

Nov. 10, 1931.

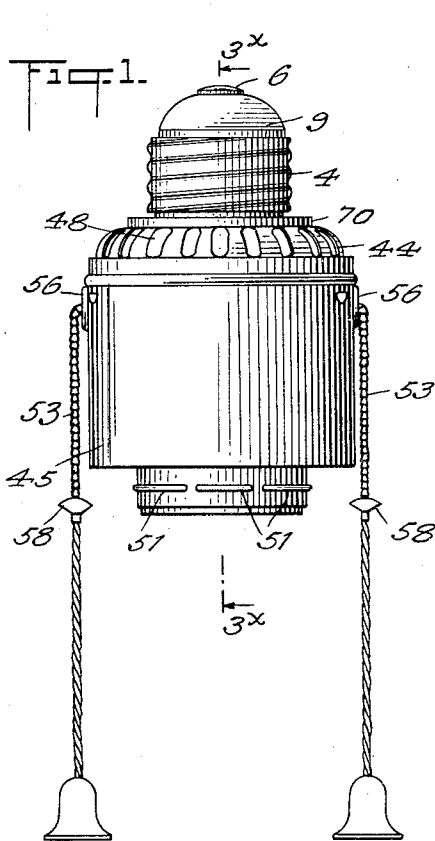
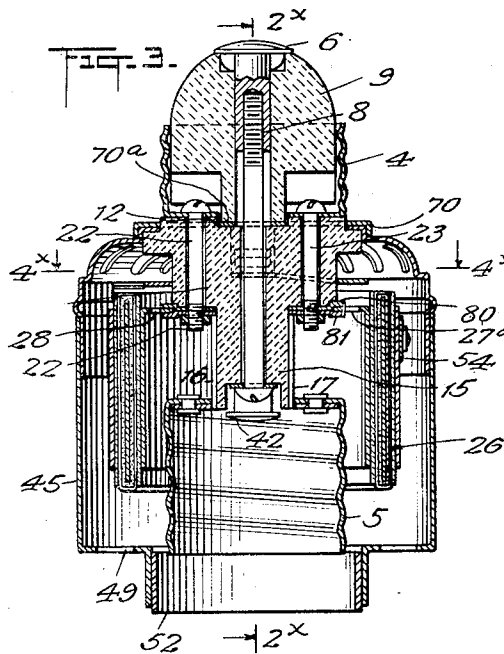
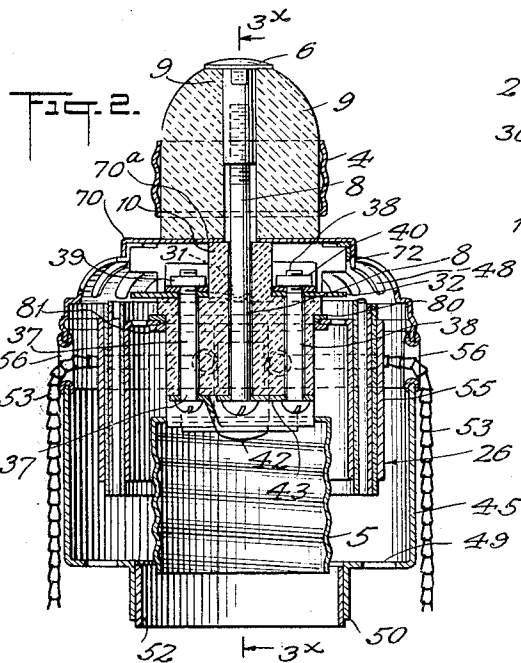
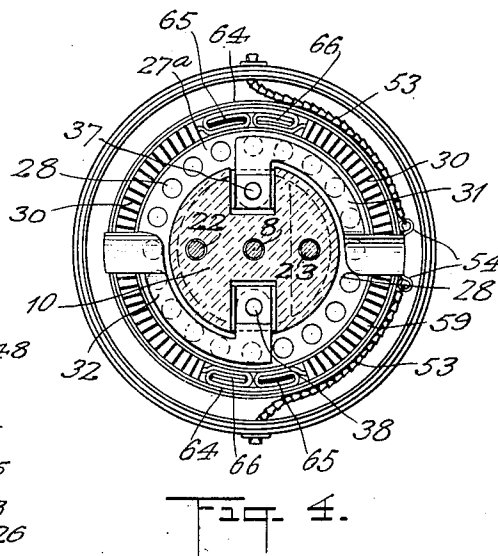
C. L. WEICHELT

