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L. BRADLEY.

RESISTANCE DEVICE FOR ELECTRIC CURRENT CONTROLLERS.

APPLICATION FILED JULY 28, 1902.

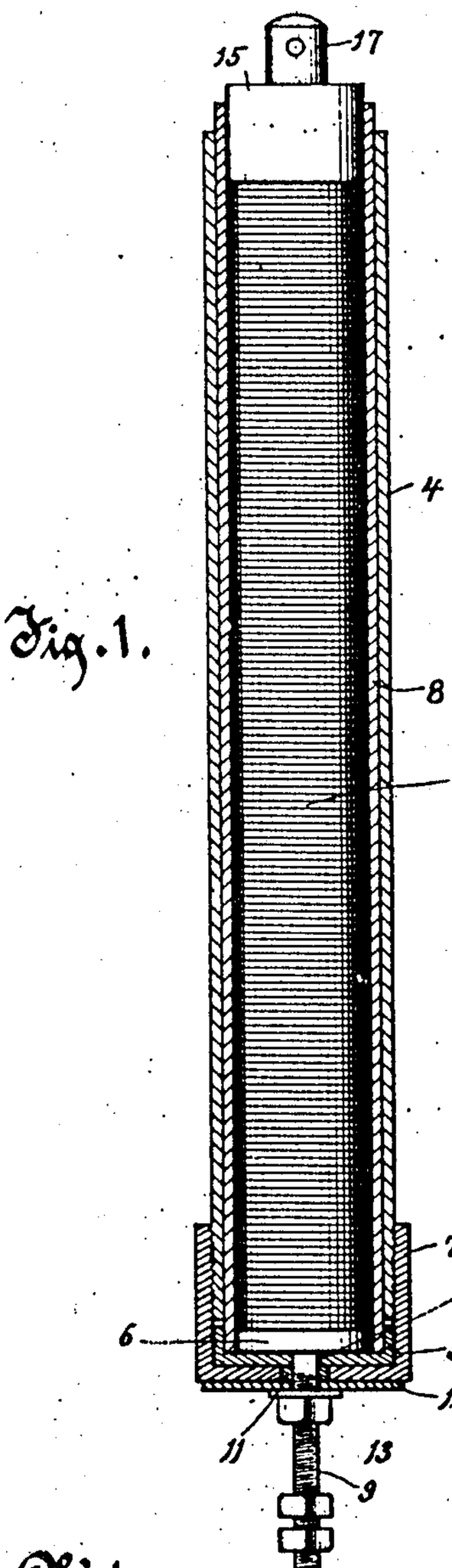

Fig. 1.

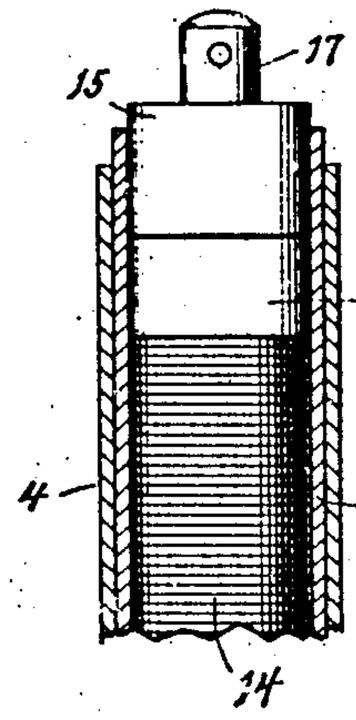

Fig. 2.

