Feb. 10, 1925. 1,525,949

A. PAPINI

ELECTRIC LIGHT DIMMING DEVICE

Filed May 15, 1923 2 Sheets-Sheet 1

Fig. 1.

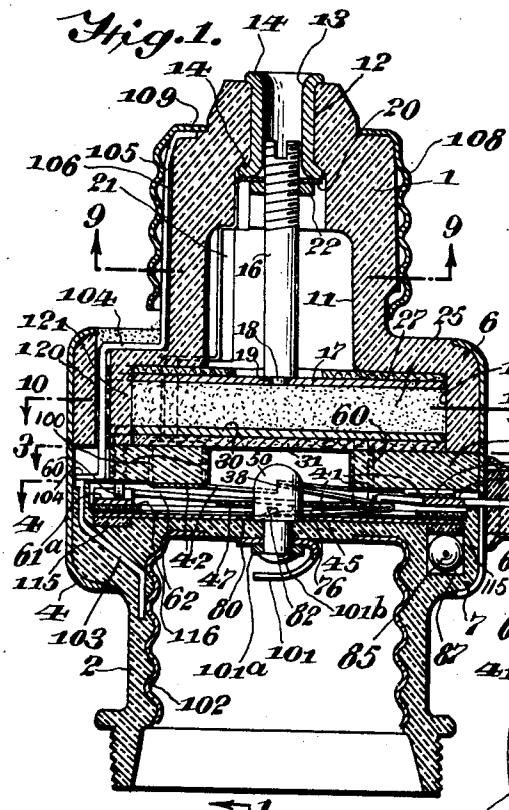


Fig. 2.

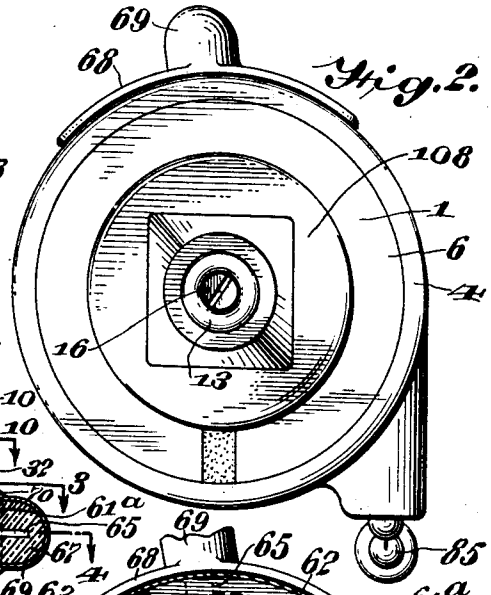


Fig. 3.

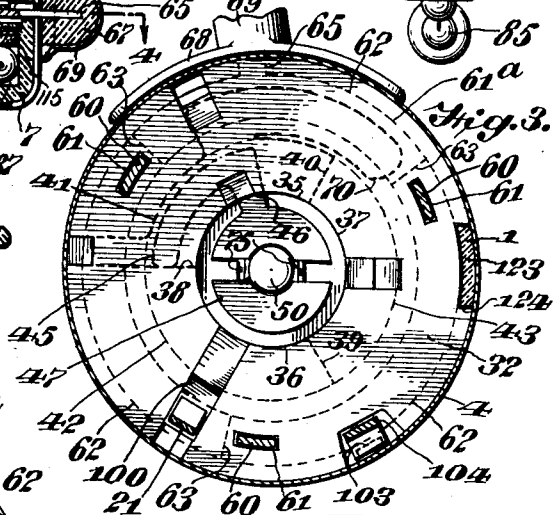


Fig. 4.

