V. G. APPLE AND J. G. KING.

CONTACT MEMBER FOR VIBRATING CURRENT CONTROLLING REGULATORS.

APPLICATION FILED FEB. 14, 1918.

1,302,622.

Patented May 6, 1919.

2 SHEETS—SHEET 1.

Fig. 1

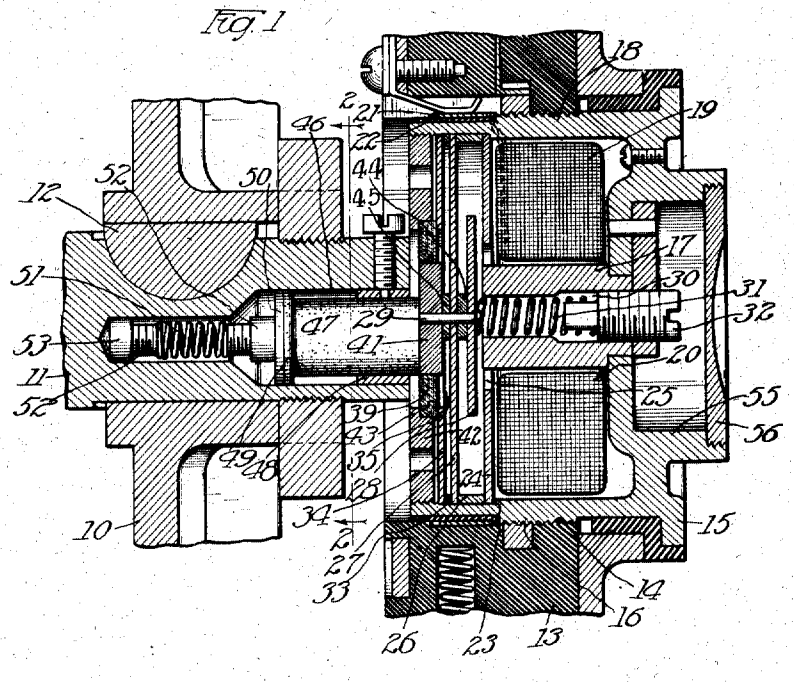
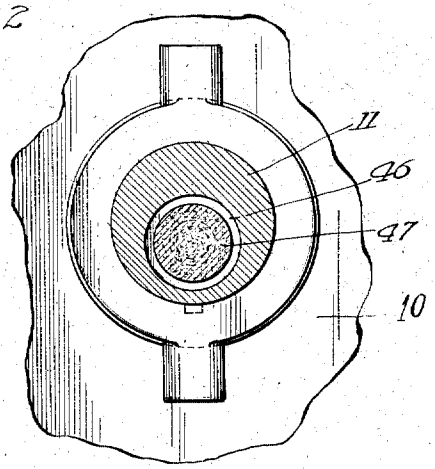


Fig. 2



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Fig. 3.

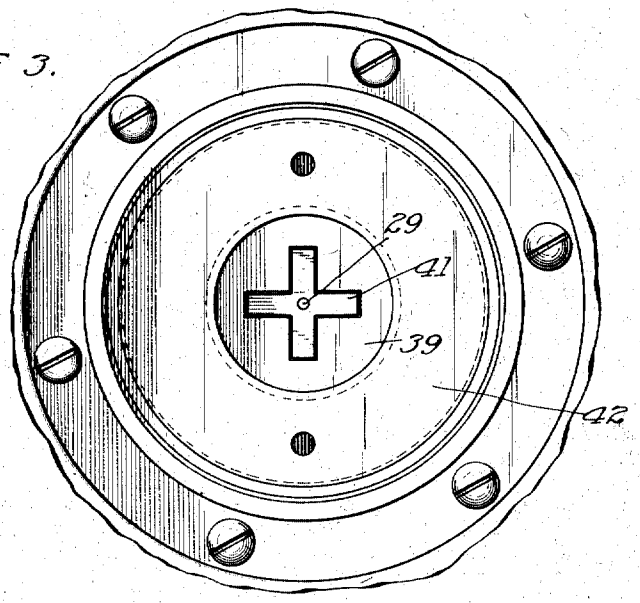


Fig. 4.

