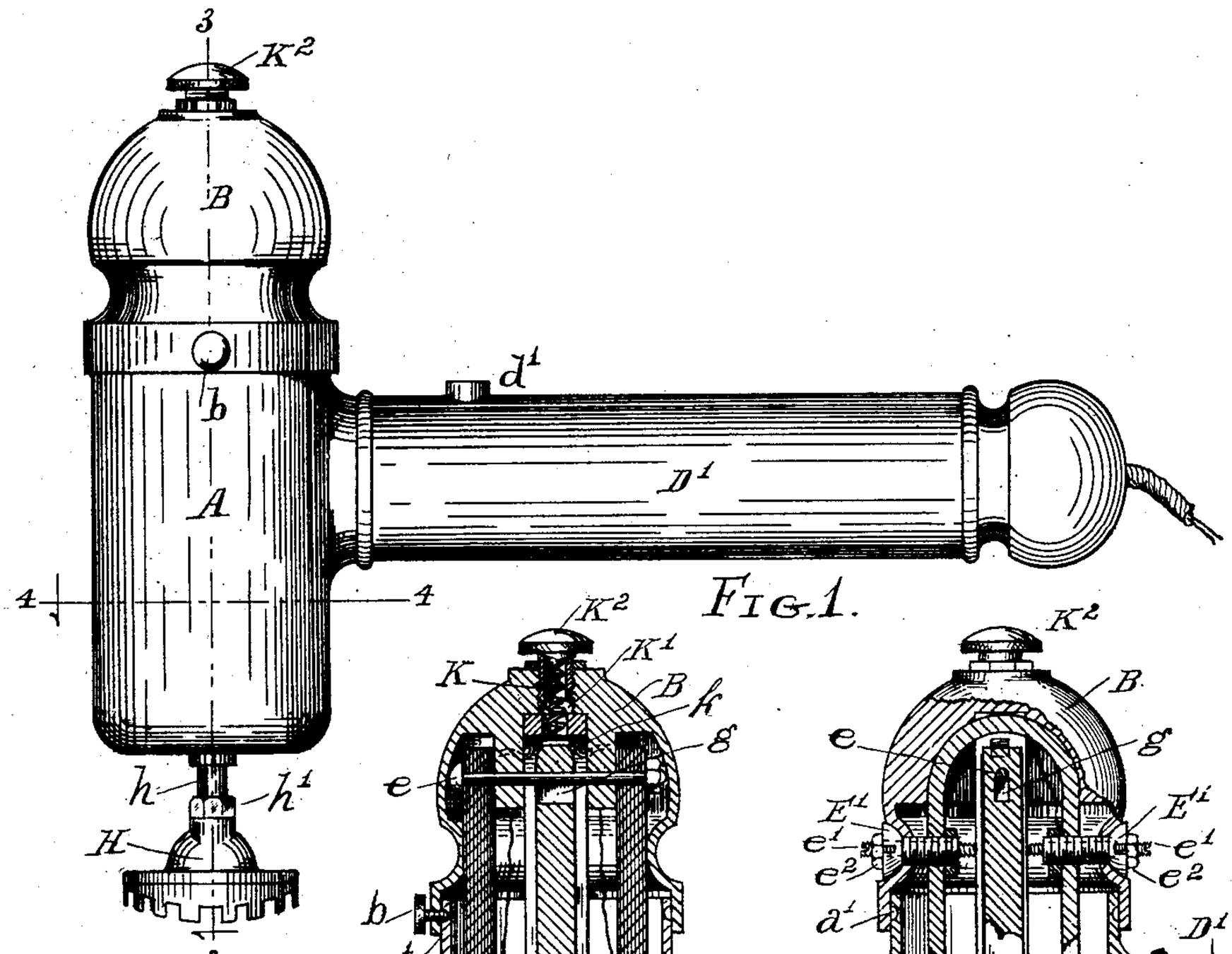

FIG. 1.

