May 4, 1937. R. A. KAMM 2,079,174

SHUNT DEVICE

Filed Oct. 8, 1936

Fig. 1

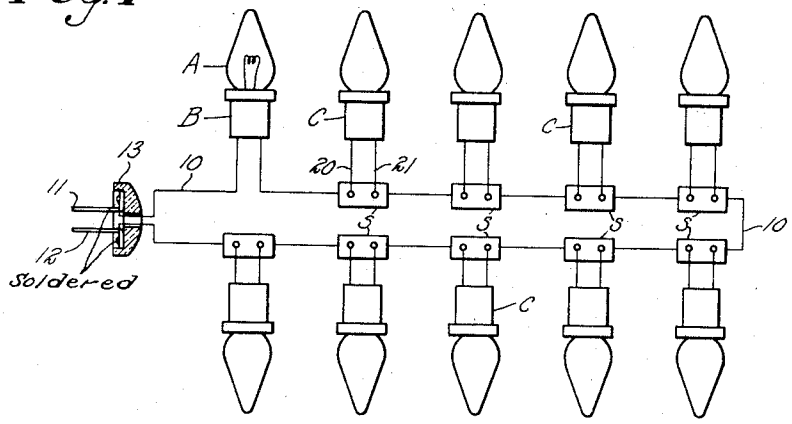


Fig. 2

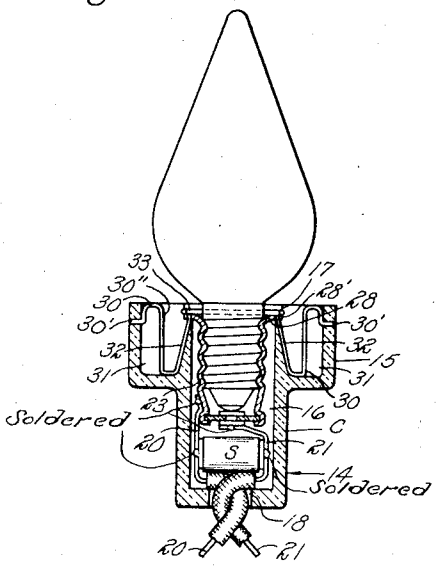


Fig. 3

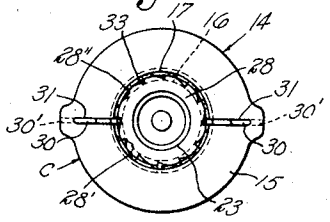
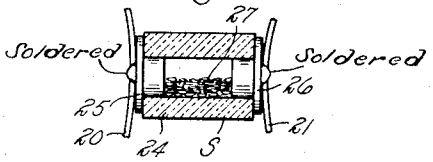


Fig. 4



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UNITED STATES PATENT OFFICE

2,079,174

SHUNT DEVICE

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Application October 8, 1936, Serial No. 104,641

13 Claims. (Cl. 200—118)

This invention relates to a shunt device for a safety lighting circuit and more particularly to a shunt device in a Christmas tree lighting circuit which directs current flow across a lamp without breaking the circuit when the lamp burns out, and which directs current flow back through a new lamp when it is inserted in position.

It has been proposed heretofore to bridge each lamp of a series connected Christmas tree lighting circuit with a resistance coil which carries current to the other lamps in the circuit when the lamp connected therewith burns out. These resistances have not only been wasteful of current, but have also tended to overload the circuit as the lamps successively burned out, and, consequently, have constituted a fire hazard in an easily inflammable Christmas tree. It has also been proposed to provide a shunt composed of a chamber associated with each lamp and partially filled with loose metallic particles. However, when using shunts employing these metallic particles, it has been necessary to vigorously tap the shunt and upset the position of the metal particles after replacing a burned out lamp in order to break the circuit through the shunt and again connect it through the lamp. The present invention does away with this objectionable tapping feature.

It is, therefore, the primary aim of this invention to provide a series circuit wherein one or more lamps may burn out without disconnecting or overloading the circuit and wherein replacement of a burned out lamp automatically connects the new lamp in the circuit and disconnects current flow through a shunt member bridged across the lamp.

It is a further object of my invention to provide a combined shunt and lamp socket construction wherein the shunt will electrically short circuit the lamp terminals when the lamp burns out and the insertion of a new lamp will break electrical connection through the shunt and connect the lamp in the circuit.

With these and other objects in view, my invention resides in the unique construction and the combination of members hereinafter fully described, illustrated in the accompanying drawing, and referred to in the claims appended hereto; it being understood, of course, that various changes in the general form, proportion, and size, as well as other minor details of construction lying within the scope of the claims, may be resorted to without departing from the spirit of the invention or sacrificing any of its advantages.