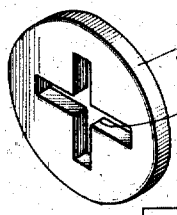


Fig. 5.

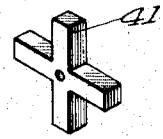
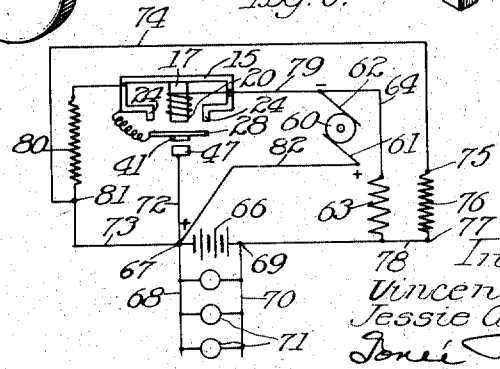


Fig. 6.



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UNITED STATES PATENT OFFICE.

VINCENT G. APPLE AND JESSE G. KING, OF DAYTON, OHIO; SAID KING ASSIGNOR TO SAID APPLE.

CONTACT MEMBER FOR VIBRATING CURRENT-CONTROLLING REGULATORS.

1,302,622. Specification of Letters Patent. Patented May 6, 1919.

Original application filed April 23, 1917, Serial No. 163,803. Divided and this application filed February 14, 1918. Serial No. 217,155.

To all whom it may concern:

Be it known that we, VINCENT G. APPLE and JESSE G. KING, citizens of the United States, each residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Contact Members for Vibrating Current-Controlling Regulators, of which the following is a specification.

The invention relates to contact members for vibrating current controlling regulators.

One of the objects of the invention is to provide a contact member, rotatable against the confronting surface of a fixed support and substantially immovable in a plane parallel with its axis of rotation, so as to maintain its contacting surface uniformly in said vertical plane; in coöperation with a vibratable contact member, axially movable in a plane parallel to or coaxially with the axis of the rotatable member, the axially movable member, preferably, projecting through said fixed support to contact the rotatable member.

Another object of the invention is to provide a specific structure in coöperation with said contact members to impart suitable motion to the respective members.

Other and further objects of the invention will become readily apparent to persons skilled in the art from a consideration of the specification when taken in connection with the drawings, wherein—

Figure 1 is a central axial section of a dynamo electric machine, showing fragments of the dynamo, and a regulator as the same would appear when mounted on the end of an engine shaft of an automobile.

Fig. 2 is a cross sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is an end view of the regulator.

Fig. 4 is a perspective view of a contact guiding disk.

Fig. 5 is an axially movable contact guided within and by said disk.

Fig. 6 is a simplified diagram of a circuit, in which our invention may be incorporated.

In all the views the same characters of reference are employed to indicate similar parts.

Dynamo electric machines are frequently used as motors for starting internal combustion engines of automobiles and alternatively, as electric generators, when driven by said engines for charging storage batteries and participating, in conjunction with the battery, to furnish current for translating devices that may be associated with the vehicle.

In the present embodiment 10 is a spider of a dynamo electric machine for supporting the armature carried upon the dynamo shaft 11 and supported rotatively thereon by a key 12. 13 is the front plate of a dynamo electric machine made preferably of insulating material. The dynamo front plate 13, made of insulating material, is fastened to the front end of the magnetic frame of the dynamo and is provided with a threaded perforation 14 that is coaxially arranged with the shaft 11. A casing 15 of the current regulator, is also provided with a threaded portion 16 for coöperation with the threaded portion 14 in the frame member. The frame member 15 is preferably made of iron or soft steel, which may be subsequently electro-plated, if desired, and is provided with a central perforated core 17. Between the annular wall 18 of the casing and the core 17 is an electric coil 19, having in the present embodiment one of its terminals 20 connected directly to the casing and the other terminal connected to an insulated ring 21, which surrounds the inner hub of the casing and is insulated therefrom by a circular ring of insulating material 22. Near the inner end of the casing is an internal shoulder 23 against which rests a perforated diaphragm or flat ring 24, preferably of magnetic material, which is provided with a perforation 25 somewhat larger in diameter than the diameter of the core 17. The core 17 projects through the perforation 25 until its front face is in the same transverse plane with the outer surface of the diaphragm 24. A spacing ring 26 separates the disk 24 from a yielding diaphragm 27. A disk armature 28, necessarily of magnetic material, is secured to the center of the diaphragm 27, as by a pin 29 and is normally in inductive relation with the core 17 and the magnetic disk 24. The path of mag-