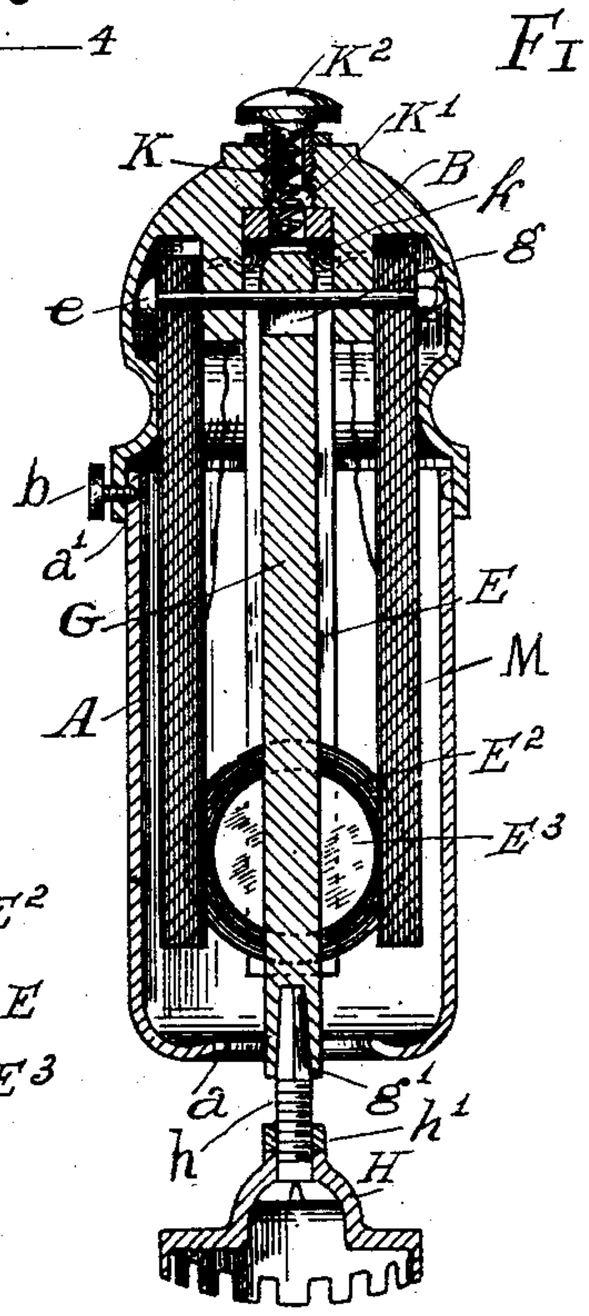

FIG. 3.