1,831,052

VARIABLE RESISTANCE DEVICE

Original Filed Aug. 7, 1929

2 Sheets-Sheet 1



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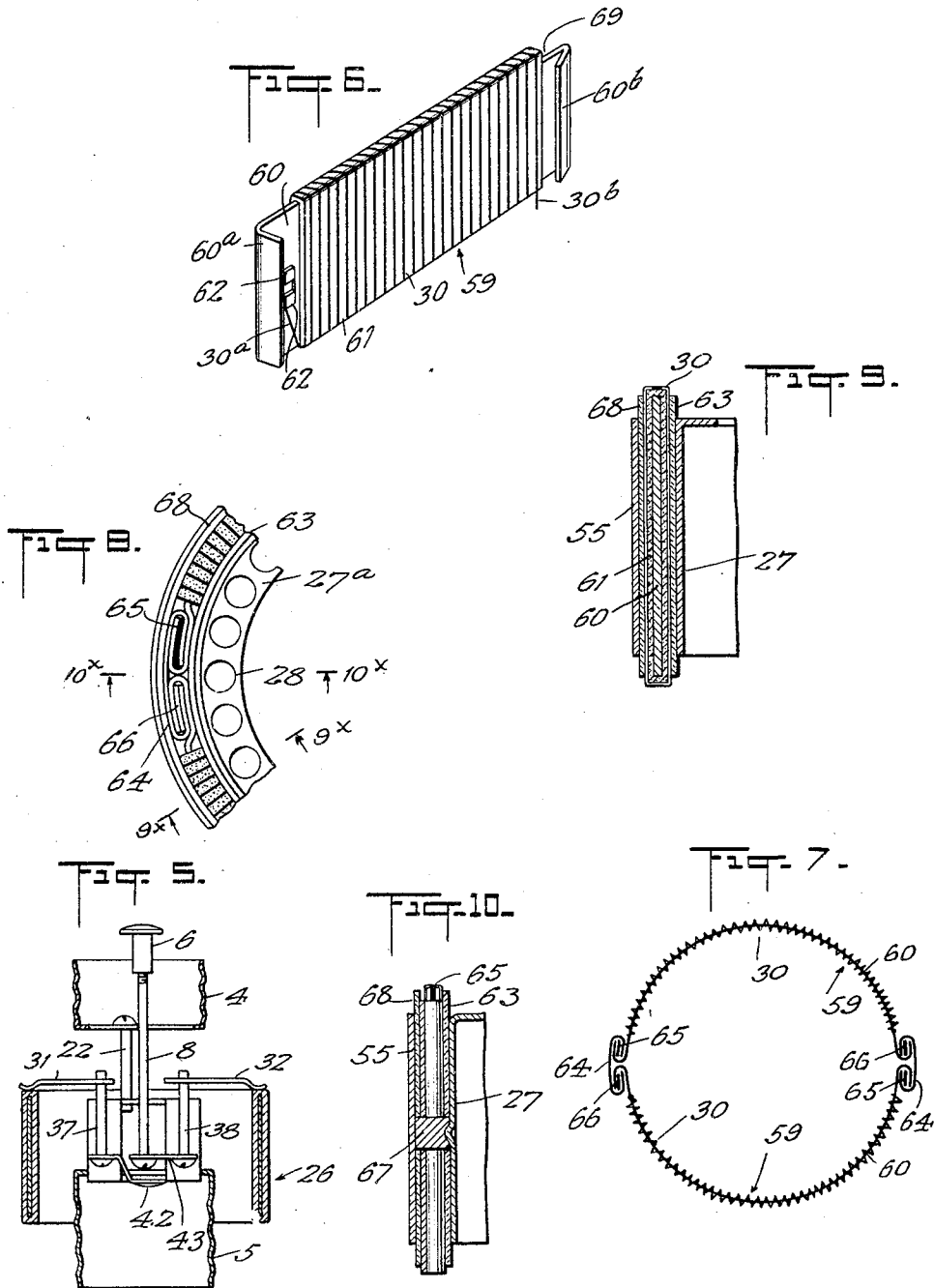
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## UNITED STATES PATENT OFFICE

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## VARIABLE RESISTANCE DEVICE

Original application filed August 7, 1929, Serial No. 384,106. Divided and this application filed August 8, 1930. Serial No. 473,790.

The present invention relates to rheostats and more particularly to rheostats for use in light dimming devices for electric lamps to regulate the flow of current through the lamp filament.

5 The general object of the invention is to provide a new and improved construction of a rheostat ring which renders it more satisfactory in operation and makes it easy and economical to manufacture.