netic flux, produced by the energized coil 19, is through the core 17, the frame 15 of the regulator, through the magnetic disk 24 and the bridging armature 28, to the core 17, thus attracting the armature 28, toward the disk 24 and the core 17, when the coil 19 is energized. The core 17 is hollow, or in other words, is provided with an axial bore 30 in which is centrally located an open helical spring 31 which rests against the armature 28, and is in adjustable relation with the core 17 by a screw 32. When the screw 32 is rotated clockwise, the tension of the spring 31 is thereby increased, therefore, it requires a greater magnetic strength to be produced by the coil 19, to attract the armature 28, than is required when the spring 31 is weaker.

A spacing ring 33 separates the disk 27 from another relatively stationary disk 34. The disk 34 is perforated, as at 35, and serves as a means for holding a relatively thick disk 39 of insulating material, which is of smaller diameter, in its place. The insulating disk 39 may be of lava, or the like, more clearly shown in Fig. 4. It is provided with a cruciform, centrally disposed opening 40, to receive a cruciform contact member 41. The contact member 41 is guided in its axial movement in the opening 40, but is free to slide axially therein.

A clamping ring 42 is screw threaded on its outer periphery and is provided with an annular shoulder 43 bounding the inner perforation thereof. The insulating disk 39, rests in the shoulder 43 of the ring 42 and against the surface of the disk 34 that bounds the perforation 35 therein.

Now it will be apparent that when the armature 28 is vibrated, in response to the change in the magnetic flux of the electromagnet, that the cruciform contact member 41 is axially moved with the armature, through the instrumentality of the connecting pin 29, and permitted to participate in such movement by reason of the fact that the contact 41 is slidably movable but guided in the cruciform perforation in the insulating supporting disk 39.

Separating washers 44 and 45 surround the pin 29 and separate the armature 28 from the flexible disk 27 and the latter disk from the contact 41, so that there will be no mutual interference of the parts when they are vibrated by the effect of the electro-magnet. The end of the armature shaft 11 is axially bored eccentrically to its axis, as at 46. Located in the center of this bore, and slidable therein, is a carbon or composition rod or cylinder 47, the front end of which rests upon a ring 48 and the rear portion being guided by the disk 49. The rear part of the rod 47 rests upon a disk of insulating material 49 which abuts against a disk 50. The rear end of the rod 47 is supported by these disks and is yieldingly pressed forwardly by a spring 51 which is located in a smaller coaxially arranged perforation 52 in the end of the shaft 11. Screw threaded buttons or ends 52 and 53 may be employed for increasing the effective length of the spring 51 so as to vary the amount of pressure exerted by it against the carbon rod 47, in its contact with the insulating disk 39.

As the shaft 11 is rotated the carbon rod 41 sweeps over the stationary disk 39 and at all times presents its front surface in a constant vertical plane for contact with the cruciform contact piece 41 which is movable through the disk 39. When the armature 28 is attracted by the electro-magnet, against the yielding influence of the spring 31, the cruciform contact member 41 is withdrawn from its electrical connection with the front end of the carbon rod 47, but the rod 47 cannot follow the contact member 41 because it abuts against the confronting surface of the disk 39.

The wear on the front surface of the rod 47 is uniform, and inasmuch as it sweeps over the confronting surface of the cruciform contact 41, the wear on such contact is also uniform. Therefore the confronting surfaces 41 and 47 are always located in parallel planes.

The casing 15 is provided with a recess 55 in which the end of the screw 32 is contained and which is covered by a screw plate, or cover 56, which is removable only when access to the screw 32 is desirable.

The present invention is more particularly concerned with the contacts 41 and 47 and their mode of operation. Other features of the structure shown will form subject matter of another application to be hereafter filed, both of which are divisional applications, divided from Serial No. 163,803, filed April 23, 1917 by Vincent G. Apple, in which said original application parts of the device herein shown, were disclosed but were not claimed, other parts of which were claimed, but were required to be divided from the original application.