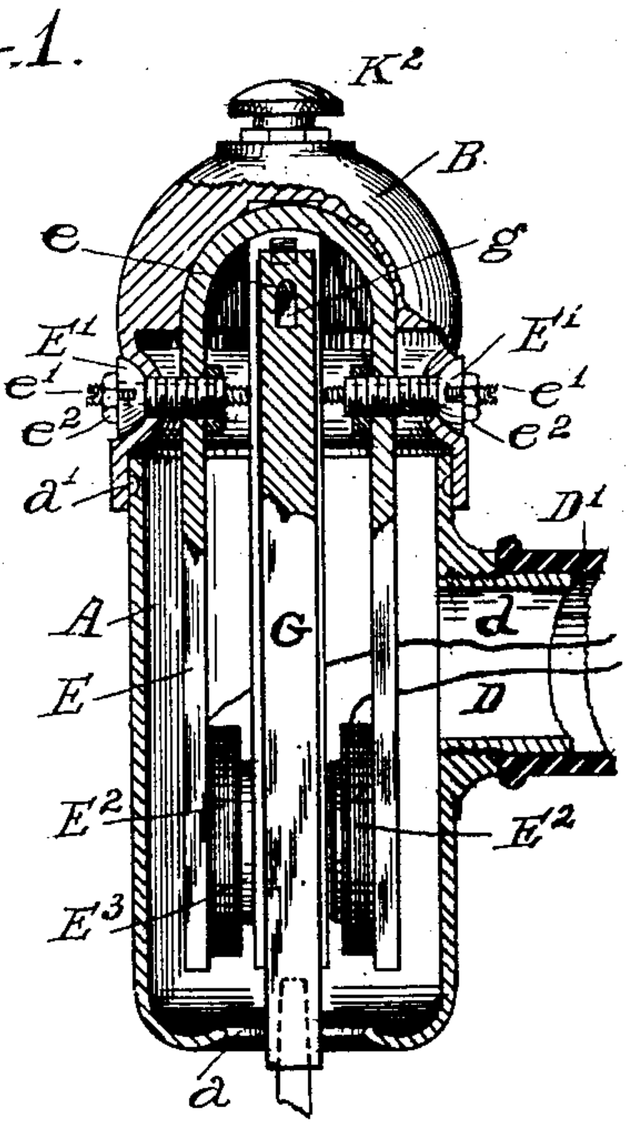

FIG. 2.

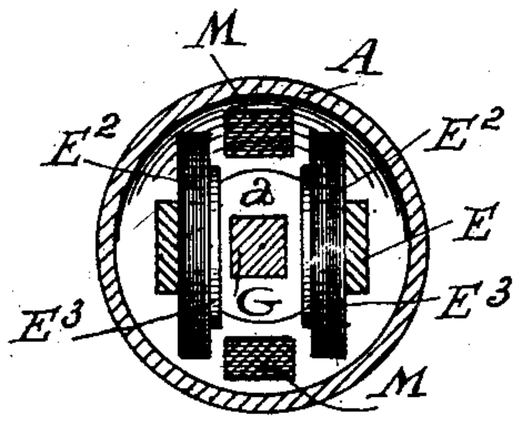

FIG. 4.

Witnesses.
R. L. Dooling,
Margaret McDonald.

Inventor:
CHARLES S. WHITNEY.
By Atty A. DuBois.

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ELECTRICAL VIBRATORY MOTOR.

APPLICATION FILED FEB. 25, 1903.

NO MODEL. 2 SHEETS—SHEET 2.