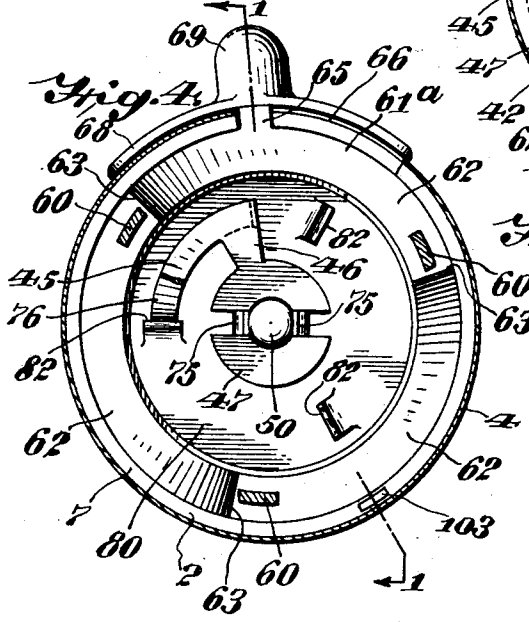
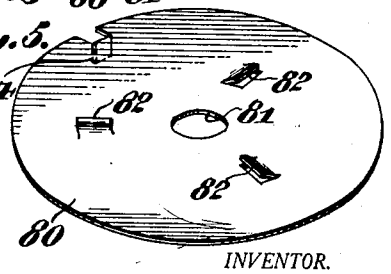


Fig. 5.



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Feb. 10, 1925.

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ELECTRIC LIGHT DIMMING DEVICE

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2 Sheets-Sheet 2

Fig. 6.

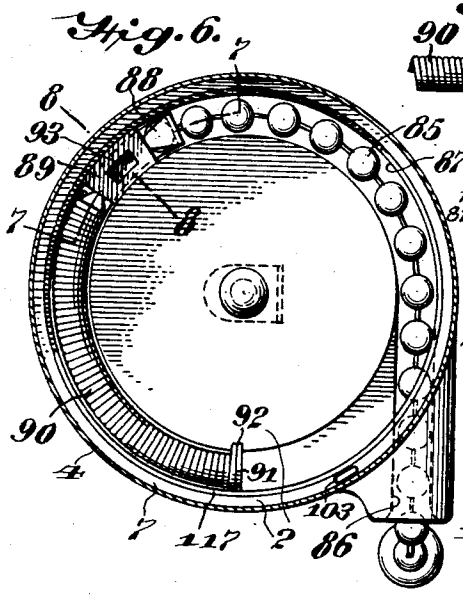


Fig. 7.

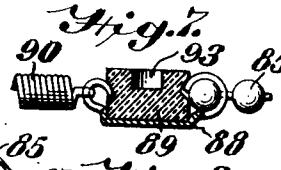


Fig. 8.



Fig. 9.

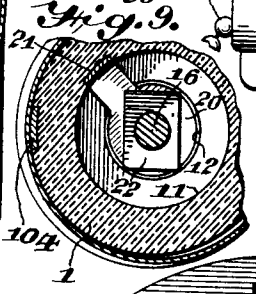


Fig. 15.

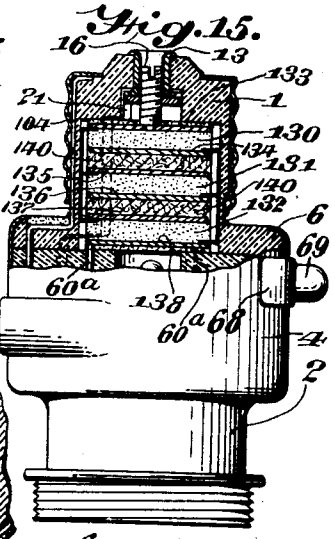


Fig. 10.

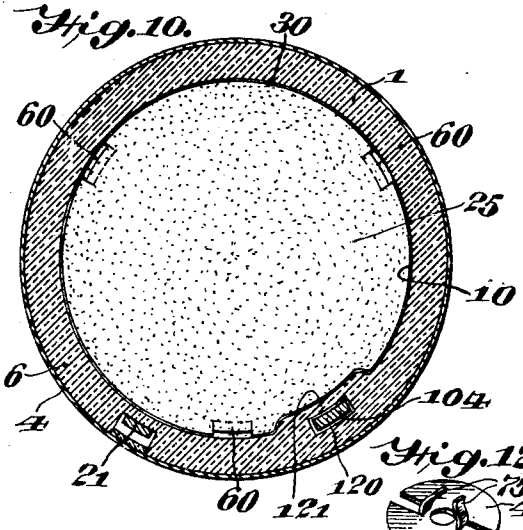


Fig. 11.

