C. WIRT.

LAMP REDUCER.

APPLICATION FILED MAR. 18, 1907.

904,826.

Patented Nov. 24, 1908.

2 SHEETS—SHEET 1.

Fig. 1

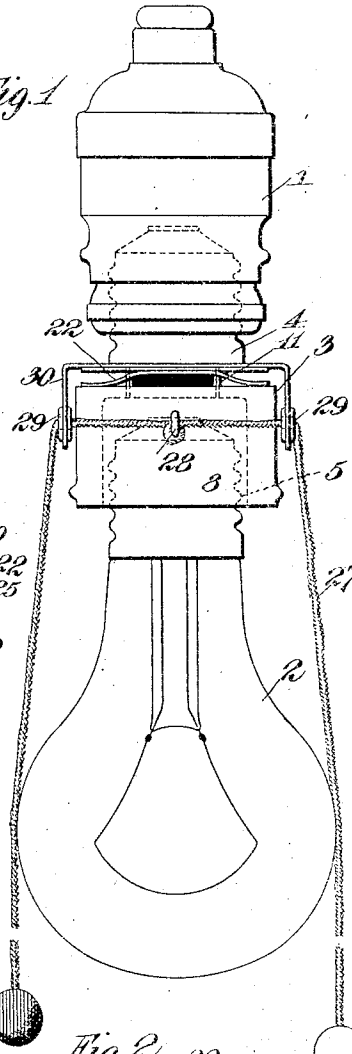


Fig. 4

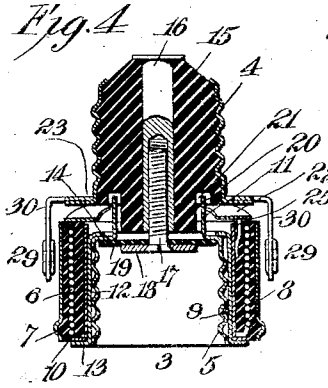


Fig. 5

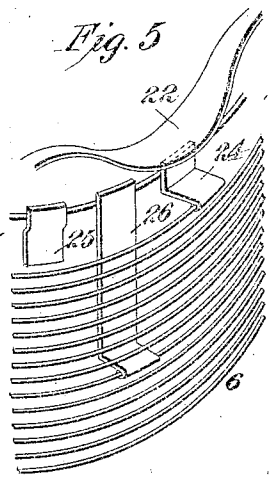


Fig. 6

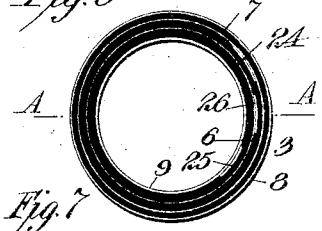


Fig. 7

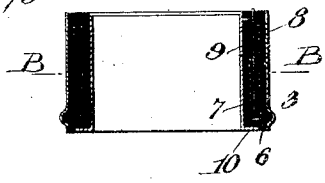


Fig. 2

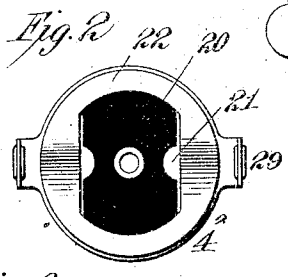


Fig. 8

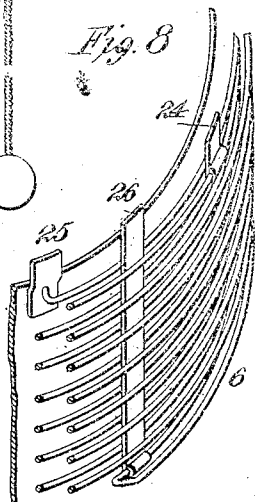
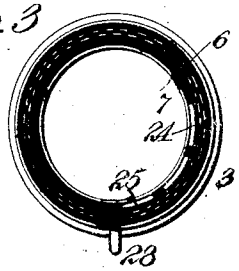


Fig. 3



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2 SHEETS—SHEET 2.

