R. D. SMITH.

LAMP DIMMING SOCKET SWITCH.

APPLICATION FILED JAN. 10, 1917. RENEWED AUG. 12, 1919.

1,343,689.

Patented June 15, 1920.

Fig. 1

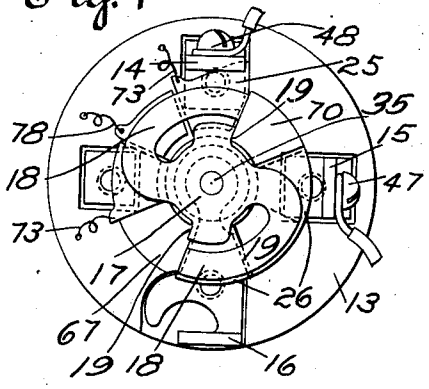


Fig. 3

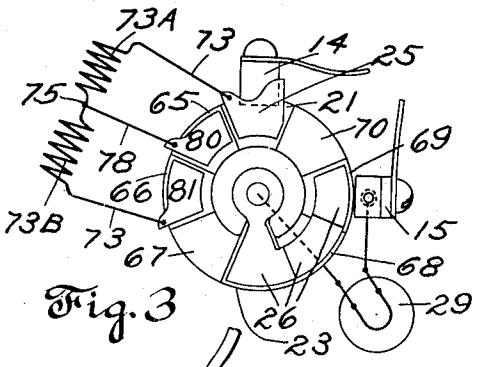


Fig. 2

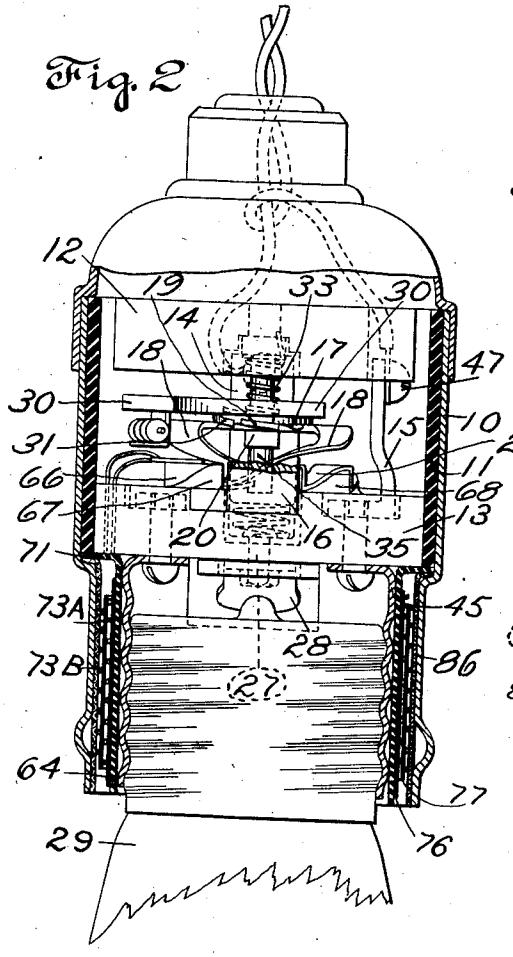
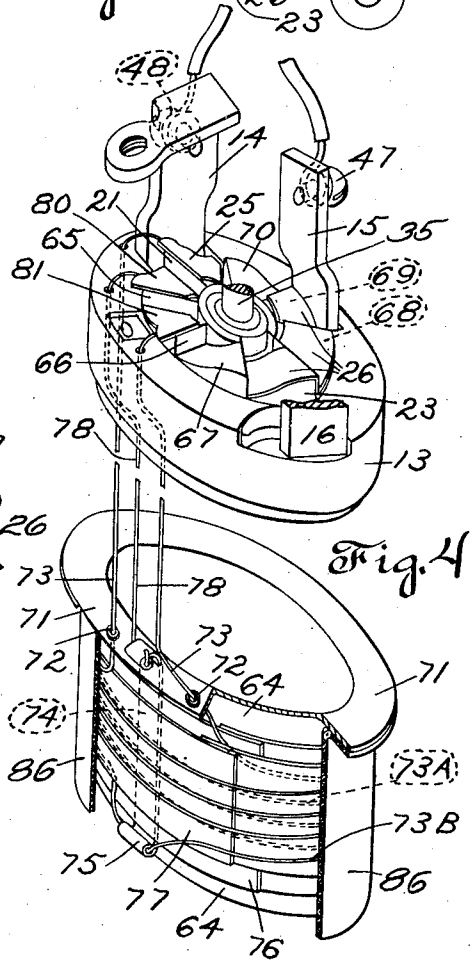


Fig. 4



Inventor,
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UNITED STATES PATENT OFFICE.

