No. 848,518. PATENTED MAR. 26, 1907.

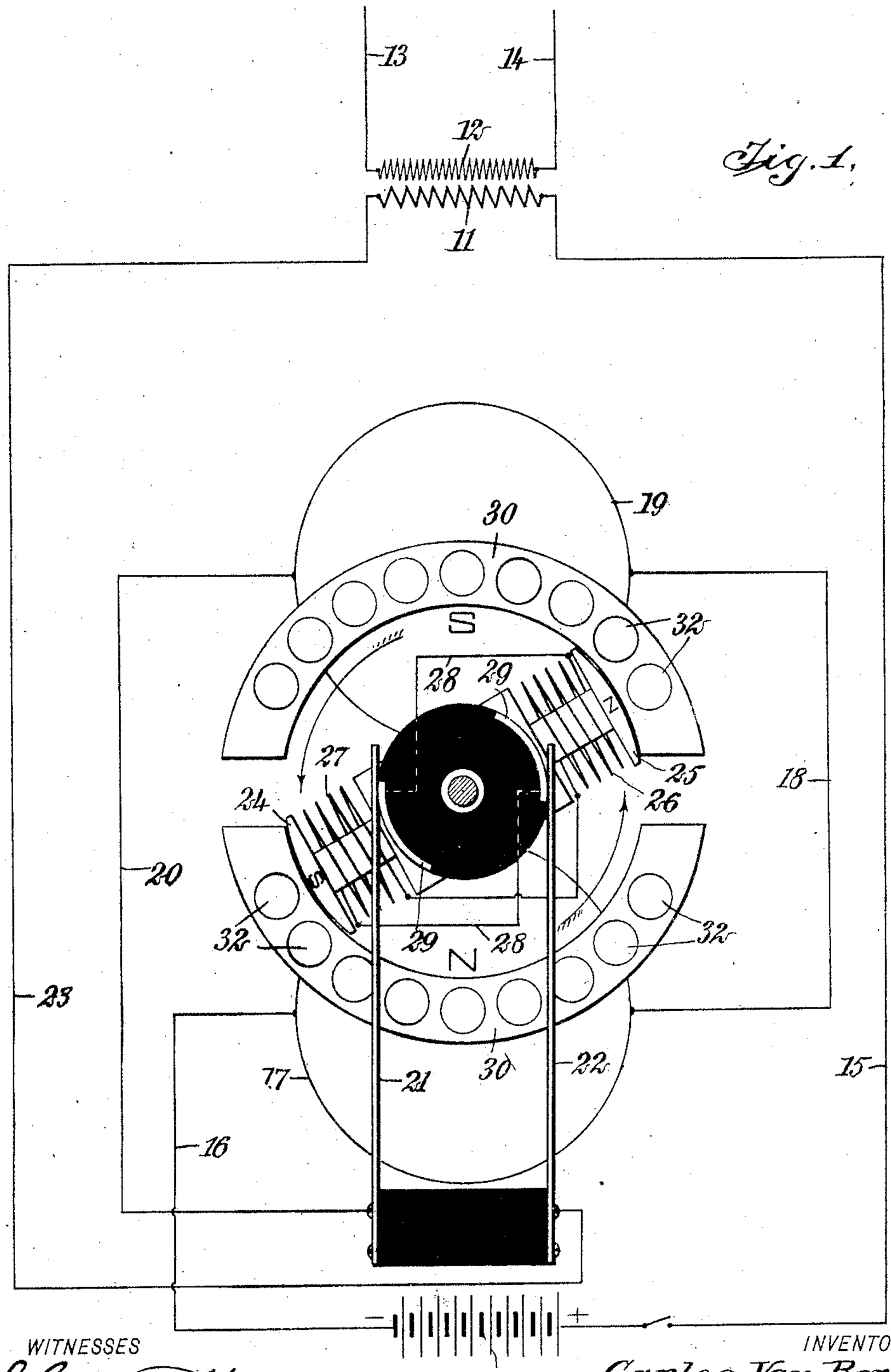
C. VAN BERGH.