In Fig. 6 of this application there is shown a simplified diagram of circuits in which the regulator is especially adapted, in which 60 is the dynamo having a positive brush 61 and a negative brush 62 with a series field 63 connected by a wire 64 to the negative brush and by wire 65 to the negative terminal of a storage battery 66. The other terminal 67, of the storage battery, is connected to a wire 68 while the terminal 69 of the storage battery is connected by a wire 70 and between the wires 68 and 70 are translating devices requiring substantially constant electrical potential, 71. The terminal 67 of the storage battery is connected by a wire 72 to the rotating contact 47 of the regulator, and is also connected by wire 73 to

the wire 74 that is connected to the end 75 of the shunt field winding 76 of the dynamo. The other end, 77, of the shunt, is connected to the wire 65 by the wire 78. A wire 79 is connected to the negative brush 72 of the commutator of the dynamo and is connected to the coil 17 of the regulator. The other end of the coil 17 is connected to the frame 15 of the governor or regulator, as at 20. A resistance coil 80 is connected to the frame 15 and to the point 81 where the wires 73 and 74 are connected together. The positive brush 61 of the dynamo is connected by wire 82 to the terminal 67.

When the dynamo is functioning as a generator the current through the series field 63 is in the opposite direction to that which it would be when it is functioning as a motor. When operating as a motor it assists the magnetizing effect of the shunt field 76, but when operating as a generator it tends to decrease the magnetic effect produced by the shunt field 76. By this means in conjunction with the vibrating contacts between the members 41 and 47, the current produced by the dynamo is maintained substantially constant.

While we have shown a single embodiment of our invention for purposes of clear disclosure, it is manifest that many changes may be made in the form and disposition of the parts within the scope of the appended claims.

Having described our invention, what we claim is:—

1. Two vibratable contact members having paths of movement at substantial right angles to each other and a relatively fixed plate through which one member projects to make contact connection with the other member.

2. Two vibratable contact members having paths of movement at substantial right angles to each other; a relatively fixed plate through which one member projects to make contact connection with the second member and means for yieldingly holding the second member in contact with the face of said plate.

3. Two vibratable contact members having paths of movement at right angles to each other; a relatively fixed plate through which one member projects to make and break contact connections with the second member, the second contact member provided with means to move it across the face of said plate and always within the plane of movement of the first mentioned member.

4. A circuit varying device comprising a stationary plate; a contact member, having an axial movement, projecting through the plate; another contact member, movable constantly across the face of the plate without being moved beyond the axial plane within which the first mentioned member is located; an electric circuit, of which said contact members are terminals and means, energized by a source of current in said circuit, to vibrate the first mentioned contact member.

5. A device of the character described comprising a perforate plate, or similar support; a vibratable contact member projecting through said plate; another contact member, movable across the face of said plate at right angles to the path of movement of the first mentioned contact member and means to yieldingly hold the second mentioned contact member in contact with said plate.

6. In an electro-magnet organization, the combination of an armature; a contact member adapted for axial movement thereby; a plate or structure through which said contact member projects, and another contact member bearing on the face of the plate and having means to move it in a path at substantial right angles to the path of movement of the first mentioned contact member.

7. In an electro-magnet organization the combination of a responsive armature; a contact, carried by the armature; a relatively stationary plate through which said contact projects; a rotatable shaft; a contact carried by said shaft and located eccentrically to the axis of the shaft; yielding means to maintain the contact against the face of said plate while being rotated, without uncovering the end of the first mentioned contact member.

8. In an electro-magnet organization the combination of a responsive armature; a cruciform contact member, carried by the armature; a relatively stationary plate through which said contact member projects; a rotatable shaft; a cylindrical contact member, carried by and projecting from the end of said shaft and located eccentrically of the axis of the shaft; a spring within said shaft to yieldingly maintain the end of said contact cylinder against the face of said plate while being rotated, the path of said rotatable contact sweeping over the face of said plate without uncovering the end of the first mentioned contact.

In testimony whereof we hereunto set our hands.

VINCENT G. APPLE.
JESSE G. KING.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."