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LAMP-DIMMING-SOCKET SWITCH.

1,343,689. Specification of Letters Patent. Patented June 15, 1920.

Original application filed October 27, 1916, Serial No. 128,132. Divided and this application filed January 10, 1917, Serial No. 141,676. Renewed August 12, 1919. Serial No. 317,098.

To all whom it may concern:

Be it known that I, RAYMOND D. SMITH, a citizen of the United States, residing at Arlington, in the county of Middlesex and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Lamp-Dimming-Socket Switches, of which the following is a specification.

This application is a division from my co-pending application, Serial No. 128,132, filed Oct. 27, 1916.

This invention relates to lamp-dimming sockets and their contained switch mechanism, and has for its broad object to incorporate in such sockets, and, preferably, entirely within the casing-inclosed structure thereof, in compact and durable form, means, preferably under control of the usual socket-switch actuating element, for varying at will the intensity of illumination produced by the socket supported lamp.

Through the principles of my present invention, the usual commercial form of pull-socket can readily be modified to increase greatly its usefulness by providing therein such self-contained means for varying the degree of light through manipulation of the usual pull chain; and this modification may be made at comparatively slight increase in cost, or complication in construction, and without sacrificing any of the desirable qualities of durability and compartness heretofore developed and now existent in this type of socket-switch.

In the embodiment of my invention herein disclosed for illustrative purposes only, I have chosen a pull-socket of well known construction, having a circular series of ratchet steps or contact inclines whose bases are disposed in a plane at right angles to the axis of rotation of the usual contact bridging plate, and of its oscillatory operating wheel. Two conductive spring arms of this contact plate are adapted, as usual to engage simultaneously with diametrically opposite contact inclines and to leave such inclines abruptly and simultaneously, thus producing the quick double break of the circuit recognized as the best practice in this type of switch construction.

The lamp-dimming means which I herein employ involves an electrical resistive unit which may be provided with circuit connections to the said switch contact inclines, whereby such unit is wholly or partially connected into series with the lamp in certain positions of the switch. This unit may be of several forms and located within the socket casing in any position consistent with the objects of the present invention but I preferably form same as a sleeve or bushing carrying a winding of fine resistance wire, properly insulated by refractory material, and located preferably around the threaded lamp receptacle and interior of the outer casing, in place of the paper or fiber insulating lining for the casing usually there contained.

The operative arrangement is preferably such that successive actuations or strokes of the usual socket pull chain shall cause variations in the intensity of the light in predetermined sequence such as, say, from full brilliancy to a slight dimming; then to further dimming; and finally to complete extinguishment of the light. The exact sequence of lighting, dimming, and extinguishing effects is of course dependent upon the arrangement of electrical connections between the resistance unit, the switch incline contacts, and the lamp; as will become more readily apparent from the following description. As will also later be made clear the preferred embodiment of my invention affords means for producing by successive strokes upon the control chain an optional sequence of lighting effects determinant upon whether a full or partial stroke of the chain is made.

I am aware that various types of electric-socket dimming devices are known in the art and I therefore wish to point out that the several objects of my present invention are directed toward obtaining the full advantages of such devices in a simpler, more compact and convenient way than has heretofore been known. To the accomplishment of these objects my invention resides partially, but not exclusively, in the details of construction, arrangement, and combination hereinafter described and claimed, and illustrated in the accompanying drawings.

In the drawings:—Figure 1 is a plan view of parts of my novelly combined pull switch and light reducing element, the upper insulating cap and inclosing casing being

omitted for clearness; Fig. 2 is a front view in elevation with casing cut away showing the complete socket switch and resistance unit; Fig. 3 is a diagram of electrical connections; Fig. 4 is an exploded view in perspective of a portion of the socket structure and of the resistance unit, the outer covering of the latter being partially broken away to more clearly show the winding of resistance wire.

In all views of the drawings identical parts are designated by like numerals.