In the accompanying drawing illustrating one embodiment of my invention and wherein like parts are indicated by like numerals:

Fig. 1 is a diagrammatic illustration of my circuit showing a plurality of lamps in series connection;

Fig. 2 is an enlarged section taken longitudinally and diametrically through one of my sockets containing a shunt and showing a lamp in position;

Fig. 3 is an enlarged plan view of a lamp socket; and

Fig. 4 is a sectional view taken longitudinally through a shunt member.

My invention of a shunt device is herein shown as applied to a safety lighting circuit of the general type illustrated in my copending application Serial No. 77,991 filed May 5, 1936, and of which this application is a continuation in part relative to the particular shunt, and wherein a wire lead 10, in the form of a loop connected at its opposite ends to terminals 11 and 12 of a connector plug 13, is series-connected throughout its length by short leads to sockets containing electric lamps, thus forming a series circuit through the lamps. Ten lamps are illustrated in the present showing of my series circuit with shunt members S respectively associated with all but one of the lamps which is designated as a master lamp A mounted in a master socket B. Each of the other sockets C has a shunt S associated therewith, and these sockets and shunts are of substantially duplicate construction. It will be appreciated, however, that the lamps are interchangeable and any desired number of lamps and sockets may be employed. Master socket B may comprise any conventional type of socket adapted to receive the master lamp A which has no shunt connected therewith so that this lamp will act in the capacity of a fuse to break the circuit in the event that it becomes overloaded due to too many of the other lamps burning out.

Each of the sockets C is provided with an insulating casing 14 having an enlarged upper end 15 and a substantially cylindrical inner cavity 16 terminating in its upper end in a counterbore 17. A hole 18 passes through the bottom of the casing to receive suitable lead wires 20 and 21 connected with and forming part of loop 10 and respectively connected with terminals on the shunt S and terminals of a screw threaded lamp supporting receptacle 23 in the usual manner as by soldering or other suitable means.

In accordance with the construction described

in the aforementioned patent application, my shunt member S may comprise an insulated tube 24 located in the bottom of cavity 16 and having metal end plugs 25 and 26 respectively connected with wires 20 and 21 and forming a cavity within the shunt member partially and loosely filled with metallic chips 27 which tend to oxidize. These chips are preferably composed of aluminum which quickly oxidizes in air, thus greatly increasing the electrical resistance through the oxide coating and between plugs 25 and 26. However, it will be appreciated that any suitable oxidizable metals such as iron, brass, etc. may be employed for the same purpose. Normally, the resistance between metal plugs 25 and 26 and through the oxide coated particles 27 is so high in comparison to the resistance through the filament of the electric lamp associated therewith that there is no appreciable current flow through the metal chips and the current is free to flow through the lamp. However, when the lamp becomes burned out, the circuit will not become broken but will pass through the metallic chips breaking down the contacting oxide coatings.

Heretofore, when a burned out electric lamp has been replaced by a new lamp a socket containing a shunt of metallic particles, it has been necessary to vigorously tap the lamp or socket so that the position of these metal particles would be upset. This was done to cause the metal particles to again contact through their oxide coatings, thus greatly increasing the resistance to current flow through the shunt member and causing the current to flow through the easier path of the lamp filament.

I overcome this objection of prior constructions by providing an improved shunt device including a lamp socket construction wherein the insertion of a new lamp serves to automatically upset these particles without necessitating this objectionable tapping operation. To accomplish this, the upper portion of lamp receptacle 23 has an annular flange 28 rotatably supported on the bottom shoulder of counterbore 17. This flange has a series of spaced ratchet toothed portions 28' having substantially radially extending shoulders 28'', as illustrated in Fig. 3. A pair of springs 30 respectively located within guiding recesses 31 in opposite sides of enlarged portion 15 are each provided with a short outer end 30' slidably received within a hole in the casing and an intermediate stepped portion 30'' terminating in an upwardly extending resilient arm 32. These arms 32 enter into substantially diametrically opposed spring pressed ratchet engagement with teeth 28'. It will be evident that other forms of springs may be employed for the same purpose, and it is not desired that the present invention be limited to the illustrated form.