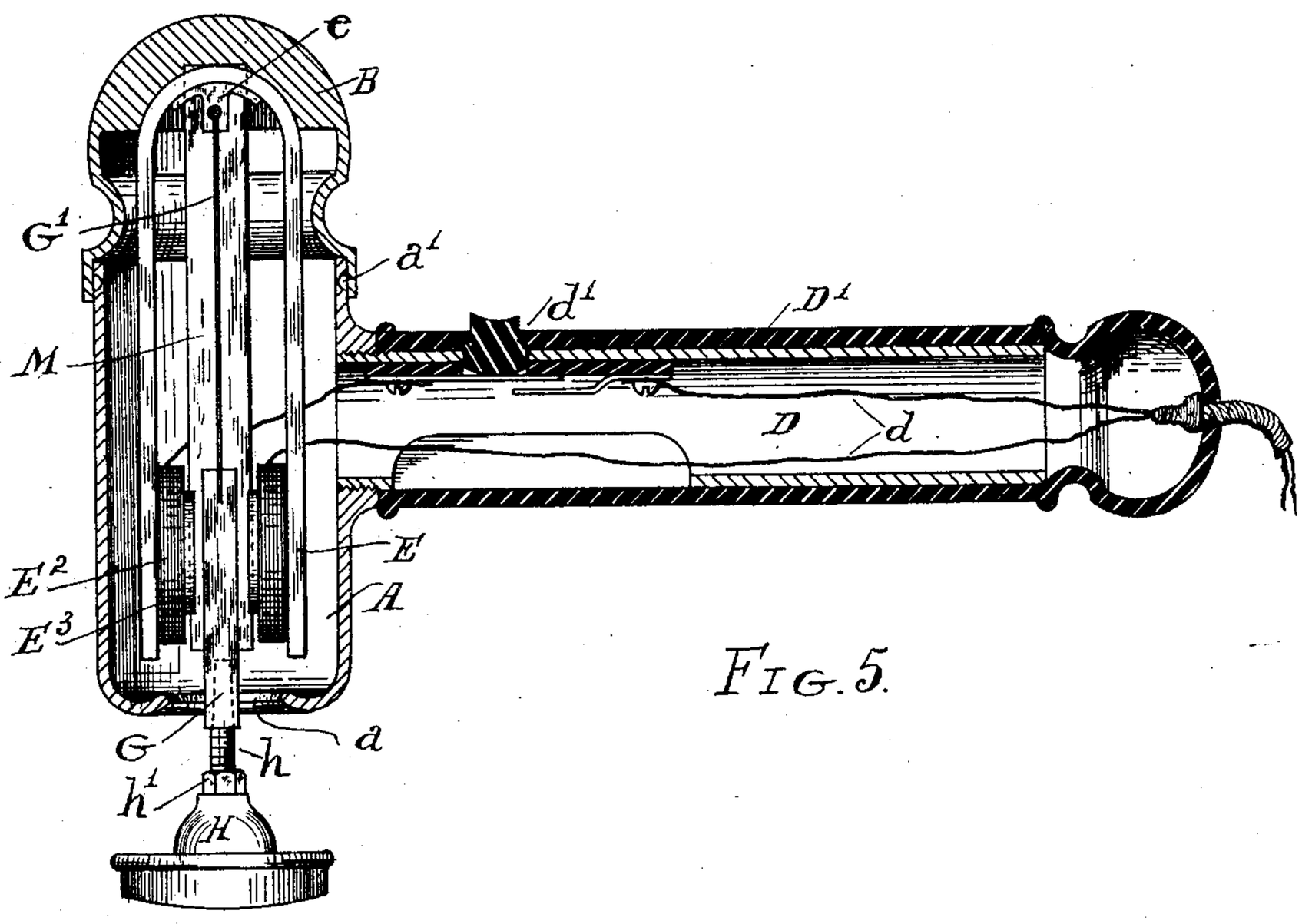

FIG. 5.

Witnesses.
R. H. Dooling.
Margaret McDonald.

Inventor.
CHARLES S. WHITNEY.
By Atty N. DuBois.

No. 743,603. Patented November 10, 1903.

UNITED STATES PATENT OFFICE.

CHARLES S. WHITNEY, OF SPRINGFIELD, ILLINOIS, ASSIGNOR OF ONE-HALF TO FOREST P. LAMOREUX, OF SPRINGFIELD, ILLINOIS.

ELECTRICAL VIBRATORY MOTOR.

SPECIFICATION forming part of Letters Patent No. 743,603, dated November 10, 1903.

Application filed February 25, 1903. Serial No. 145,011. (No model.)

To all whom it may concern:

Be it known that I, CHARLES S. WHITNEY, a citizen of the United States, residing at Springfield, county of Sangamon, and State of Illinois, have invented certain new and useful Improvements in Electrical Vibratory Motors, of which the following is such a full, clear, and exact description as will enable others skilled in the art to which it appertains to make and use my said invention.

My invention relates to vibratory motors for massage apparatus or similar light apparatus.

The purpose of my invention is to provide a vibratory motor operative by alternating electrical currents as distinguished from continuous-current motors in use prior to my invention.

With this end in view my invention consists in the novel features of construction and combinations of parts shown in the annexed drawings, to which reference is hereby made, and hereinafter particularly described, and finally recited in the claims.

For the purpose of clearly illustrating my invention I have in the drawings shown my improved motor as applied to a massage apparatus. Obviously it may be applied to any other apparatus in which a light oscillative motor would be effective.