The casing appears at 10 and is provided in its upper portion with an insulating lining 11. This casing contains an upper insulating block 12, and a lower insulating block 13, connected and spaced by three standards 14, 15 and 16. The usual, rotatable, contact-bridging plate 17 has two opposite and downwardly sloping, conductive, spring arms 18, shoulders 19 and a hub 20. Eight equally spaced inclines 21, 65, 66, 67, 23, 68, 69 and 70 are formed, respectively, in circular arrangement on the lower block 13, each incline terminating in an abrupt shoulder.

Incline 21 carries a contact leaf 25 shaped to conform therewith and to extend therefrom into contact with the base of insulated standard 14, which carries a binding post screw 48 for one of the socket leads. To contact leaf 25 is connected one terminal of the resistance wire 73. Incline 65 carries a similar but insulated contact leaf 80 which, by means of the wire 78, is in electrical connection with only an intermediate point in the resistance winding. Incline 66 carries also an insulated contact leaf 81 to which is attached the other extremity of the resistance wire 73. Opposite inclines 67 and 70 are blank, and a single, continuous contact leaf 26 is formed to occupy each of the three inclines, 23, 68 and 69 extending also to electrical contact with the center tongue 28 for the filament base terminal of an incandescent lamp 29.

The threaded shell receptacle 45 for the lamp is in permanent electrical contact with the insulated standard 15 which carries a binding post screw 47 for attachment of the other socket lead. Spring arms 18 of plate 17 are adapted conductively to bridge diametrically opposite inclines, as the plate 17 is rotatively impelled about the vertical, insulated stud 35 by successive oscillations of the usual insulated operating wheel 30, which by means of shoulders 31 engages under axial tension of spring 33 with shoulders 19 of plate 17, and against the torsional tension in said spring rotates plate 17 positively in one direction approximately ninety degrees of travel for one full stroke on the pull chain, this type of socket-switch construction being well known in the art. From the preceding it will be clear that a full stroke on the control chain will advance each of the switch arms over two successive inclines, whereas a partial stroke may advance each of the arms 18 over only one incline.

Fig. 4 clearly shows the construction of the resistance unit and its connection to the three incline contacts 25, 80 and 81. A thin cylindrical drum 64 formed of asbestos paper, or some other suitable insulating and refractory material, is flanged at its top 71 and is provided in this portion with small eyelets 72 through which may pass the terminals of the fine resistance wire 73. These eyelets provide a smooth and durable guide for the wire and are easily attachable when constructing. A strip of conductive foil 74 is held longitudinally against the drum 64, passing upwardly through a slot in the flange 71, and at its lower end 75, makes electrical contact with an intermediate coil of the resistance wire.

An inner layer of mica 76 covers the foil 74 and on this mica is wound helically from top to bottom, the first layer 73^A of resistance wire. A second or outer layer of mica 77 covers the winding 73^A and over this second layer is wound helically from bottom to top, the second layer 73^B of resistance wire. A lead 78 connects the foil strip 74 with contact leaf 80. An outer covering 86 of some suitable material, such as asbestos tape, is then applied to cover and protect the windings, thus forming a compact resistance sleeve which may be inserted in place of the usual shell lining about the threaded receptacle for the main lamp;—without any increase of size or change in form of the outer shell as generally employed.

From Fig. 3, it will be clear that bridging of successive pairs of diametrically opposite inclines by the contact plate 17, when the latter is advanced counter-clockwise, produces the following cycle of lighting effect in the lamp 29—bright, dim, dimmer, extinguished and then bright again. Of course, this sequence of operation can be varied by rearrangement of contacts and also different operative effects can be obtained by increasing or diminishing the number of inclines and contacts.

It will be understood that if desired the radiation of heat generated in the resistance winding 73 may be assisted by perforating the outer casing 10 in its portion proximate said winding, or by other suitable heat radiative construction compactly arranged; and as before stated the resistance unit may have any suitable form and location. It will also be clear that to practice my invention it is not necessary to make use of contact inclines arranged as detent teeth of a stationary ratchet coöperating with the one-way rotatable current switching member to prevent the retrogressive movement thereof between

contacts. Any mechanical contrivance to hold the said member 17 in selected circuit-governing position while the actuator 30 is returned by the spring 33 to a position for another stroke is within the spirit of my invention, and equivalent to the precise arrangement herein illustrated for accomplishing this function.