ELECTRIC MEDICAL APPARATUS.

APPLICATION FILED DEC. 1, 1906.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 2.

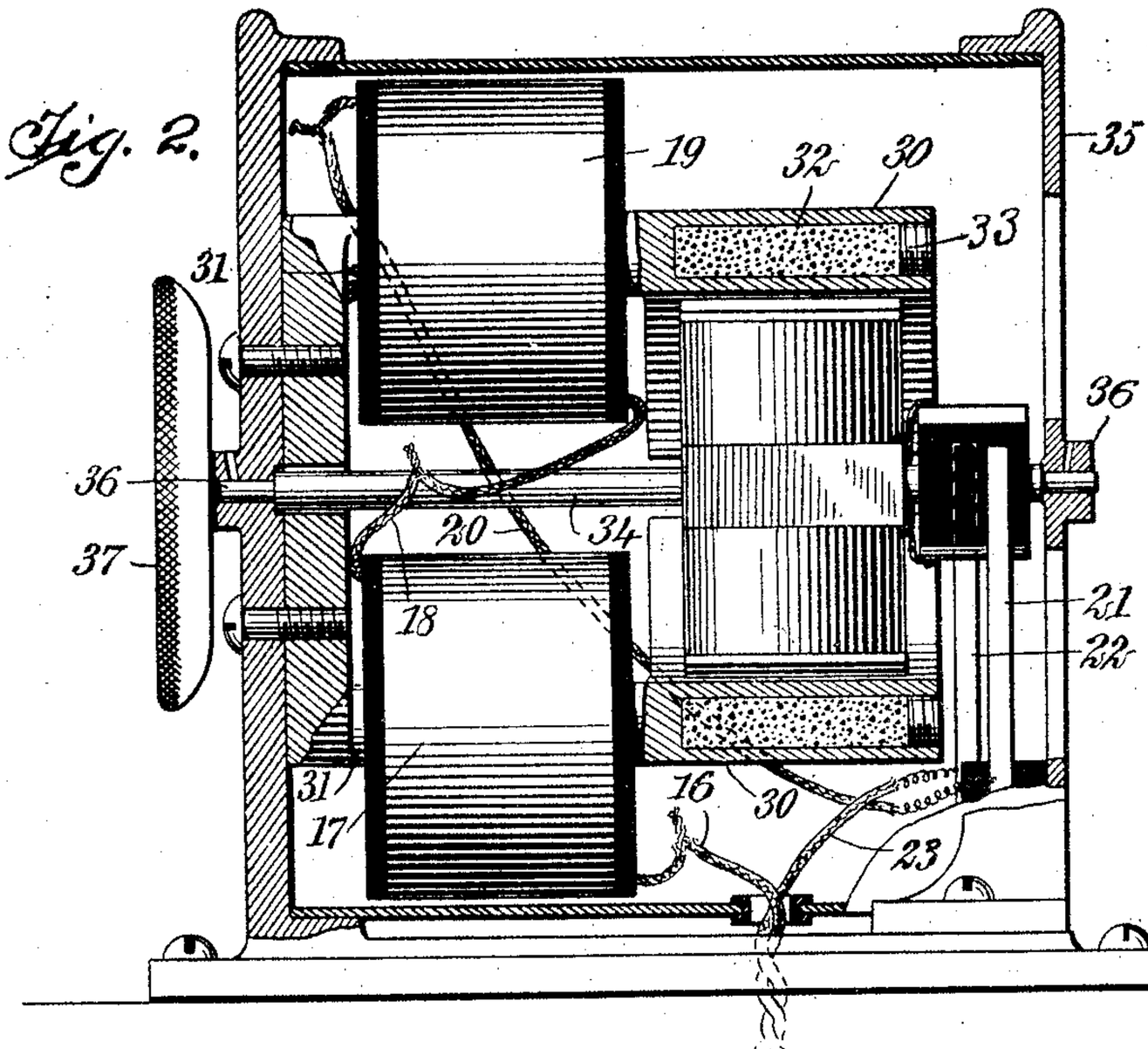
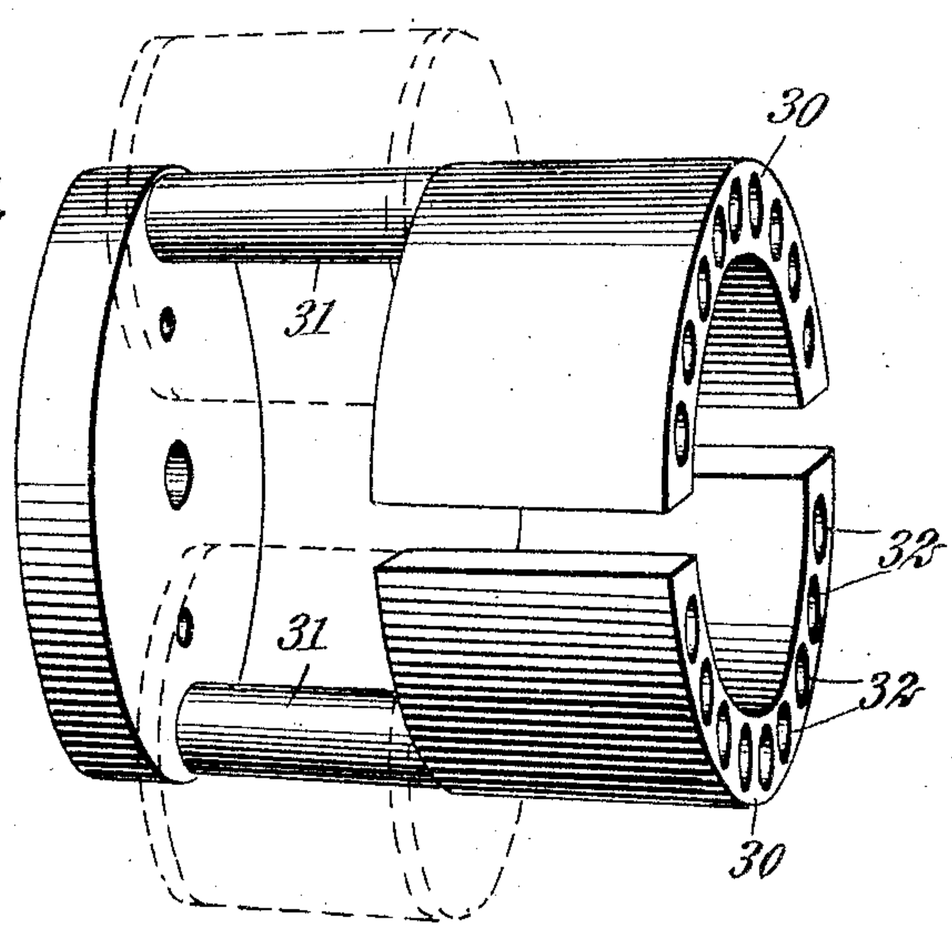