Referring to the drawings, Figure 1 is a side elevation of the complete apparatus. Fig. 2 is a partial vertical longitudinal section, taken on the axis of the handle of the apparatus. Fig. 3 is a vertical longitudinal section on the line 3 3 of Fig. 1. Fig. 4 is a transverse section on the line 4 4 of Fig. 1, and Fig. 5 is a longitudinal axial section through the handle and the shell and shows in elevation a modified form of the apparatus.

Similar reference-letters designate like parts in all of the views.

The operating parts of the mechanism are contained within a housing A, which may be of any suitable material and of any suitable or convenient form. I prefer, however, to use a brass housing of cylindrical form. At the lower end of the housing is an opening *a*, adapted to permit free oscillation of the armature carrying the rubber. Near the upper end of the housing is a circumferential channel *a'*, receiving screws or equivalent devices by which the hood is connected with the housing. The hood B, of any suitable material, is preferably dome-shaped, as shown, and fits loosely over and turns on the upper end of the housing, vertical displacement of the hood being prevented by a screw or screws *b*, the inner end of which travels in the channel *a'*. Secured to the housing is a handle consisting of an inner metallic tube D and an outer covering D' of insulating material.

The electromagnet-frame E is of steel in the form of an inverted U and is supported centrally within the hood by screws E'. Suitably-wound coils E^2 are mounted on laminated cores E^3 on the frame E, parallel to and facing each other, and are in electrical connection with any suitable source or generator of alternating electric current. An armature G, preferably of soft iron, is supported on the hood B and extends downward and oscillates freely between the electromagnets. In the drawings I have shown two forms of the armature, either of which may be used without departing from my invention. I prefer to use the form shown in Fig. 5—viz., an armature-plate G, of soft iron, secured to the lower end of a spring G', the upper end of the spring being secured to the electromagnet-frame E and the spring being tuned to vibrate in accord with the alternations of the operating-current.

Where alternating current of very low frequency is employed, an armature G, mounted to oscillate on a pivot *e*, as shown in Fig. 3, may be advantageously used. In that form of the armature I provide a slot *g*, near the upper end of the armature, adapted to permit slight vertical movement of the armature on the pivotal bolt *e*, so as to cause shunting of the current when excessive pressure is applied in manipulating the apparatus, as hereinafter explained. At the lower end of the armature is a socket *g'*, adapted to receive the shank *h* of the rubber H. The shank *h* is screw-threaded for a part of its length, and its upper part is squared to fit in the socket *g*. A nut *h'* on the screw secures the rubber on the shank.

Two laminated permanent magnets M are secured to the hood B by a bolt *e* and occupy

a vertical position parallel to each other and diametrically opposite to the electromagnet-frame. The south-seeking ends of both of the permanent magnets are contiguous to the poles of the electromagnets, and the armature when at rest occupies an intermediate vertical position with respect to the electromagnets and the permanent magnets. The effect of this arrangement of the parts is that the permanent magnets induce magnetism in the soft-iron armature, making a north pole of the lower end of the armature, which will be attracted by a south pole of the electromagnet. The electromagnets change polarity when the exciting alternating current passes through zero and reverses, so there will be two reversals of magnetism, producing one forward and one backward movement of the armature for each complete cycle of the alternating current.

It is obvious that a permanently magnetic armature may be used in this apparatus. I prefer, however, to use a polarized soft-iron armature, for the reason that it is not subject to impairment by the impact of its operation.

Adjusting-screws e' work in female screws E′ and extend through the sides of the frame E and may be turned in or out to vary the scope of the oscillation of the armature, as occasion may require. Lock-nuts e^2 on the screws e' prevent accidental displacement of the screws.

Electrical conductors d, within the handle and connected with any suitable source of alternating electric current supply, are in operative relation to a controlling-switch d' of any suitable or convenient construction.