Fig. 9

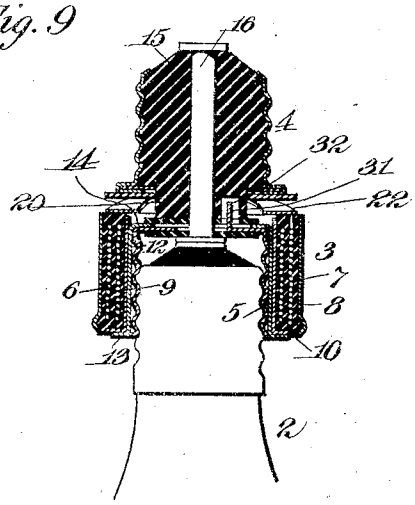


Fig. 13

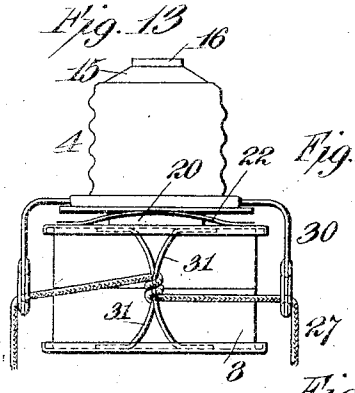


Fig. 10

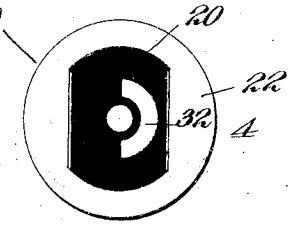


Fig. 14

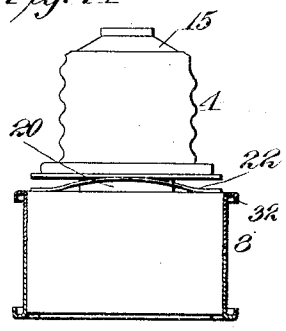


Fig. 11

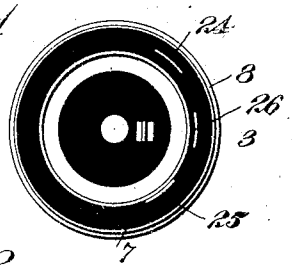
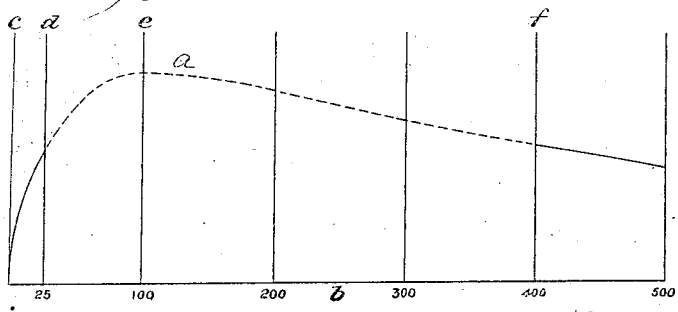


Fig. 12



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UNITED STATES PATENT OFFICE.

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LAMP-REDUCER.

No. 904,826. Specification of Letters Patent. Patented Nov. 24, 1908.

Application filed March 16, 1907. Serial No. 362,915.

To all whom it may concern:

Be it known that I, CHARLES WIRT, a citizen of the United States, a resident of the city of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Lamp-Reducers, of which the following is a specification.

The object I have in view is the production of a small, cheap and simple device of unobtrusive appearance for attachment to incandescent electric lamps by means of which the volume of light may be reduced without the accompaniment of undue heat.

In the drawings which illustrate several embodiments of my invention, Figure 1 is an elevation of a lamp and socket and a device embodying my invention interposed between the two. Fig. 2 is a bottom view of the plug with the rheostat ring removed but showing the spring in place; Fig. 3 is a top view of the rheostat ring; Fig. 4 is a section taken at right angles to Fig. 3; Fig. 5 is an enlarged view, partly diagrammatic, showing connections with the resistance coil; Fig. 6 is a sectional view of a modification, on the line B—B of Fig. 7; Fig. 7 is a modification on the line A—A of Fig. 6; Fig. 8 is an enlarged view, partly diagrammatic, showing connections with the preferred form of resistance coil, as shown in Figs. 6 and 7; Fig. 9 is a sectional view of a modification; Fig. 10 is a bottom view of the plug of the same. Fig. 11 is a top view of the resistance unit of the same; Fig. 12 is a view of the curve of energy and resistance showing certain features of my invention, and Figs. 13 and 14 are details.

In all of the views like parts are designated by the same reference characters.

In the drawings, 1 is a socket, and 2 is a lamp; 3 is a dimmer or reducer interposed between the lamp and the socket. This dimmer or reducer is provided with a plug 4 for attachment to the socket, and a socket 5 for attachment to the lamp. The plug 4 is shown as of the type adapted to engage with an Edison socket, and the socket 5 of the type for engagement with an Edison lamp. Any other form of attachment may be provided, as is obvious, so that the invention may be used with any kind of socket or lamp.