Modifications and improvements of my invention disclosed herein, and having particular reference to the mounting of the resistance winding and coöperative arrangement of the same with the lamp receptacle and inclosing shell, are described and claimed in my copending application, filed June 5, 1917, Serial No. 172,932.

It is immaterial to the spirit of my invention what type of socket structure is employed either as to its precise switching mechanism or outward form and provision therein for mechanical and electrical connection to the means of support. Those skilled in the art will appreciate that my invention may be as readily embodied in that type of socket-switch commonly known as an adapter, as in the herein illustrated permanent or "fixture" form of socket.

Without, therefore, limiting the scope of my invention to the precise form and mechanical arrangement of pull-socket switch herein described and illustrated, what I claim as new is,—

1. A socket-switch structure having, in combination with means for attachment and a single electrical connection to the supply circuit, a switch-holding block with a centrally-mounted ratchet-driven, current-switching member, and a plurality of circularly and concentrically arranged inclines positioned coöperatively with said member; a lamp receptacle mounted on said insulating block with a circuit connection to a contact plate on a selected member of the series of inclines; and an electrical resistance unit having circuit connections to contact plates on others of said inclines arranged in series with the receptacle contacts; whereby progressive, ratchet-caused movement of said current switching member varies in a predetermined manner the operative electrical series connection of said lamp receptacle and said resistance unit to the supply circuit.

2. A socket-switch structure having, in combination with means for attachment and a single electrical connection to the supply circuit, a switch-holding block with a centrally-mounted ratchet-driven, current-switching member, and a plurality of circularly and concentrically arranged inclines positioned coöperatively with said member; a lamp receptacle mounted on said insulating block with a circuit connection to a contact plate on a selected member of the series of inclines; and an insulated winding of resistance wire positioned about said lamp receptacle and interior of the outer socket casing and having electrical connection to a contact plate on another of said inclines arranged in series with the receptacle connected device; whereby progressive, ratchet-caused movement of said current switching member varies in a predetermined manner the operative electrical series connection of said lamp receptacle and said winding of resistance wire to the supply circuit.

3. A socket-switch structure having, in combination with means for attachment and a single electrical connection to the supply circuit; an insulating switch-holding block with a centrally mounted, rotatable and ratchet-driven, current-switching member, the said member being formed as an insulated centrally pivoted double-break conductive plate having diametrically opposite contact-making arms; a plurality of circularly arranged inclines having abrupt shoulders formed on the said insulating block and positioned coöperatively with said contact-making arms to form diametrically opposite positioning seats therefor; a two-pole plug receptacle mounted below said block with a circuit connection to contact plates on a selected pair of the series of inclines; and an electrical resistance unit having circuit connections to contact plates on others of said inclines arranged in series with the plug contacts; whereby progressive, ratchet-caused movement of said current switching member varies in a predetermined manner the operative electrical series connection of said lamp receptacle and said resistance unit to the supply circuit.

4. A socket-switch structure having, in combination with means for attachment and a single electrical connection to the supply circuit; an insulating switch-holding block with a centrally mounted, rotatable and ratchet-driven, current-switching member, the said member being formed as an insulated centrally pivoted double-break conductive plate having diametrically opposite contact-making arms; a plurality of circularly arranged inclines having abrupt shoulders formed on the said insulating block and positioned coöperatively with said contact-making arms to form diametrically opposite positioning seats therefor; a two-pole plug receptacle mounted below said block with circuit connection to contact plates on a selected pair of the series of inclines; and an insulated winding of resistance wire positioned about said lamp receptacle and interior of the outer socket casing and having electrical connection to contact plates on others of said inclines arranged in electrical series with reference to said winding and the receptacle connected device; whereby progressive, ratchet-caused movement of said current switching member varies in a predetermined manner the operative electri-

cal series connection of said lamp receptacle and said winding of resistance wire to the supply circuit.

5. In a socket-switch structure having parallel superposed switch-holding-and-insulating plates disposed at right angles to the axis of the structure, and further having a plate-mounted co-axial plug receptacle and a surrounding metallic protective casing, in combination; a resistance winding in sleeve form, mounted exteriorly and circumferentially on a portion of the casing inclosed structure and within the longitudinal limits of the conjoined structure formed by said receptacle and switch-holding plates; and a multi-step switch supported between said plates and embodying a single-acting current switching member and a plurality of circuit controlling contacts arranged cooperatively with said member and selectively to connect the receptacle circuit and resistance winding in series with the supply circuit.

