

(No Model.)

D. McF. MOORE.
CIRCUIT INTERRUPTING MECHANISM.

No. 604,687.

Patented May 24, 1898.

Fig. 1.

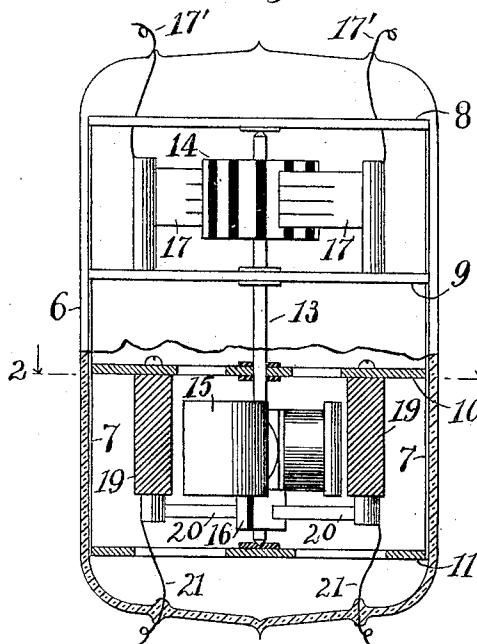


Fig. 3.

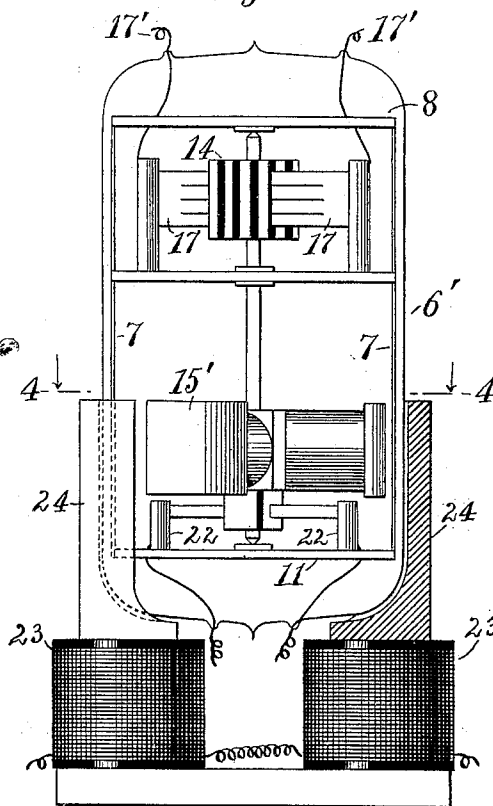


Fig. 2.

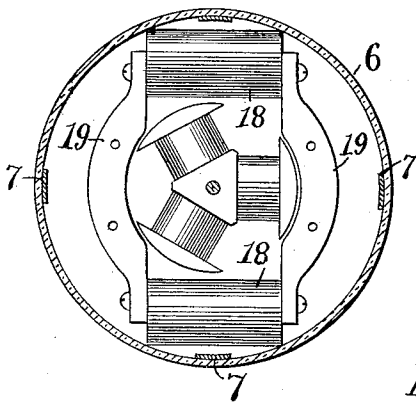


Fig. 4.

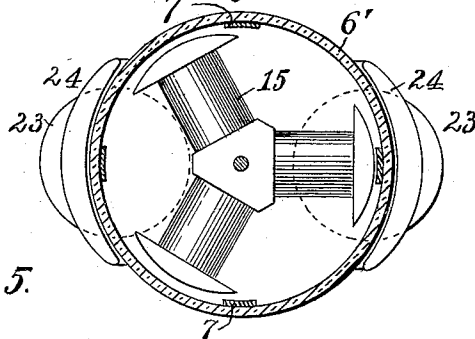
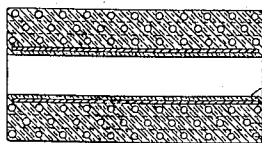


Fig. 5.