In order to avoid the possibility of injury to the person being operated upon by reason of undue pressure in manipulating the apparatus, I provide means whereby the electric current will be automatically shunted and the action of the rubber instantly stopped whenever undue pressure is applied. This means consists of a cushioning-spring K in a suitable housing K′, centrally situated on top of the hood B. The lower end of the spring K bears against the upper end of the armature G. A cap K^2 screws in the housing K′, and by screwing the cap up or down the tension of the spring may be varied, so as to permit the application of a greater or less degree of pressure in operating the device, as occasion may require. Secured on the upper end of the frame E are insulated contact-springs k in such relation to the upper end of the armature G that when the armature is moved upward it will contact with the springs. The contact-springs k are connected in parallel with the conducting-wires supplying current to the coils of the electromagnets.

In practical use the apparatus is manipulated by means of the handle and is moved with the rubber H in contact with the person of the patient. In cases in which the rubber when set at one angle operates to the discomfort of the patient the hood may be turned, turning the frame and rubber with it until the rubber assumes any desired position. To bring the rubber into action, it is only necessary to press down the switch d', so as to close the electric circuit. The alternating current passing through the coils of the electromagnets will alternately change the polarity of the electromagnets, causing the armature to vibrate in step with the alternations of the exciting current and producing coincident oscillations of the rubber.

I am aware that direct current has hitherto been employed in apparatus of this kind to energize electromagnets, so as to produce make-and-break contact of a spring-actuated armature; but apparatus so constructed is feeble and uncertain in operation.

By employing a motor adapted for use with alternating electric currents I am enabled to oscillate the oscillating armature at a much greater speed and more effectively than is possible in any apparatus depending upon a battery and make-and-break contact for energizing the magnets. In my apparatus the oscillations of the armature coincide with the alternations of the alternating currents operating the apparatus.

The operating parts of the apparatus are all connected with the hood B. By turning the hood the oscillating armature may be caused to operate at any desired angle with respect to the handle. The parts may all be removed from the shell by loosening the screws b and lifting the hood from the shell.

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

1. In a motor, the combination of a hood, a frame within said hood, screws connecting said frame with said hood, adjusting-screws turning in said connecting-screws, lock-nuts on said adjusting-screws and armature oscillating on said frame and electromagnets on said frame and electrically connected with a source of alternating-current supply, as set forth.

2. In a motor, the combination of a housing a frame supported within said housing, electromagnets on said frame, an armature mounted to oscillate between said electromagnets and movable vertically on said frame, contact-springs on said frame, connected in parallel with the wires in connection with said electromagnets, a spring in contact with the upper end of said armature and means for regulating the tension of said spring, as set forth.

3. In a motor, the combination of a cylindrical metallic handle, insulation surrounding said handle, a switch mounted on said handle, conductors in electrical connection with a source of alternating-current supply, a housing secured to said handle, a hood mounted to turn on said housing, a frame mounted in said hood, electromagnets mounted on said frame and in electrical connection with the conductors controlled by said switch,

and an armature oscillative between said electromagnets, as set forth.

4. In a motor, the combination of a main structure, electromagnets supported on said structure, means for supplying alternating electric current to said electromagnets, an armature mounted to oscillate between said electromagnets, and means for polarizing said armature, as set forth.

5. In a motor, the combination of a main structure, electromagnets supported thereon and energized by alternating electric current, a spring tuned to vibrate in accord with the alternations of said current, an armature on said spring and means for polarizing said armature, as set forth.

6. In a motor, the combination of a main structure, permanent magnets supported on the main structure, electromagnets supported on the main structure and energized by alternating electric current, a spring tuned to vibrate in accord with the alternations of the energizing-current and an armature on said spring polarized by said permanent magnets, as set forth.

In witness whereof I have hereunto signed my name, at Springfield, Illinois, this 17th day of February, A. D. 1903.

CHARLES S. WHITNEY.

Witnesses:

CHARLES R. ROSE,

R. J. BECK.