6. In a socket-switch structure having parallel superposed switch-holding-and-insulating plates disposed at right angles to the axis of the structure, and further having a plug receptacle of smaller diameter than said plates and mounted co-axially with the structure on one of said plates, in combination; a resistance winding, in sleeve form, mounted exteriorly on said plug receptacle; and a multi-step switch supported between said plates and embodying a single-acting current-switching member and a plurality of circuit controlling contacts connected respectively to close the circuit to said receptacle and to connect said resistance winding progressively in series with the receptacle circuit; whereby selectively, and by a progressive movement of said member, the receptacle circuit may be connected in series with the supply circuit or with a portion or all of said resistance winding and the supply circuit.

7. In a lamp socket of the class described, having a switch with stationary contacts therefor, a lamp receptacle, and an insulated, outer casing arranged to inclose both said switch and said receptacle, a resistance unit mounted exteriorly on said receptacle and comprising in combination; a flanged drum of insulating and refractory material having eyelet-protected openings in an upper flanged portion thereof and being positioned between said receptacle and said outer casing; a single winding of resistance wire arranged on said drum in two helically disposed layers separated by a layer of insulating and refractory material, the terminals of said windings extending through said eyelet openings; an insulated, conductive strip disposed transversely of said winding and having a single electrical connection therewith at an intermediate point thereof and also having electrical connection with one of said stationary switch contacts; and an outer insulating and refractory covering for said winding and said eyelets, substantially as shown and described.

8. In a lamp socket-switch, in combination with the switch and holding-and-insulating plate therefor, and a plug receptacle mounted below and on said plate; a sleeve-formed resistance device with contacts arranged to be put in series with the receptacle switch-controlled circuit, said device comprising an insulating drum mounted externally on said receptacle and a resistance winding carried by said drum,—the device being compositely formed of an inner portion with the winding externally thereon and having metallic eyelets at its top portion through which the winding terminals are led, and an outer portion substantially covering cylindrically the said inner portion, winding and eyelets; an upper portion of the sleeve containing said eyelets being bent from the axis of the sleeve to form a flange, which is positioned between the lower surface of said plate supporting the switch, and a shouldered, cylindrical, metallic, protecting shell, telescopingly engaging with, and surrounding, the socket-switch structure.

9. In a socket-switch structure having a flexible pull-device to actuate the switch and means for electrical connection to a supply circuit, in combination; a spring-returned switch-actuator connected to be governed by said device; a resistance winding carried as a part of the said structure; a two-pole plug receptacle mounted on the said structure; a controlling switch arrangement embodying as one switch member a series of substantially circularly arranged contact terminals adapted when connected progressively to the supply circuit to place the receptacle and designed parts of said resistance winding electrically in series, and further embodying a circuit-governing contact member, said latter contact member and said series of contact terminals being coöperatively arranged, by relative movement therebetween, to connect the supply circuit progressively to different terminals of said series; and engaging means between said pull-device and one of the relatively movable switch members for driving the latter in one direction; together with means to prevent retrogressive relative movement between said switch members.

10. A pull-actuated, lamp-dimming-socket-switch structure embodying a pawl-and-ratchet actuated, rotary, pull-switch mechanism, having a pull-operated, pivoted, and spring-returned actuator with means to limit the stroke thereof to a partial rotation, and having further a rotatable switch member driven by said actuator and coöperating with a series of circularly-arranged stationary contacts, formed to prevent retrogres-

sive rotation of said member, and positioned successively to be engaged conductively thereby; a lamp receptacle mounted on said structure to be supplied with current through the switch; a rheostat mounted as part of the said structure and electrically connected to one or more of the said stationery contacts, thereby wholly, or in part, to be interposed in the receptacle circuit in designed positions of said switch member; electrical connections from another of said stationary contacts to said receptacle; and conductive means to complete a circuit through the switch to the current-supply leads,—plurality of said stationary contacts being spaced in succession within the full stroke movement of said member, whereby, through a full or partial stroke of the pull-operated actuator, said receptacle may selectively be connected to the supply circuit with or without the said rheostat, or a part thereof, in series.

Signed at Boston, Massachusetts, this 9th day of January, 1917.

RAYMOND D. SMITH.

Witnesses:
J. E. BLACKMAN,
JAMES D. GORDON.