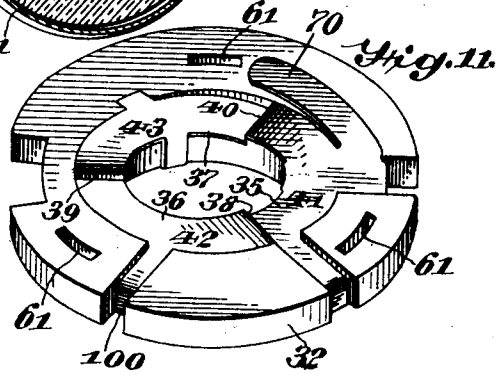


Fig. 12.

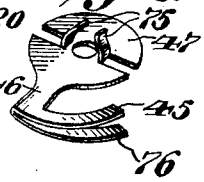


Fig. 13.

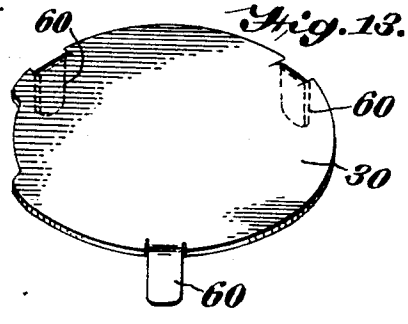
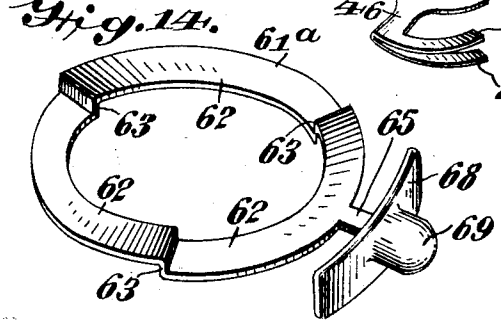


Fig. 14.



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Patented Feb. 10, 1925. 1,525,949

UNITED STATES PATENT OFFICE.

ANTHONY PAPINI, OF PHILADELPHIA, PENNSYLVANIA.

ELECTRIC-LIGHT-DIMMING DEVICE.

Application filed May 15, 1923. Serial No. 639,077.

To all whom it may concern:

Be it known that I, ANTHONY PAPINI, a subject of the King of Italy, and a resident of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented an Improvement in Electric-Light-Dimming Devices, of which the following is a specification.

My invention relates to electric light dimming devices, and it has for one of its objects to provide an improved and novel means whereby the flow of an electric current through a circuit may be controlled so as to vary and control the brightness of an electric light produced thereby.

A further object of the invention is to provide an improved and novel means for effecting a variation of the resistance offered by a resistance element to the flow of an electric current through a circuit.

A further general object of the invention is to provide a device which is simple in construction, highly efficient in operation, and which may be cheaply and economically manufactured.

To these and other ends my invention comprehends the construction and arrangement of parts as hereinafter described in detail and particularly pointed out in the claims.

In order that the invention may be more readily understood, reference may be had to the accompanying drawings in which I have illustrated one convenient form of mechanical embodiment thereof. However, it will be understood that changes in the details of construction may be made within the scope of the claims without departing from the said invention.

In the drawings:

Fig. 1 is a longitudinal sectional view of a device embodying my invention taken on the line 1—1 of Fig. 4;

Fig. 2 is a top plan view thereof;

Fig. 3 is a transverse sectional view taken on the line 3—3 of Fig. 1.

Fig. 4 is a transverse sectional view taken on the line 4—4 of Fig. 1:

Fig. 5 is a view in perspective of a plate for actuating or moving one of the contact elements of the device;

Fig. 6 is a top plan view of the lower half of the device, certain parts thereof being removed in order that other parts of the construction may be more clearly depicted;

Fig. 7 is a vertical sectional view taken on the line 7—7 of Fig. 6 showing a detail of construction;

Fig. 8 is a view taken on the line 8—8 of Fig. 6 showing a detail of construction;

Fig. 9 is a transverse sectional view taken on the line 9—9 of Fig. 1;

Fig. 10 is a transverse sectional view taken on the line 10—10 of Fig. 1;

Fig. 11 is a perspective view of a stationary member carrying contact elements which are adapted to cooperate with the movable contact element above referred to, which member is situated between the said movable contact member and the resistance element to which reference has hereinbefore been made;

Fig. 12 is a view in perspective of the movable contact member previously referred to;

Fig. 13 is a view in perspective of a member which is adapted to be actuated to control and vary the resistance to the flow of an electric current;

Fig. 14 is a perspective view of a cam member for actuating the member shown in Fig. 13, which cam member is adapted to be manually operated; and

Fig. 15 is a view in longitudinal section of a fragmentary portion of the device showing a modified construction.