Interposed between the plug 4 and the socket 5 is a resistance coil 6. This resistance coil 6 is adapted to be cut out or in, or a certain part of it cut in, in series with the lamp. This coil 6 constitutes a rheostat, which is preferably molded in a ring of insulating material 7. The outside of the ring is a shell 8 preferably of metal; inside of the ring is a shell 9 also preferably of metal. This shell 9 is provided with an outwardly-turned annular flange 10.

The socket 5 consists of a threaded sleeve having one or more inwardly extending fingers or projections 11. Secured to the sleeve is a cylindrical sleeve 12 having an annular flange 13 extending outwardly at its bottom, and an inwardly-turned flange 14 at the top. This cylindrical sleeve 12 closely surrounds the threaded socket 5 and is secured thereto preferably by soldering. The rheostat ring freely turns around the sleeve 12, its flange 10 engaging with the flange 13 of the sleeve B. The plug 4 is made up of a metal casing, screw-threaded as shown, for attachment to the lamp socket and filled with a plug 15 of insulation. Within the plug is a pin 16 forming a center contact. This pin 16 is provided with a tapped hole in which is placed a screw 17. The head of this screw 17 supports a washer 18 of metal, and a larger washer 19 of insulating material. This washer 19 engages with the inturned flange 14 of the socket. The plug 15 is formed on its lower face with an uncylindrical extension 20. In the opposite sides of this extension are pockets 21 (see Fig. 2). The projections 11 extend into these pockets and serve as a means to prevent the socket 5 from rotating. A spring disk 22, having a non-circular central opening, surrounds the extension 20 and engages with a flange 23 on the walls of the plug 4 and also with the upper edge of the rheostat ring. The rheostat coil is electrically connected at one extremity to a clip 24 which extends up through the upper wall of the insulation 7. One of the metallic walls of the rheostat ring is electrically connected to a clip 25. A clip 26 is connected to the coil at some point intermediate its ends. The upper faces of all of these clips extend up through the insulation 7 and are in a position to be successively engaged by the spring disk 22 as the rheostat ring is rotated. The rheostat ring is rotated in any suitable manner, but preferably by means of a cord or flexible chain 27, having its two ends extending down-

wardly in convenient reach to be grasped. About the center of the cord or chain it is attached to a staple or loop 28. From this loop the cord or chain leads on both sides through bull's-eyes 29—29, carried upon a yoke or bracket 30 by the flange 23 of the plug 4. These bull's-eyes give a proper lead for the cords or chains 27, and transform the vertical pull upon the cords to the necessary pull to partially rotate the rheostat ring. By pulling upon one or other end of the cord or chain, the rheostat ring will be partly rotated, bringing the clips 24, 26 and 25 successively in contact with the spring 22. Electrical circuits will be through the pin 16 and to the center-pin or terminal of the lamp by contact with the screw 17 or washer 18 with the center-pin of the lamp. After passing through the filament current will pass through the sheathing of the neck of the lamp to the socket 5; thence it will pass either directly through the clip 25 to the disk 22, and thence to the outer wall of the plug 4, or through the whole or a portion of the resistance coil, depending upon whether the disk 22 is in contact with the clip 25 or clip 26. By rotating the rheostat ring to cause the clip 25 to engage with the disk 22, the rheostat coil will be short-circuited and the lamp will burn with full brilliancy. By engaging the clip 24 with the disk 22 by rotating the rheostat ring the entire resistance coil will be in series with the lamp, and thus reduce the brilliancy by an amount determined by the resistance of the coil. By turning the rheostat ring so that the clip 26 is in contact with the disk 22 only a portion of the resistance will be in circuit; consequently a greater amount of light will be produced. By determining the position of the clip 26 where it engages with the coil, the amount of resistance in circuit with the lamp can be ascertained. A number of intermediate clips similar to 26, engaging with different portions of the coil, may be employed, as is obvious, if it be desired to produce different variations in amount of light. When the disk 22 is not in engagement with any of the clips 24, 25 or 26, the circuit is naturally broken and the lamp is not lighted.

I may modify my invention in many ways, one modification being shown in Figs. 6 and 7. In this modification the coil 6 is a coil of superposed layers, the number of layers being as many as desired. The clip 26 engages with the coil where the inner and outer coils are connected together. The clip 24 is connected to the upper extremity of the outer coil and the clip 25 is connected to the upper extremity of the inner coil and also to the inner shell 8. This construction gives the full cooling area of surface for each coil and helps the heat to dissipate freely.

In the modification shown in Figs. 9, 10 and 11, the invention is shown as applied to a turnbulb type of reducer. In this modification the rheostat ring is turned by the turning of the lamp. The yoke 30 and cord 27 are omitted as being unnecessary.