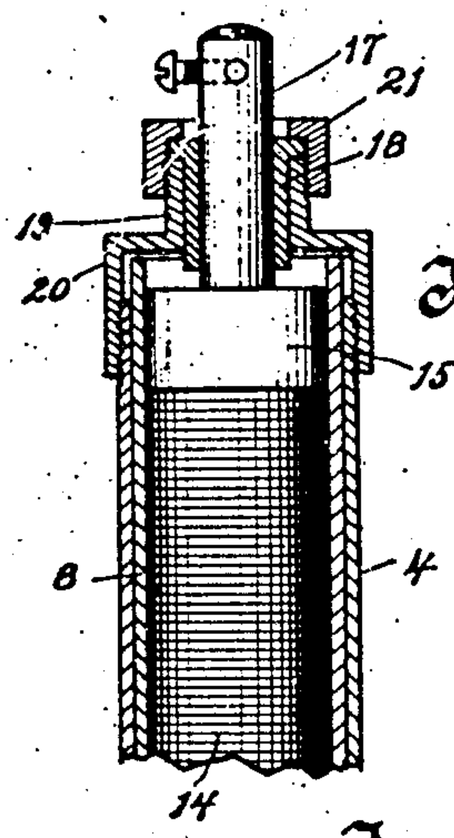

Fig. 3.

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UNITED STATES PATENT OFFICE.

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RESISTANCE DEVICE FOR ELECTRIC-CURRENT CONTROLLERS.

No. 815,317. Specification of Letters Patent. Patented March 13, 1906.

Application filed July 28, 1902. Serial No. 117,286.

To all whom it may concern:

Be it known that I, LYNDE BRADLEY, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a new and useful Improvement in Resistance Devices for Electric-Current Controllers, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

My invention has relation to improvements in resistance devices for electric-current controllers.

Heretofore in the use of carbon disks as a resistance medium in electric-controlling devices wherein the casing containing the disks is not substantially air-tight entirely satisfactory results have not been obtained, by reason of the fact that such material quickly deteriorates with use, owing to said material corroding by the action of air thereon, to which it is exposed.

It is therefore the primary object of my invention to provide a construction for rendering a variable-resistance medium in the form of carbonaceous plates substantially proof against the action of air thereon by inclosing said plates in a container of such construction as to prevent by the exclusion of air from the plates the oxidation of said plates and consequent disintegration thereof at the temperature to which they are subjected by the action of the electric current passing therethrough, and said construction also providing for the retention of the carbon-dioxid gas, which being heavier than the air will assist in preventing the air from gaining access to the plates and deleteriously effecting said plates.

A further object resides in the provision of an improved construction whereby the carbon disks are so protected as not only to be rendered substantially proof against the entrance of air thereto, but is also rendered substantially proof against the admission of dust thereto.

With the above in view the invention consists of the devices and parts, or their equivalents, as hereinafter set forth.

In the accompanying drawings, Figure 1 is a vertical sectional view of a resistance medium constructed in accordance with my invention. Fig. 2 is a similar view of the upper portion of a modified form of resistance medium, and Fig. 3 is a similar view of the upper portion of still another modified form.

Referring to the drawings, the numeral 4 indicates a tube or container, usually of metal. At the end of this tube is a cup-shaped socket 5, composed of some suitable insulating material, preferably asbestos. Resting upon the bottom of this socket is a block 6, preferably of metal. The cup-shaped socket 5 is itself seated in a large outer cup-shaped socket 7, preferably of metal. This socket 7 has its upwardly-extending annular flange interiorly threaded to engage exterior threads at the lower end of the tube 4. Within the tube 4, and closely hugging the inner wall of said tube, is an interior tube 8. This tube is composed of a suitable insulating material, preferably asbestos, (although any other desirable material may be used,) and serves to prevent the electric current which flows through the resistance medium from passing onto the outer tube 4. The lower end of the insulating-tube 8 extends into the cup-shaped socket 5 and surrounds the block 6. The said block 6 is provided with a depending binding-post 9, which passes through an opening 10 in the cup-shaped inner socket 5, and also through an insulating-bushing 11, the said bushing 11 fitting in an opening therefor in the outer cup-shaped socket 7, and hence preventing the electric current, which passes through the carbon disks, from flowing from the binding-post to the outer cup-shaped socket. The outer side of the socket 7 has arranged thereagainst an insulating-plate 12, which prevents the current from flowing from the binding-post to the socket 7. A nut 13 turns on threads formed on the binding-post 9 and when turned in one direction draws the block 6 and insulating-cup 5 firmly against the bottom of socket 7, and thereby prevents entrance of air to the interior at this end of the tube.