Referring to the drawing: 1 designates the upper portion or half of a plug consisting of suitable insulating material, such as porcelain, and 2 the lower portion or half of the said plug, likewise consisting of suitable insulating material. These two portions are connected together by means of a thin sheet metal band 4 cylindrical in cross section. The upper and lower edge portions of this band are extended inwardly as indicated so as to engage the outer edges of the upper and lower sides of enlarged portions 6 and 7 of the members 1 and 2. It will be understood that the binding and holding band 4 is not placed in position until after the operative mechanism of the device, which is included within the plug consisting of the members 1 and 2, has been placed in position therein.

The enlarged portion 6 of the member 1 is provided with an enlarged opening, as indicated at 10, which communicates with an opening 11 of intermediate area or size, which in turn is in communication with an opening 12 of relatively small transverse area which extends through the upper or

outer end of the member 1 of the plug. A contact sleeve 13 is situated within the opening 12 and is retained therein by the flared opposite end portions 14, as shown in Fig. 1 of the drawings. The outer end of the member 13 is adapted to contact with a contact member having connection with one side or one branch of a circuit when the plug is screwed into a socket in the usual manner.

An adjusting bolt or rod 16 is situated within the member 1 of the plug structure in axial alinement with the opening through the sleeve 13. The upper end of the adjusting rod or bar 16 extends into the opening through the contact sleeve 13 and is held thereby in axial or central relation with respect to the device. The lower end of the adjusting bolt or rod 16 is in contact with a compression plate 17, and in order that the said bolt or rod may be retained in fixed relation, axially or centrally, with respect to the plate 17 the said bolt is provided with a small projection, as indicated at 18, which enters the small hole 19 in the said plate. The upper end of the adjusting bolt 16 extends through an opening in the upper transversely extending end portion 20 of a strip or bar 21 which constitutes a portion or section of one branch of an electric circuit through the device. The portion 20 is situated between the lower or inner end of the sleeve 13 and a nut 22 which is in screw threaded engagement with the upper screw threaded end portion of the adjustable bolt 16. Upon rotating the bolt 16 and at the same time holding the nut 22 against rotation relative adjustment between the bolt and nut are effected. The said nut operates to hold the portion 20 of the strip 21 of conducting material in contact with the lower end of the sleeve 13. Such adjustment likewise varies the pressure of the pressure plate 17 upon the upper side of the resistance element 25 situated within the enlarged opening or chamber 10 within the enlarged lower end portion of the part 1 of the plug. This resistance element comprises a mixture of powdered conducting and non-conducting material, such as graphite and mica. The proportions of these ingredients in the mixture may vary. I have found, however, that the mica may be employed in the proportions varying from about, though not less than, one-half part of mica to one part of graphite to about, though not more than, three parts of mica to one of graphite.

A washer 27 of sheet asbestos is interposed between the pressure plate 17 and the bottom of the enlarged portion 10 of the opening within the portion 1.

A co-operating pressure plate 30 is situated on the lower side of the resistance element 25, which plate rests upon a washer 31 of asbestos which in turn rests upon the upper side of an annular member 32 of insulating material, the lower side of which is provided upon its inner edge portion adjacent a central opening therethrough with inclined portions 35, 36 and 37. The lower end of each of these inclined portions or surfaces is separated from the adjacent end of the next succeeding surface by shoulders 38, 39 and 40.

The inclined portions 35, 36 and 37 are provided with thin sheet metal cover plates 41, 42 and 43. The first two of these plates, 41 and 42, are adapted to be placed within the electric circuit, but the third one, 43, is not. The purpose of providing the latter is to protect the body 32 of insulating material from wear due to the rubbing thereover of the contact spring 45 integral with an arm 46 extending outwardly from a thin disk-like plate 47 which is rotatably supported upon the upwardly projecting cylindrical stud 50 which is supported upon the upper or inner end of the member 2 which is hollow, as shown in Fig. 1.