10 This application is a division of co-pending application Serial No. 384,106, filed August 7, 1929.

15 The invention will be understood from the following description taken in connection with the accompanying drawings in which Fig. 1 is a side view of a light dimming device; Fig. 2 is a vertical sectional view of said device; Fig. 3 is a similar view on the planes indicated by the lines 3x-3x of Figs. 1 and 2; Fig. 4 is a horizontal sectional view looking downwardly on the plane indicated by the line 4x-4x of Fig. 3; Fig. 5 is a schematic illustration of the circuit connections through the device; Fig. 6 is a perspective view of one of the two resistance units forming the rheostat ring before it is bent into semi-circular form; Fig. 7 is a schematic illustration of the electrical connections with relation to the conductive support and the two resistance wires wound thereon; it also illustrates the electrical disposition of the pair of insulating contacts and the pair of conducting contacts which serve, respectively, to open circuit and to short circuit the resistance of the two wires; Fig. 8 is a partial view in detail of the rheostat ring showing the means of uniting the ends of the two supporting metallic strips on which the resistance wires are wound; and Figs. 9 and 10 are views taken on the planes indicated by the lines 9x-9x and 10x-10x of Fig. 8.

45 The light dimming device shown in the drawings is of the type forming a connection between an electric lamp and the terminal socket of an electrical fixture. This device comprises a tubular rheostat ring 26 constructed in accordance with the invention and described in detail hereinafter, and in the embodiment of the invention shown, this

ring is rotatable and its rotation produces the desired variation of the intensity of light from the electric lamp.

Referring particularly to Figs. 2 and 3, the connection of the light dimming device to a lamp socket is provided by an upper screwthreaded metallic shell 4 carried by an insulating body 9 and the center pin contact 6 also carried by said body. An inner insulating body 10 having an inner non-cylindrical extension 15 is held to the lower end of the body 9 by a center screw 8 threaded into the center pin 6. The connection of the light dimming device to an electric lamp is provided by a lower screwthreaded metallic shell 5 held at a distance from the base of the aforesaid extension 15 by a pair of spacing brackets 16 and 17 engaging the sides of the extension 15, and by a spring center contact 42 secured to the lower end of the extension 15. These brackets 16 and 17 are secured to the base formed by the extension 15 by screws 22 and 23 which also secure the plug shell 4 to the upper end of the body 10, electric connection between the plug shell 4 and the socket shell 5 being thus provided through the intermediary of the brackets 16 and 17 in cooperation with the screws 22 and 23.

The rheostat 26 is spaced from the body 10 and the shell 5 by an inturned annular flange 27<sup>a</sup> formed with ventilation openings 28, and rotatably supported between the faces of a pair of washers 80 and 81, secured to the base of the extension 15 by the aforesaid screws 22 and 23, whereby the rheostat 26 is capable of adjustment around the common axis of the parts.

The resistance of the rheostat 26 consists of two oppositely disposed resistance wires 30, 30 (see Fig. 7), one end of one of these wires being electrically connected to the diametrically opposite end of the other in a manner which will be later described; and two oppositely disposed spring wipers 31 and 32 (see Fig. 4), secured to the insulating body 10 by the screws 37 and 38 and nuts 39 and 40 above the plane of the base of the extension 15. These wipers cooperate with the upper edge of the rheostat ring 26 in a sliding engagement with the resistance wires 30, 30.

The screw 37 also secures the socket center contact 42 (Fig. 5) to the extension 15 and thus serves to provide electrical connection between said center contact 42 and the wiper 31. The screw 38 holds a metallic strip 43 against the lower end of the extension 15 of the center porcelain member. This strip 43 is also held by the center screw 8, whereby the center contact 6 of the plug and wiper 32 are in electrical connection through the intermediary of the center screw 8, the metallic strip 43 and the screw 38.

The outer casing of the light dimming device consists of two members 44 and 45 formed, respectively, with ventilation openings 48 and 49 and removably joined at their inner ends by suitable locking devices. The upper edge of the upper member 44 seats on the insulating body 10, and a ring 70 disposed between the bodies 9 and 10 firmly clamps this casing member in place. The lower casing member 45 is preferably formed with an extension 50, lined interiorly with an insulating strip 52 and formed with outwardly struck portions 51 in the shape of a single thread to receive the threads of a lamp-shade holder (not shown in the drawings).

The rotation of the ring 26 is accomplished by a pair of cords or flexible chains 53, 53, secured at their inner ends to a staple 54 carried by the rheostat ring 26, and leading from both sides of said staple through the eyes 56, 56, formed through the lower casing member 45. The limitation of the rotational movement of the rheostat ring is accomplished by stops 58, 58, exteriorly attached to the chains 53, 53, and cooperating with the eyes 56, 56. The point of attachment of the staple 54 should bear such relation to the rheostat ring and the location of the eyes 56, 56 should bear such a relation to the wipers 31 and 32, that each resistance wire 30 is adapted to cooperate with a wiper between the limit positions of the rheostat.