Fig. 3.



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ELECTRIC MEDICAL APPARATUS.

No. 848,518. Specification of Letters Patent. Patented March 26, 1907.

Application filed December 1, 1906. Serial No. 345,909.

To all whom it may concern:

Be it known that I, CARLOS VAN BERGH, a subject of the King of England, and a resident of Winnipeg, in the Province of Manitoba, Dominion of Canada, have invented a new and Improved Electric Medical Apparatus, of which the following is a full, clear, and exact description.

This invention relates to certain improvements in electrical apparatus especially adapted for controlling the current employed for medical purposes.

The object of the invention is to provide a new and improved means for interrupting the current generated by a battery of any suitable kind, and, furthermore, to provide an interrupter which may run at very low speed and is noiseless in its operation.

A further object of my invention is to provide a new and improved motor adapted for use as an interrupter of a continuous current or for other purposes for which motors are commonly employed.

In my improved apparatus I provide a special form of motor capable of operating at such low speed that the current passing through said motor may be interrupted and the intervals may be so controlled as to correspond in time with the pulsations of the heart of the person being treated.

The invention consists in certain features of construction and combination of parts, all of which will be fully set forth hereinafter and particularly pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures, in which—

Figure 1 is a diagrammatic representation of my improved motor and the connections whereby it operates. Fig. 2 is a side elevation of my improved motor, showing the field-magnets in vertical longitudinal section. Fig. 3 is a perspective view of the field-magnets and of the supports for the field-coils.

As my improved motor is especially designed as an interrupter for the current employed for medical purposes, I have illustrated it diagrammatically in Fig. 1 as placed in the circuit from the battery 10 and intermediate said battery and primary coil 11 of the induction-coil. In connection with the primary coil 11 is a secondary coil 12 for the induced current, and in the circuit containing this coil may be connected any suitable form of apparatus for treating a patient by electricity. As the special form of apparatus employed in the induced or secondary currents is not material to my invention, I have merely illustrated the secondary circuit as terminating in wires 13 and 14, which may lead to any point desired. One pole of the battery 10 is connected directly to the coil 11 by means of a wire 15, while the other pole of the battery is connected by a wire 16 to one of the field-coils 17 of the motor, which in turn is connected by a wire 18 to the other field-coil 19 and thence by a wire 20 to one of the brushes 21. The opposite brush 22 is connected by a wire 23 to the opposite end of the coil 11, and both brushes bear against the commutator, so that the current normally flows from the battery 10 to the coil 11, through the brush 22, the armature, the brush 21, the field-coils, and back to the battery. The armature preferably has but two poles 24 and 25, and these are so wound that one is the north pole, while the other is the south pole. The coil 26 of one pole is wound in series with the coil 27 of the other pole, and each coil terminates in a wire 28, said wires leading to the respective plates or segments 29 of the commutator. The commutator contains but two plates or segments, and each of these is of a length substantially equal to one-quarter of the circumference of the motor. The two plates are oppositely disposed, so that when the brush 21 is in contact with one of the plates the brush 22 will be in contact with the opposite plate, but whereby when the armature is rotating through a portion of its revolution the brushes will not be in contact with either plate, and the current passing through the armature, field-coils, and induction-coil will be interrupted.

Surrounding the armature and lying as closely adjacent to the path of the outer surface thereof as possible are placed the two field-magnets 30, supported upon cores 31, passing through the field-coils. These field-magnets are formed of metal integral with their supporting-cores and are preferably in the form of two segments, the outer surfaces of which lie adjacent the path of the outer surface of the armature. In order to retard the armature and prevent the too-rapid rotation thereof, I provide each of the field-magnets 30 with a plurality of pockets or re-

cesses 32 of a depth slightly greater than the width of the armature and lying in the path surrounding the outer surface thereof. Each of these pockets or recesses contains finely-subdivided steel densely packed therein. The openings to the recesses may be closed in any suitable manner to retain the powdered steel in place, in the form illustrated in the drawings small plugs 33 being employed for this purpose. The armature and commutator are mounted on a suitable shaft 34, and the entire motor is preferably inclosed within a casing 35 of any suitable character. The walls of the casing are provided with suitable journals 36, and one end of the shaft 34 preferably extends outward through one of said journals and is provided with a suitable hand-wheel 37, by means of which the motor may be started and which also serves as a fly-wheel to maintain the armature in motion and cause it to pass the dead-centers.