In order to limit the extent of rotary movement of the rheostat ring, a finger 31 on the ring or socket part extends into a cut-away cavity 32 made in the insulation of the plug. This cavity occupies a portion only of a circle, and limits the turning movement of the ring. By turning the lamp bulb the ring will also be turned, successively engaging the contact clips 24, 25 and 26 with the spring disk 22.

I may use any form of insulating material which has the necessary mechanical strength, electrical insulation and heat-resisting qualities. I find that a mixture of Portland cement properly treated suffices, and possesses the further advantage that it may be readily molded. The lower end of the outer shell 9 may be provided with a bead, as shown, to more effectually support the outer casing upon the insulation.

Fig. 13 shows one manner of securing the cord in place. It is desirable to attach the cord after the rheostat ring is finished, and the position of the contact points determined. The point of attachment must bear a definite relation to these points, and is best made in the manner shown. The cord is looped around the spring clip 31, which is sprung in place between the flanges 32 on the outer casing 8. The frictional engagement of the clip with the flanges will hold the former in any position it may be placed.

Another portion of my invention consists in properly proportioning the resistance to the voltage and amperage of the current, by means of which I avoid excessive heat when the lamp is working upon reduced candle power. This I make possible by proper relation between the candle power and the number of amperes used. What is required practically in a bed-room light and for many other purposes, is a low candle power for giving a moderate light, say of two or three candles, and in addition, a dull red carbon, which will indicate the location of the lamp while giving but an extremely small amount of light. The following figures are given by Professor Langley for candle power and resistance, representing a test on an ordinary 16-candle 50 watt incandescent lamp:

1. Candle power equals .2; resistance in the circuit of the lamp equals 200% of the lamp resistance.

2. Candle power equals 1; resistance in the circuit of the lamp equals 55% of the lamp resistance.

3. Candle power equals 2; resistance in

the circuit of the lamp equals 40% of the lamp resistance.

4. Candle power equals 3; resistance in the circuit of lamp equals 30% of the lamp resistance.

5. Candle power equals 16; no resistance in circuit.

It is well understood that the maximum heat in the resistance under the conditions as quoted above will be found when the resistance in series with the lamp is equal in ohmic value to the lamp. From the above figures I will show that it is possible to get the variation in candle power desired while avoiding the condition of maximum heating. I prefer, in practice, to put two resistances into the device, one having a value of three or four times that of the lamp and the other having a value of from 20% to 30% of the ohmic value of the lamp. By this means I am enabled to cut down the candle power of the lamp to about three or four candles while getting only a moderate amount of heat in the resistance, for the reason that the volts on the resistance are low. I am also able to get a candle power of about .1 candles with a very small amount of heating in the resistance because the amperes will be small.

These relations are illustrated roughly in Fig. 12, in which the curve *a* is the curve of watts or heat in the resistance. The base *b*, upon which the ordinates *c*, *d*, *e* and *f* are drawn, represents resistance in series with lamp and are spaced according to the percentage of ohmic resistance of the lamp. The curve *a*, drawn through these ordinates, represents the heating effect of the current in the resistance represented by the height of the ordinate. At ordinate *c* no resistance is in series with the lamp. At ordinate *d* a resistance equal to about 25% of the lamp is cut in. At this resistance the 16 candle power lamp will produce about 3 candles. At ordinate *e* 100% of the resistance of the lamp is in series with the lamp, producing a light of about half a candle. At ordinate *f* about 400% of the resistance of the lamp is in series producing a light of about .1 candle power. The ordinate *e* is at about the peak of the curve and represents the maximum heating effect of the resistance. I proportion my steps o nresistance so that this maximum heating effect is avoided, and by proportioning the resistance corresponding to the ordinates *d* and *e* for the intermediate step of the lamp the heating effect is very much reduced.

It is to be noted that *e*, which represents 100% of the ohmic resistance of the lamp will also produce about one-half candle power light, which is that which has heretofore been used by others and which is the most likely to be used owing to the fact that 100% and ½ candle power about coincide. The ordinate *e* is coincident where the lamp and resistance are equal in ohmic value or 100% each, which is a value which has hitherto been commonly used in "turn-down" lights.

Rheostat lamp sockets, which have been the subject of many designs and have been placed on the market by various makers, have invariably been designed, so far as I know, either for a continuous variation (as done by a slider on a carbon resistance) or designed to have as many steps as convenient, said steps being adapted to give as many grades of candle power as might be feasible in a small device.