Witnesses:

C. L. Belcher

D. H. Decker

Inventor

Daniel McF. Moore

By

H. C. Townsend
Attorney

UNITED STATES PATENT OFFICE.

DANIEL MCFARLAN MOORE, OF NEWARK, NEW JERSEY.

CIRCUIT-INTERRUPTING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 604,687, dated May 24, 1898.

Application filed September 9, 1897. Serial No. 651,153. (No model.)

To all whom it may concern:

Be it known that I, DANIEL MCFARLAN MOORE, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented a certain new and useful Circuit-Interrupting Mechanism, of which the following is a specification.

This invention relates to magnetically-operated circuit-interrupters, and particularly to such interrupters adapted for use in vacuum chambers or receptacles.

The object of the invention is to so construct a magnetic interrupter that the vacuum in which it is operated may be readily obtained and maintained. Heretofore this has been impossible, because of the inability to exclude or extract all the air and gases from the coils of the magnets. This object may be accomplished by embedding the wire of the magnet or magnets of the interrupter in a vitreous material which has a minimum amount of occluded gases.

To this end the invention consists in the construction, combination, and arrangement of parts hereinafter fully described, and set forth in the claims.

In the accompanying drawings, which form a part of this specification, Figure 1 represents in partially-sectionized side elevation one form of electromagnetic circuit-interrupter embodying my invention. Fig. 2 represents a horizontal section thereof, taken in the plane indicated by line 2 2, Fig. 1. Fig. 3 represents in side elevation another form of electromagnetic circuit-interrupter in which my invention is involved. Fig. 4 is a horizontal section thereof, taken on the plane indicated by the line 4 4, Fig. 3. Fig. 5 is a longitudinal axial section of an electromagnetic, illustrating the particular feature of my invention.

My invention may be utilized in the construction of magnetic circuit-interrupters of various forms and designs; but it is shown herein as utilized in an interrupter of the rotary sort.

In Fig. 1 the entire motor for operating the interrupter, together with the latter, is inclosed within a vacuum receptacle 6, while in Fig. 2 the armature or rotary part of the motor is located within the vacuum receptacle 6', while the field coils and poles or the sta-

tionary part of the motor are located outside of said receptacle.

In Fig. 1 a frame of any suitable material, as aluminium, is constructed in suitable form, substantially as shown and described in my prior application, Serial No. 615,970, filed December 17, 1896.

For the purposes of illustrating this invention suffice it to say that the framework consists of vertical rods 7, to which are attached cross plates or bars 8, 9, 10, and 11. Passing through these plates and suitably journaled therein is the shaft 13, on which is mounted a circuit-interrupting wheel 14, the armature 15, and its commutator 16. The brushes 17 of the circuit-interrupter are shown as mounted on posts arising from the plate 9. The conductors 17' from the circuit-interrupter issue from the vacuum receptacle and are sealed in the wall thereof, substantially as indicated.

The field-coils of the motor are indicated at 18, their cores being connected by the pole-pieces 19, said field-coils and pole-pieces being supported in place by a connection of the latter to the plate 10 in any suitable way.

The brushes 20, bearing upon commutator 16, may be supported in any suitable way, as by posts depending from the pole-pieces 19.

The circuit-wires 21 of the motor may be led from the vacuum receptacle and sealed in the walls thereof, substantially as indicated.

In Fig. 2 the construction of the interrupter-supporting frame and of the interrupter are substantially as just described; but in this form of the apparatus the armature 15' alone is mounted within the receptacle 6', its brushes being suitably supported from the plate 11, as by posts 22. The field-magnets are exterior to the vacuum receptacle and are indicated at 23. The polar extensions 24 of the field-magnets embrace the receptacle 6', as indicated, being brought as closely as possible to the poles of the armature. This arrangement of the motor or its rotary part within the vacuum receptacle makes it possible to obtain a higher rate of speed for the circuit-interrupter than can possibly be obtained with the rotary part of the motor in the open air. With magnet-coils, however, as heretofore constructed it would be utterly impossible to obtain and maintain a vacuum