Within the tube 4 and surrounded by the insulating-tube 8 are a series of carbon disks 14, superimposed one upon the other.

In the application of my invention the resistance device is arranged in an electrical circuit, (not shown,) one wire to said circuit being connected to the binding-post 9 and another wire being in electrical connection

with the opposite end of the column of carbon plates. The current enters the tube over the binding-post, thence passes through the carbon plates, and thence out of the opposite end of the tube onto the wire electrically connected at that end. In order to regulate the degree of resistance, a compression device (not shown) is employed, which acts on the carbon plates and compresses the same, so as to effect a gradual cutting out of the resistance. This compression device does not, by preference, act directly on the carbon plates, but upon a block 15, preferably of metal and disposed in the end of the tube opposite to the end from which the binding-post 9 projects. This block fits closely to the wall of the inner insulating-tube 8, and therefore serves not only to take the direct thrust of the compression device, but also by its close fit effects a close enough joint at this end of the tube to render said end substantially air-tight. In order to even more effectually make said end air-tight, the inner insulating-tube 8 may be extended at said end a short distance beyond the end of the metallic tube 4, as clearly shown in the drawings. When this inner insulating-tube is composed of asbestos and is thus extended beyond the end of the outer tube, it will be found that it will have a tendency to bend inwardly, and its outer edge will therefore approach said block more closely. For the reason stated, therefore, I prefer to extend the inner insulating-tube in the manner described, although I do not wish to be understood as limiting myself thereto, inasmuch as successful results may be obtained where the inner tube terminates flush with the end of the outer tube.

From the construction described it will be seen that the opposite ends of the tube are rendered substantially air-proof by the provision of the inner insulating-tube 8 in connection with the other parts disposed and arranged as described—that is to say, the insulating-tube 8, in connection with the block 15, renders one end of the resistance medium substantially air-tight, and the insulating-tube in connection with the cup-shaped insulating-socket 5, block 6, and outer cup-shaped socket 7 render the opposite end of said resistance device substantially air-tight, the insulating-bushing 11 and the plate 12 also assisting in securing the air-tight joint. Practice has demonstrated that this provision of a substantially air-tight tube for containing the carbon plates makes it possible to employ such carbon plates in an entirely satisfactory manner in connection with an electric-current-controlling device and without danger of the carbon plates oxidizing or disintegrating at ordinary temperatures to which the resistance medium is subjected by the action of the electric current passing therethrough.

In Fig. 2 of the drawings I show a slightly-modified form of construction wherein I employ a disk 16, preferably of carbon, which is next to and abuts against the block 15 and is of a substantial thickness, or, in other words, is of considerably greater thickness than the other disks therebeneath. This piece of carbon permits the resistance medium to be subjected to a very high temperature without danger of corrosion, inasmuch as said disk offers little resistance to the current, and thereby becomes heated to a comparatively slight extent.

The modified construction shown in Fig. 3 admits of a still higher temperature than the form shown in Fig. 2 without danger of the carbon disks becoming disintegrated. This construction consists in rendering the end of the tube where the pressure is exerted as completely air-tight as possible. Referring to this modification, the numeral 18 indicates an insulating-tube which surrounds the outwardly-extending stem 17 of the block 15. This tube 18 is surrounded by an outwardly-extending tubular projection 19 from a coupling 20. The inwardly-extending rim of this coupling is interiorly threaded, and these interior threads engage exterior threads formed at the outer end of tube 4, whereby the coupling is secured in place. The outer end of the tube 18 is provided with an outwardly-extending flange which fits over the outer end of the tubular projection 19, and a nut 21 takes onto exterior threads formed on said tubular projection 19, and said nut is provided at its outer end with an inwardly-extending flange which when the nut is turned inwardly is brought firmly against the flange of the tube 18, and consequently securely clamps said flange to the outer end of the tubular projection 19. From this construction it will be evident that a very close joint is provided against the entrance of air. This close joint also effectually provides against the entrance of dust into the tube 4. In practice I have found that where dust or dirt enters the said tube and passes to the carbon disks it very seriously affects the proper working of the device.