The lower compression plate 30 is provided at intervals of 120° with downwardly extending legs or projections 60 adjacent its periphery, which legs extend downwardly through openings 61 in the member 32. The lower ends of these legs are in contact with the upper side of a ratchet-like cam ring 61^a provided with three inclined portions 62. The lower ends of these legs respectively contact with the inclined portions 62. The lower end of the upper surface of each of these portions 62 is separated from the raised or elevated end of the next succeeding portion by a shoulder or off-set 63, as best shown perhaps in Fig. 14 of the drawings. The annular ratchet-like cam 61^a is provided with a radially extending projection 65 which extends outwardly through a horizontal slot 66 in the sheet metal cylindrical member 4. A lump of insulating material 67 is mounted upon the outer end of the projection 65. A plate 68, provided for the purpose of covering and concealing the slot 66, is provided at its central portion with a socket-like projection 69 which fits over the lump 67 of insulating material. The portion 69 of the plate 68 which covers the insulating material 67 constitutes a handle by means of which the annular cam member 61^a may be adjusted or rotated either in a clockwise or in an anti-clockwise direction. By rotating the annular cam member 61^a in a clockwise direction the positions of the inclined surfaces of the portions 62 thereof are changed with respect to the projections 60. The higher parts of the surfaces of the said portions contact with the lower ends of the said projections so that they are elevated to cause corresponding elevation of the compression plate 30 to effect a compressive ac-

tion upon the resistance element 25 previously referred to. Upon turning the said annular cam member in the opposite direction the compression plate 30 is allowed to descend so that the pressure exerted against the resistance element 25 is reduced. The descending movement of the plate 30 is due to the resilient action of the composition of the resistance element 25.

The area of the adjustable plate 30 and of the portion of the resistance element 25 in contact therewith should not be less than the area of a plate of not less than one inch in diameter. If the area should be less, injurious arcing between the particles of the material of the resistance composition adjacent the adjustable plate 30 and between the particles of the said composition and the plate is liable to take place.

The stationary contact plate 41 previously referred to is provided with a spring finger 70 which is in contact with the cam member 61ª.

It will be noted that the member 32 previously referred to is situated between the opposing edge portions of the members 1 and 2 and is clamped between the same and also that it is held against lateral displacement by the surrounding cylindrical sheet metal member 4.

For the purpose of effecting better electrical contact between the plate 47 and the stud 50 upon which said plate is rotatably mounted, I have provided the said plate with upwardly extending spring fingers 75 which hug and contact with the said stud, as is clearly shown in Fig. 4 of the drawings. The projection 46 is extending radially from the plate 47 is provided with a spring finger 76 in opposed relation to the spring contact 45, as shown. The spring finger 76 is in contact with a rotatable plate 80 which rests upon the upper end of the member 2 and is held in axial relation with respect thereto by the stud 50 which extends upwardly through a central opening 81 in said plate. The said plate is provided with projections 82 arranged at intervals of 120° which projections are adapted to contact with the end of the spring finger 76 upon rotation of the said plate 80. Rotation or partial rotation of the said plate 80 is effected by means of a pull or actuating chain 85 the outer end of which extends outwardly through an opening 86 which extends tangentially with respect to the upper end portion of the member 2. The said member 2 is provided in its upper end portion adjacent its outer edge with a groove 87 within which the chain is situated. The inner end of the chain is connected to one end of a clip member 88 which is attached to a block 89 of insulating material. The opposite end of said clip is connected to the inner end of a contractile spring 90 the opposite or outer end of which is provided with an anchorage plate 91 which is secured within a slot or seat 92 in the upper end of the member 2 of the plug. The spring 90 is normally in contracted position, as shown in Fig. 6. The block 89 of insulating material is provided with an opening 93 in its top side with which is engaged a depending lug or projection 94 upon the contact actuating plate 80. Upon pulling the chain 85 the block 89 is caused to move in a clockwise direction (see Fig. 6) and such movement stretches and tensions the spring 90. Such movement likewise causes a corresponding clockwise movement of the plate 80. Such movement of the latter plate causes corresponding rotative movement of the contact member 45 by reason of the contact of the end of the spring finger 76 with the projections 82 which extend upwardly from said plate. Upon release of the chain 85 the spring 90 contracts so as to return the block 89 with the plate 80 in engagement therewith to normal position. Upon the operation of the plate 80 it is turned through an angle or distance of about 120°.