within the receptacle. To overcome this difficulty, the turns and layers of wire constituting the armature and field-coils, where both are included in the vacuous space, are thoroughly insulated by and embedded within a mass of some vitreous material, such as glass or porcelain, preferably the latter. In Fig. 4 the construction of the magnet on this plan is illustrated in detail. Such construction is effected by coating with porcelain the core of the magnet, which may be solid or tubular, (here shown at 25 as tubular.) This coating may be applied in any of the well-known ways and be fused to or "fired" upon the metal of the core. This coating is indicated at 26. About the core thus formed is coiled a layer of wire, the turns of which are spaced apart, as indicated at 27. Another coat of porcelain is then deposited upon this layer of wire, thereby thoroughly insulating the turns of the coil from one another and embedding the whole within the mass. Another layer of wire may then be coiled upon the first, as indicated at 28, and this thoroughly embedded in porcelain, as just described and as indicated. This mode of construction may be continued until the coil has assumed the proper proportions. In the drawings three layers are illustrated, the last being indicated at 29.

In the construction of the frame of the interrupter as illustrated aluminium has been used because of the minimum amount of occluded gases. The vacuum may be further protected, however, by coating all the metal parts thereof, so far as practical, with porcelain, substantially in the manner described in connection with the core of the magnet; but this is not so material as is the insulation of the magnet-coils in the manner just described. While the magnet thus insulated is especially adapted for use *in vacuo*, it must be understood that magnets so constructed in accordance with this invention are not hereby limited to this specific use, as they may be advantageously used in various other places—as, for instance, in corrosive and other sorts of liquids and in damp or wet places. This method of constructing the coils of a motor makes it possible to locate one entire electromagnetic motor within a vacuous chamber, so that a self-starting or induction motor may now be operated *in vacuo*. The efficiency of a motor so located is greatly increased because of the capability of reducing the "air-gap" thereof, as well as because of the greater ease of operation due to the lack of air resistance.

Motors of different construction from those shown may be employed for magnetically op-

erating the circuit-interrupter, and the arrangement and location thereof within the vacuum-chamber may be varied from that illustrated. So, also, the manner of coating and embedding the wire of the magnet-coils may be varied from that described without departing from the invention.

What I claim as my invention is—

1. The combination with a vacuous receptacle, of a circuit-interrupter therein, a motor for driving the interrupter, the rotary part of which motor is within said receptacle and has its coils insulated and thoroughly embedded in a vitreous mass.

2. The combination with a vacuous receptacle, of a circuit-interrupter therein, a motor for driving the interrupter also located in the receptacle and having the coils thereof insulated by and thoroughly embedded in a vitreous mass.

3. A magnetically-operated circuit-interrupter the magnet or magnets of which are inclosed in a vacuous receptacle and the coils of which are insulated by and thoroughly embedded in a vitreous mass.

4. The combination with a vacuous chamber, of a rotary circuit-interrupter located therein, a circuit of induction controlled thereby, an electromagnetic motor located wholly within said chamber for operating the interrupter, and an operating-circuit for said motor independent of the circuit of induction.

5. The combination with a vacuous chamber, of a rotary circuit-interrupter located therein, a circuit of induction controlled thereby, a self-starting or induction motor the armature or rotary part of which with its coils is located within said chamber and operates the interrupter, and a power-circuit for said motor independent of the circuit of induction, substantially as set forth.

6. The combination with a vacuous receptacle, of a circuit-interrupter therein, and electromagnetic devices operating the interrupter, said devices being also located in the receptacle and having its coil or coils covered by an inclosing vitreous envelop.

7. A magnetically-operated circuit-interrupter inclosed in a vacuous receptacle, and having the metal portions of the magnet or magnets which operate said interrupter coated with a vitreous envelop.

Signed at New York, in the county of New York and State of New York, this 20th day of August, A. D. 1897.

DANIEL MCFARLAN MOORE.

Witnesses:

WM. H. CAPEL,
D. H. DECKER.