In every case I believe the grading of candle power at will has been the only consideration regardless of the heat question which, when found to be troublesome, has been met by using a small candle lamp (as an 8-candle instead of a 16-candle) or by increasing the size of the rheostat to dimensions which really preclude the use of the device as an attachment to a lamp holder.

By my invention the full commercial size lamp (16 candle power) and a socket resistance of feasible size can be secured. When the resistance coil is made with each section of the full length of the ring to get the maximum heating and current values properly proportioned I am enabled to secure a device which is of small size and will not disadvantageously heat, which, so far as I am aware, has not before been obtained. By this method of working only on the extremes of the resistance I am able to make a dimmer or reducer for a 16 candle 50 watt lamp having the effective heat radiating surface of a size not over 1½ inches in diameter and 1 inch long, and I find that the heat under these conditions may be kept so low that a linen cord used to turn the resistance may be wrapped about the surface of the rheostat ring and show no apparent loss of strength after a number of days of steady running heat. The size of dimmer or reducer mentioned will be accommodated by most of the small lamp shades such as are used for parlor or bed-room electroliers, and the slight added projection of the lamp in place is scarcely noticeable.

I am familiar with resistance sockets which are for sale, but so far as I know, they are only for 8 candle lamps. The size of these sockets is about the same as the size of my resistance sockets for 16 candle lamps. These prior sockets can be bought, though they are little used, and are objectionable in being of at least twice the length and are very clumsy in appearance.

In accordance with the provisions of the patent statutes, I have described the principle of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to

have it understood that the apparatus shown is merely illustrative and that the invention can be carried out in other ways.

Having now particularly described the nature of my invention, and in what manner the same is to be performed, what I claim and desire to secure by Letters Patent is:

1. A lamp reducer having a socket for attachment to a lamp and a plug for attachment to a socket and a rotary rheostat ring surrounding the socket.

2. A lamp reducer having an attachment for a lamp, an attachment to a socket, and a rotary rheostat ring surrounding the attachment for the lamp and means operated by the rotation of the ring for interposing a variable resistance in circuit with the lamp.

3. A lamp reducer having a plug for attachment to a socket and a socket for attachment to a lamp, a rheostat ring surrounding the socket and having contacts and a spring in engagement with the contacts.

4. A lamp reducer having a plug for a socket and a socket for a lamp, the said plug having a non-circular projection, a spring disk surrounding the projection and a rheostat ring surrounding the lamp socket and having contacts in engagement with the spring disk.

5. A lamp reducer comprising a resistance, the said resistance being so proportioned as to reduce the candle power of a constant potential electric lamp or lamps in steps or divisions so proportioned as to permit of having in series with the lamp or lamps a resistance considerably less than the lamp resistance, or considerably more than the lamp resistance, so that the maximum amount of heat which will be generated in the resistance when the ohmic value equals the ohmic value of the lamp is avoided.

6. A reducer for electric lamp regulation comprising a helical coil of resistance wire and contact bars disposed parallel to the axis of said coil, an inner and an outer cylindrical casing and an insulating filling adapted to act as a support and to hold the several members in position.

7. A reducer for electric lamp regulation comprising a helical coil in one or more layers, contact bars parallel to the axis of said coil and exposed at one or both ends, a body of molded heat-resisting insulating material acting as a support, together with a suitable contact member movable relatively to the contact bars.

8. A reducer for an electric lamp or lamps having two or more steps, the resistance for each step consisting of a layer occupying practically the full available area for the purpose of getting rid of heat most effectively.

9. An electric resistance adapted to reduce the candle power of an electric lamp having spring contacts co-acting with a contact or contacts on the lamp, whereby all or a part of said resistance may be put in circuit with said lamp to the end of getting more or less candle power.

10. An electric resistance adapted to reduce the candle power of a constant potential electric lamp having steps or divisions so proportioned as to permit of having in series with the lamp a resistance considerably less than the lamp resistance, or considerably more than the lamp resistance to the end that the maximum amount of heat which will be generated in the resistance when the ohmic value equals the ohmic value of the lamp be avoided.

11. A resistance for reducing the candle power of an electric lamp consisting of a case or shell fitted to engage the lamp holder, suitable coils of wire or other resistance conductors, spring tongues co-acting with the base of the lamp and adapted to be forced down thereby into contact with each other and into contract with a short-circuiting member, whereby the amount of resistance in circuit may be varied or the resistance cut out altogether when full candle power of the light is desired.

This specification signed and witnessed this 15th day of March, 1907.

CHARLES WIRT.

Witnesses:
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JOHN S. LOTSCH.