As the spring contact 45 is carried around by the action of the plate 80 as just indicated it contacts successively with the metal plates 41, 42 and 43 which are seated upon the inclined portions 35, 36 and 37 of the member 32. The plate 43 is insulated so that when the contact spring 45 is in contact therewith the circuit is broken and no current is permitted to flow through the device. If, however, the chain 85 is pulled so as to slide the contact spring 45 from the plate 43 onto the plate 42 the circuit is completed through the conducting strip 21, the bent metal strip 100 with which the lower or inner end of the latter is in contact, the plate 42 with which the said bent metal strip is integral, the spring contact 45 and arm or projection 46 to the stud 50. and from the latter to the contact 101 with which one end of the filament of a lamp is adapted to contact. The contact 101 is held in engagement with the lower reduced end portion of the stud 50, which extends through an opening in the upper portion 51 of the part 2, by a washer 101ª which in turn is held in place by the up-set lower end 101ᵇ of the said reduced portion, as shown. The opposite end of the filament is in electrical connection with the bushing 102 of the socket in the member 2 of the plug, which bushing is in contact with a contact strip 103 the upper end of which is in contact with the lower end of a contact strip 104, the lower portion of which is mounted within a passageway through the enlarged lower end portion of the part 1 of the plug, while the upper portion thereof is corrugated, as indicated at 105, and is seated within an elongated slot 106 within

the reduced upper end portion of the part 1. The corrugated sleeve 108 is connected by soldering at 109 to the upper end of the strip 104. If it is desired to dim the light the chain is again pulled so as to move the contact member 45 from the plate 42 to the plate 41. When such contact is made the circuit is completed through the bolt or rod 16, the upper compression plate 17, the resistance element 25, the lower compression plate 30, the depending projections 60, the cam member 61ª, the spring finger 70 which is in contact with the cam member and which is integral with the plate 41, and from thence to the spring contact 45 and thereafter the same as when the circuit is completed through the conducting strip 21, as above described.

It will be understood that when the circuit is completed through the resistance element 25 the resistance thereof may be varied and controlled by adjusting the cam member 61ª which operates through the projections 60 to vary the pressure of the plate 30 against the said element and to thereby vary the compactness and density of the latter. By increasing the pressure of the plate 30 to thereby increase the density or compactness of the said element the resistance is decreased.

The chain 85 heretofore referred to and spring 90 are insulated from the plate 80 by means of an annular strip 115 of insulating material, the said strip having a portion removed so that the opposite ends thereof are situated upon opposite sides of the block 89 of insulating material. A ring 116 of flat sheet insulating material, such as mica, is located directly above the outer edge portion of the contact actuating plate 80 and is supported upon an annular shoulder 117 upon the inner side of the upwardly projecting flange-like portion at the upper or inner end of the part 2. The flat ring 116 is situated between the plate 80 and the cam member 61ª and constitutes a support for the latter.

It will be seen that the parts 85 and 90, 80 and 61ª are properly insulated from each other so as to insure proper operation of the device.

In order to prevent the conducting strip 104 from contacting with the compression plates 17 and 30 I have provided a passageway 120 through the lower enlarged portion of the member 1, the inner side of which is closed by an integral portion 121 which shields the conducting strip 104 from the said plates.

In order to insure that the member 32 and the parts 1 and 2 shall remain in fixed relation with respect to each other I have provided the lower enlarged portion of the member 1 with a projection 123 which extends through a rectangular shaped notch 124 in the outer edge of the member 32 and into a depression (not shown) in the inner or upper edge of the part 2.

In the modification of the construction shown in Fig. 15 of the drawings I have provided a plurality of resistance elements 130, 131 and 132 upon the opposite sides of each of which are compression plates constituting electrodes which plates are designated 133 and 134, 135 and 136 and 137 and 138. Interposed between the compression plates or electrodes 134 and 135 and 136 and 137 are sections of insulating material 140, such as asbestos. As in the construction shown in the preceding figures of the drawing the first or original adjustment is effected by adjusting the screw bolt 16.