In order to prevent displacement of the casing relative to the stationary parts, the ring 70 is formed with a diametrically extending inner portion 70<sup>a</sup> integral therewith and centrally apertured for the passage of the center screw 8. This portion 70<sup>a</sup> is seated within a slot 12 formed at the upper end of the body 10 and thus prevents displacement of the ring 10 relative to the stationary parts. A depending tooth 72 formed at the rim of the ring 70 engages the inner edge of one of the ventilation openings 48 and thus prevents displacement of the casing relative to the ring 70 and hence relative to the stationary parts. The ventilation opening engaged by the tooth 72 is made longer than the remaining openings 48 so as to be easily distinguishable therefrom.

Since one end of one wire 30 is electrically connected to the diametrically opposite end of the other wire 30, it follows that a rotation

of the ring 26 produces a variation of the resistance measured between the wipers 31 and 32. Thus, with the arrangement of parts described, a series circuit is established which includes the center contact 6, the spring wiper 32, the resistance circuit between the two wipers, the spring wiper 31, the center contact 42, the lamp filament, the socket shell 5 and the plug shell 4; and a rotation of the rheostat ring 26 correspondingly enables a variation of the current through said lamp filament.

In accordance with the present invention, novel means are provided for constructing a rheostat ring such as the ring 26 used in the lamp dimming device described above. In the embodiment of the invention shown, the rheostat ring 26 comprises a tubular conductive support preferably formed in two separate metallic strips 60, 60, bent into semi-circular shape and joined at their ends. Each strip is covered with a suitable protective insulation, such as a wrapping thereon of several layers of an asbestos sheet 61, the ends 60<sup>a</sup> and 60<sup>b</sup> of the strip 60 being left bare, and a resistance wire or element 30 is wound spirally on the asbestos covering 61, one end 30<sup>a</sup> of said wire being attached around lugs 62 formed by striking up the material on the bare end 60<sup>a</sup> of the strip and being thereby in electrical connection with the strip, while the other end 30<sup>b</sup> of the said wire is left electrically unconnected with relation to the end 60<sup>b</sup> of the strip. The upper edge of the latter end is formed with an angular recess 69 for a purpose which will be made apparent presently, and both ends of the strip are outwardly plicated. The strips 60, 60 may be formed into semi-circular shape before or after positioning of the asbestos covering and wire thereon, and the two resistance units 59, 59 formed in this way are assembled on the inner rotatable shell 27 in such a way that recesses 69, 69 are disposed at the upper end of the rheostat and diametrically opposite to one another. This assembling of the resistance units 59, 59 on the inner shell 27 positions the electrically connected ends 30<sup>a</sup>, 30<sup>a</sup> of the resistance wires diametrically opposite to one another, and the free ends 30<sup>b</sup>, 30<sup>b</sup> also diametrically opposite to one another. The resistance wires 30, 30 are suitably insulated from the shell 27 as by a strip of mica 63 placed intermediate said wires and shell, the free ends 30<sup>b</sup>, 30<sup>b</sup> of the resistance wires being inwardly positioned between the mica insulation 63 and the asbestos insulation 61.

C-shaped conductive clamping members 64, 64 cooperate with adjacent plicated ends of the strips 60, 60 in holding adjacent ends of the two resistance units 59, 59 together and in establishing an electrical connection between the strips 60, 60. The upper edges of said members 64, 64 are formed with re-

cesses corresponding to the recesses 69, 69. Insulating mica brush riding contacts 65, 65 are inserted longitudinally within the folds connecting the recessed ends 60<sup>b</sup>, 60<sup>b</sup> of the strips and are made to project above the recesses in alinement with the upper end of the coil. Conducting contacts 66, 66 are placed within the folds connecting the other ends 60<sup>a</sup>, 60<sup>a</sup>. Locking pieces 67, 67 located in apertures extending through the connected ends of the resistance units serve to prevent a vertical displacement of the connecting members 64, 64 and of the insulating and conducting contacts 65, 65 and 66, 66. The assembled resistance units are protected by an outer shell comprising a metal band or ring 55 which holds the locking pieces 67, 67, in place. The shell 55 is insulated from the resistance wires 30, 30 by suitable insulating means such as a strip of mica 68. The locking pieces 67, 67 are preferably formed with an inner central recess into which the inner shell 27 is outwardly punched (as shown in Fig. 10) as a means to prevent a vertical displacement of said parts on the inner shell.