Assuming the parts of the motor to be in the position illustrated in Fig. 1 and the switch in the wire 16 is closed, a current passing through the two field-coils will cause one of the field-magnets to become a north pole and the other field-magnet a south pole, and the opposite poles of the armature will likewise become north and south, as indicated by the letters on Fig. 1. The north pole of the armature is drawn toward the field-magnet forming the south pole and the armature will be caused to rotate. As soon as the plate 29 leaves the brush 22 the current through the armature and through the field-coils will be interrupted; but the armature will continue to rotate, due to its own inertia. Furthermore, the armature will rotate until the plates 29 contact with the opposite brushes, and the poles of the armature will be reversed and rotation of the armature continued. In order to prevent too-rapid rotation of the armature, I provide the powdered steel in the recess 32, above referred to, and the action of this is to attract the metal of the armature and retard it. Only a portion of the energy is utilized for rotating the armature, as a large part is employed in magnetizing the finely-subdivided steel. As soon as one pole of the armature passed the center portion of the opposite field-magnet the current is cut off and the other magnet is no longer magnetized from the current, but it is magnetized to a certain extent by the powdered steel, and thus continues to attract the armature; but as soon as the pole of the magnet passes the central portion of the armature more of the small pockets containing powdered steel are located upon one side thereof than upon the other and the armature is held against its own inertia and also against the pull of the opposite electro field-magnet when the current through the latter is closed and said magnet becomes energized. The number of the pockets, their size, and the quantity of powdered steel are so proportioned to the size and strength of the electromagnets that the armature is not completely stopped, but only retarded, so as to result in a very slow rotation. During about half of each revolution the current from the battery 10 is broken, and no current passes through the coil 11 of the induction-coil. By means of my improved motor above described the armature may be so retarded that the interruptions in the current may be timed to agree with the pulsations of the heart of the patient being treated, and thus a very beneficial effect may be produced.

It is common to produce an interrupted current for use for medical purposes; but it is customary to interrupt the current by some form of vibrator. The treatment by means of electricity is especially beneficial for nervous persons, and it is often found that the beneficial effect which would otherwise be produced by the electric treatment is rendered almost negligible by the irritating and nerve-racking sensation produced by the buzz of the vibrator. Furthermore, the interruptions in the current are of such high frequency that a large portion of the otherwise beneficial effect is lost. By the use of my improved motor as an interrupter of the current the buzz of the vibrator is entirely obviated and no noise whatever is produced by the slow-running motor. Furthermore, the interruptions are so timed that the current may produce effects upon the heart and circulatory system entirely unattainable by any apparatus heretofore employed.

To control the strength of the current in the secondary circuit, which includes the coil 12 of the induction-coil, I provide any suitable means. (Not shown.)

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

1. An electric circuit including a suitable source of electrical energy, an induction-coil, and an interrupter, said interrupter comprising a motor having a rotary armature and powdered steel for retarding said armature.

2. An electric circuit including a suitable source of electrical energy, an induction-coil, and an interrupter, said interrupter comprising a motor having a rotary armature, powdered steel for retarding said armature, and a commutator adapted to deliver a current to said armature during only approximately one-half of each revolution.

3. An electric circuit including a suitable source of electrical energy and an interrupter, said interrupter comprising a motor having a rotary armature, a commutator adapted to deliver a current to said armature during only approximately one-half of each revolution, and means for retarding said armature during a portion of each revolution.

4. An electric circuit including a suitable

source of electrical energy, and a noiseless interrupter, said interrupter comprising a motor having a rotary armature, magnets surrounding said armature, means within said magnets for retarding the rotation of the armature, and a commutator adapted to deliver a current to said armature during only approximately one-half of each revolution.

5. An electric circuit including a suitable source of electrical energy and an interrupter, said interrupter comprising a motor having a rotary armature, a commutator adapted to deliver a current to said armature during only approximately one-half of each revolution, and means for retarding the armature during the remainder of each revolution.

6. An electric circuit including a suitable source of electrical energy and an interrupter, said interrupter comprising a motor having a rotary armature, and means for retarding said armature during a portion of each revolution.

7. An electric circuit including a suitable source of electrical energy and an interrupter, said interrupter comprising a motor having a rotary armature, a commutator adapted to deliver a current to said armature during only approximately one-half of each revolution, magnets surrounding said armature, said magnets being provided with pockets or recesses, and a finely-subdivided metal within said recesses for retarding the armature.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CARLOS VAN BERGH.

Witnesses:
JNO. M. RITTER,
PHILIP D. ROLLHANS.