The lowermost plate 138 is provided with projections 60ª which correspond to and perform the same function as the projections 60 previously referred to.

The plates 133, 135 and 137 are connected in parallel as also are the plates 134, 136 and 138, as shown. In this way the three resistance elements are connected in parallel. The combined areas of the several plates in contact with the lower sides of the resistance elements 130, 131 and 132 should not be less than that of the area of a plate which is not less than one inch in diameter. The reason for this has already been pointed out in connection with the description of the structure shown in the previous figures.

It will be seen that by my invention I have provided a device of simple and unitary structure including simple and efficient means for varying the compression of the resistance element or elements to thereby vary the resistance thereof to the flow of an electric current therethrough. It will also be seen that I have provided a construction embodying a simple and novel means for effecting rotation of a rotatable contact member to thereby either disrupt or break the circuit entirely or change the path through which an electric current is permitted to flow.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In an electric light dimming device, the combination of an electric circuit including two branches, one of which comprises variable resistance means, an adjustable compression member upon one side of said resistance means, a cam actuating member movable in either of two directions about the longitudinal axis of the said device, and means interposed between the compression member and said cam actuating member whereby movement of said actuating member causes or permits movement of said compression member.

2. In an electric light dimming device.

the combination of a circuit comprising a branch including a resistance element, compression members upon opposite sides of said element, an oscillatable member having inclined cam acting surfaces thereon, and means interposed between one of said compression members and the said cam acting surfaces whereby upon movement of the said oscillatable member movement of the said last mentioned compression member is effected.

3. In an electric light dimming device, the combination of an electric circuit comprising a variable resistance element therein, compression plates upon opposite sides of said element, one of which is stationary and the other one of which is movable toward and from the said element, the said last mentioned plate being provided with projections which extend away from the said element, and an annular member rotatable in either direction and having inclined cam acting surfaces with which the ends of the said projections are in contact whereby upon rotary movement of the said member movement of the said movable compression plate is effected.

4. In an electric light dimming device, the combination of a two-part plug casing, a member of insulating material intermediate said parts, the under side of said member being provided with inclined portions separated from each other by shoulders, two of the said inclined portions being provided with metal contact plates, means for securing together the two parts of the said plug casing, an electric circuit comprising two branches, one of which includes a variable resistance element, compression plates upon opposite sides of said element, one of which is movable for varying the compression of the said element, said last mentioned plate being provided with projections which extend away from said element, a ring-shaped member which is partially rotatable in either direction about its axis, said member being provided with inclined cam acting portions with which the said projections are in contact, means whereby the said last mentioned member is electrically connected with one of the contact plates upon the said member of insulating material, a rotatable contact member, and means for causing rotation thereof to cause the same to contact successively with the metal contact plates upon the said member of insulating material.

5. In an electric light dimming device, the combination of a circuit having a branch including a compressible resistance element, electrodes on opposite sides of the said element, and means whereby either of said electrodes may be adjusted independently of the other.

6. In an electric light dimming device, the combination of an electric circuit including two branches extending through said device, one of said branches comprising a variable resistance element, and independently adjustable means upon opposite sides thereof whereby variation of the resistance may be effected.

7. In an electric light dimming device, the combination of a circuit including a plurality of branches one of which comprises one or more variable resistance elements, electrodes on opposite sides of said elements, means for adjusting one of said electrodes into permanent position, and means for independently adjusting another of said electrodes at will for the purpose of varying the resistance offered by the said element or elements.

8. In an electric light dimming device, the combination of a circuit including a plurality of branches within said device, one of said branches comprising a resistance element of compressible material, electrodes on opposite sides of said material, and means for independently adjusting said electrodes.

9. In an electric light dimming device, the combination of an electric circuit comprising a variable resistance element consisting of a body of powdered material, compression plates upon opposite sides of said element, and means for adjusting one of said plates at will to vary the pressure of the same against the said element, the area of said adjustable plate being not less than the area of a circular plate not less than one inch in diameter.

In testimony that I claim the foregoing as my invention, I have hereunto signed my name this 23d day of April, A. D., 1923.

ANTHONY PAPINI.