When the rheostat ring is used in the light dimming device heretofore described, the inner shell 27 may have formed thereon the inturred flange 27<sup>a</sup> serving to support the rheostat, and the outer shell 55 may have secured thereto the staple 54 to which are attached the chains 53, 53 serving to rotate the rheostat.

With the arrangement of parts described, the diametrically disposed ends 30<sup>a</sup>, 30<sup>a</sup> of the resistance wires are in electrical connection with one another through the conductive supports 60, 60, the resistance wires 30, 30, being thus placed in series. Since the wipers 31 and 32 are adapted to operate, respectively, on these resistance wires between their ends, a continued displacement of the rheostat ring relative to said wipers, in electrical contact with the convolutions of the resistance wires, produces a continuous variation of the resistance measured between said wipers.

In the embodiment of the invention described, the total resistance between the free ends 30<sup>b</sup>, 30<sup>b</sup> of the resistance wires is such as to produce a glow or dim light from an electric lamp. Upon rotation of the rheostat ring, such as by pulling either of the chains 53, 53, any desired degree of light intensity of illuminating by the lamp may thus be established. One of the limit positions of the rheostat ring places the wipers 31 and 32 in engagement, respectively, with the insulating brush riding contacts 65, 65, whereby the current through the light dimming device is interrupted. The other limit position of the rheostat places the wipers in engagement, respectively, with the conducting contacts 66, 66, and since they are in electrical connection with one another through the conductive supports 60, 60, the resistance wires

30, 30, are short-circuited and an electric lamp will correspondingly burn with full brilliancy. It is noted that the limit position of the rheostat ring interrupting the current through the device is adjacent those positions which establish minimum light intensities from the lamp, whereas the limit position of the rheostat ring short-circuiting the resistance wires is adjacent those positions which establish maximum light intensities from the lamp.

It is also noted that the strips 60, 60, need not be connected electrically at both of their ends, but may be electrically connected only at one pair of adjacent ends, the two resistance elements 30, 30 being then connected in series through one of the strips.

It now becomes apparent that there is provided a rheostat ring of simple construction and efficient in operation and one in which the parts thereof may be easily assembled, and that this construction makes possible electrically connecting oppositely disposed ends of the two resistance elements with facility.

What I claim:

1. A variable resistance device, comprising two arcuate conductive strips electrically connected together, two resistance elements wound respectively on said strips, and insulated therefrom, one end of one element and the oppositely disposed end of the other element being electrically connected to the strips and the other ends of the elements being insulated relatively to the strips, and switching means in sliding engagement with the two elements between their ends.

2. A variable resistance device, comprising conductive support, two resistance elements wound on separate portions of said support and insulated therefrom, one end of one of said elements being electrically connected to the non-adjacent end of the other element through said support and the other ends of the elements being insulated relatively to the supports, and switching means cooperating with said elements between their ends.

3. A variable resistance device comprising a circular conductive support, two resistance elements wound on separate portions of said support and insulated therefrom, one end of said elements being electrically connected to the non-adjacent end of the other element through said support and the other ends of said elements being insulated from said support, conducting contacts adjacent to and in electrical connection respectively with the ends of the elements connected to the support, insulating contacts adjacent respectively the free ends of the elements, and switching means cooperating with the elements between their ends and cooperating with said conducting contacts and with said insulating contacts to respectively short-

circuit and open-circuit the resistance elements.

4. A variable resistance device, comprising two resistance units bent into semi-circular shape, each of said units comprising a conductive strip and a resistance element wound thereon and insulated therefrom, each element being connected at one end to its respective strip, said units being mechanically joined together at their ends, the ends of the elements connected to the strips being each disposed between free ends of the elements, at least one pair of adjacent ends of the strips being electrically connected to one another, and switching means cooperating with the elements between their ends.

5. A variable resistance device, comprising two arcuate resistance units, each of said units comprising a conductive strip and a resistance element wound thereon and insulated therefrom, each of said elements having one end connected to its respective strip, the ends of said strips being outwardly plicated, C-shaped conductive clamping members the folds of which cooperate with plicated ends of the strips in holding the resistance units together and in establishing electrical connection between at least one pair of adjacent ends of the conductive strips, the ends of the elements connected to the strips being each disposed between free ends of the elements, a conducting contact and an insulating contact retained respectively within the folds of a clamping member, another conducting contact and another insulating contact retained respectively within the folds of the other clamping member and switching means cooperating with the resistance elements for sliding engagement therewith between their ends and cooperating with the conducting contacts and with the insulating contacts to respectively short circuit and open circuit the resistance elements.

In testimony whereof, I have signed this specification.

CARL L. WEICHELT.

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