What I claim as my invention is—

1. The combination with a compressible resistance medium of carbonaceous material in the form of plates, of a container inclosing the plates, and a gas-retaining closing means therefor to prevent oxidation of said plates.

2. The combination of a resistance medium of carbonaceous material in the form of plates, a container inclosing the plates, a gas-retaining closing means therefor to prevent oxidation of said plates, and means for subjecting the plates to pressure to produce variable conductivity of the plates.

3. The combination of a variable-resistance medium of carbonaceous material in the form of plates, a container inclosing the

plates, and gas-retaining means for excluding air from said container, whereby oxidation of the plates is prevented.

4. The combination of a resistance medium of carbonaceous material in the form of compressible plates, a container inclosing the plates, means for closing the ends of the container, the closing means at one end being immovable and adapted to retain an air-excluding gas for preventing oxidation of the plates, and the closing means at the other end being movable inwardly and outwardly in order to produce variable resistance of the plates.

5. In a resistance device for electric-current controllers, the combination of an outer tubular casing, a resistance medium within the tubular casing, a coupling connected to one end of the tubular casing and having an outwardly-extending tubular projection, a block within the tubular casing and adapted to bear against and compress the resistance medium, said block provided with an outwardly-extending stem, a tube within the outwardly-extending tubular projection of the coupling and surrounding the outwardly-extending stem of the block, and means for forming a substantially air-tight joint at the other end of the tubular casing.

6. In a resistance device for electric-current controllers, the combination of an outer tubular casing, a resistance medium within the tubular casing, a coupling connected to one end of the tubular casing and having an outwardly-extending tubular projection, a block within the tubular casing and adapted to bear against and compress the resistance medium, said block provided with an outwardly-extending stem, a tube within the outwardly-extending tubular projection of the coupling and surrounding the outwardly-extending stem of the block, said tube having a laterally-extending flange at its outer end, a nut turning on threads formed on the outwardly-extending tubular projection of the coupling and provided at its outer end with a lateral inwardly-extending flange adapted to be brought against the flange of the tube which is surrounded by the tubular projection of the coupling, and means for forming a substantially air-tight joint at the other end of the tubular casing.

7. In a resistance device for electric-current controllers, the combination of a tube, a resistance medium within the tube, means for forming a substantially air-tight joint at one of the ends of the tube, and two blocks placed together within the opposite end of the tube and closely fitting but movable in said end of the tube, the inner block bearing against the resistance medium, and the said blocks forming a substantially air-tight joint at said end of the tube.

8. In a resistance device for electric-current controllers, the combination of an outer tubular casing, a resistance medium within the tubular casing, a socket at one end of the tubular casing, a block in the bottom of the socket and upon which the resistance medium bears, an outer socket inclosing the inner socket and connected to the outer tubular casing, a coupling connected to the other end of the tubular casing and having an outwardly-extending tubular projection, a block within this end of the tubular casing and adapted to bear against and compress the resistance medium, said block provided with an outwardly-extending stem, and a tube within the outwardly-extending tubular projection of the coupling, and surrounding the outwardly-extending stem of the block.

9. The combination of a resistance medium of carbonaceous material, a container inclosing the carbonaceous material, means for forming a substantially air-tight joint at one of the ends of the container, and a block movable inwardly and outwardly in the opposite end of the container and against the carbonaceous material at that end of the container, the two opposite substantially air-tight joints of the container preventing oxidation of the carbonaceous material, and said block adapted when moved inwardly toward the carbonaceous material to produce variable conductivity of said carbonaceous material.

10. The combination of a resistance medium, a container inclosing said resistance medium, an insulating-tube in the container and surrounding the resistance medium, a socket into which the inner insulating-tube extends, a block in the bottom of the socket and closely fitting the upright wall of said socket, and upon which block the resistance medium bears, an outer socket inclosing the inner socket and connected to the outer container, and means for forming a substantially air-tight joint at the opposite end of the container, the two opposite substantially air-tight joints of said container preventing oxidation of the resistance medium.

In testimony whereof I affix my signature in presence of two witnesses.

LYNDE BRADLEY.

Witnesses:
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