Wires 20 and 21 which electrically connect the shunt S and receptacle 23 in parallel or bridged relation secure these members together as a unit which is rotatable within casing 14 in a clockwise direction relative thereto, as shown in Fig. 3, and under control of the ratchet action of spring arms 32. Hence, it will be evident that a lamp may be screwed into the receptacle which will be prevented from turning due to the frictional action of spring arms 32. When the lamp has bottomed within the receptacle making electrical contact therewith, further rotation of the lamp or rotation of the casing in a reverse direction will cause spring arms 32 to snap in ratchet engagement with teeth 28', thus vigorously upsetting the position of the metallic particles 27 which again contact their oxide-coated faces, greatly increasing the resistance therethrough and directing the current through the lamp filament. Usually the lamp and its supporting receptacle will assume a stationary position after the lamp has been screwed to a bottoming position and the casing will thereafter be rotated to cause the snapping action of the spring arms and upsetting the positions of metal particles 27. However, the flexibility of the wire leads 20 and 21 extending from the casing will permit twisting of these leads sufficient to allow for rotation of the receptacle and cause a snapping action of the springs, after which the wire leads may return to their former positions. A burned out lamp may be easily unscrewed since the spring arms 32 will lock against shoulders 28'' and prevent relative reversed rotation between casing 14 and receptacle 23. Receptacle 23 is removably secured in its rotatable position by a substantially C-shaped locking spring 33 resiliently received in an annular groove in the side wall of the counterbore as shown. It will thus be appreciated that the single operation of simply screwing a lamp into the socket to its contacting position will be sufficient to operate the ratchet, thus automatically upsetting the metallic particles within the shunt and connecting the lamp within the circuit.

I claim as my invention:

1. In combination, a lamp casing, a lamp receptacle movable relative to the casing, a shunt device containing loose metallic particles, and means operable by the relative movement between said casing and the receptacle for upsetting the relative positions of the metallic particles.

2. In combination, a lamp casing, a lamp receptacle within and rotatable relative to the casing, a shunt device, and means operable upon relative rotation between the casing and receptacle for agitating and upsetting the relative positions of the metallic particles.

3. In combination, a casing, a lamp receptacle within and rotatable relative to said casing, a shunt device rotatable with said receptacle and containing loose metallic particles, and operative means between said casing and receptacle for agitating said shunt device upon rotation of the receptacle relative to the casing whereby the relative positions of said metallic particles are upset.

4. In combination, a lamp casing, a lamp receptacle within and rotatable relative to said casing, a shunt device containing loose metallic particles and associated with said receptacle, and means for preventing rotation of the lamp receptacle relative to the casing in one direction and for agitating said shunt device and upsetting the relative positions of the metallic particles upon rotation of the receptacle in the opposite direction.

5. In combination, a lamp casing, a lamp receptacle within and rotatable relative to said casing, a shunt device containing loose metallic particles, and a ratchet connection between the casing and receptacle for agitating said shunt member and upsetting the relative positions of the metallic particles upon relative rotation between said casing and receptacle.

6. In combination, a lamp casing, a lamp receptacle rotatably mounted within the casing, a shunt device containing loose metallic particles, means connecting the shunt device to the receptacle, and a ratchet connection between the

casing and receptacle whereby the relative rotation between the receptacle and casing will actuate the ratchet and upset the relative positions of the metallic particles.

7. In combination, a lamp casing, a lamp receiving receptacle rotatably mounted within the casing, a shunt device in the casing, said device containing loose metallic particles, means rigidly and electrically connecting the shunt to the receptacle, and a ratchet connection between said casing and said receptacle whereby a lamp may be inserted in the receptacle and operate the ratchet to upset the relative positions of said particles.

8. In combination, a lamp casing having a cavity, a lamp receiving receptacle rotatably mounted in said cavity, a hollow shunt device within the cavity and containing loose metallic particles, means electrically connecting the shunt to the receptacle so that it is supported thereby and said particles are connected in parallel relation with the receptacle, and a ratchet connection between the casing and receptacle whereby the insertion of a lamp therein will operate the ratchet and upset the relative positions of the metallic particles.

9. In combination, a lamp casing having a lamp receiving receptacle rotatably mounted therein, a tubular shunt member within the casing and partially filled with metallic oxidizable particles, terminals at each end of the tubular member electrically engaging said particles, means rigidly supporting the shunt and electrically connecting the terminals in bridged relation with the receptacle, a flange on the receptacle rotatably supporting the receptacle within the casing, and ratchet means between the receptacle and casing.

10. In combination, a lamp casing composed of insulating material, a lamp receiving receptacle rotatably mounted in the casing, a hollow shunt member supported within the casing by the receptacle, loose metallic particles within the hollow portion of the shunt member and connected in bridged relation across the receptacle, and a ratchet connection between the casing and the receptacle permitting relative rotation of the casing and receptacle in one direction and preventing rotation in the opposite direction, the metal particles in the shunt normally resisting current flow but passing current and preventing breaking of the circuit when a lamp in the receptacle becomes burned out, the insertion of a new lamp serving to operate the ratchet device and to upset the metal particles, thus causing the shunt to again resist current flow and again direct current through said lamps.

11. In combination, a lamp casing composed of insulating material and having an inner cavity, a lamp supporting receptacle rotatably mounted in said cavity, terminals on said receptacle, a hollow shunt member having spaced end terminals, the space between said end terminals being partially filled with metallic particles to electrically connect the same, means rigidly supporting the shunt beneath the receptacle and electrically interconnecting the shunt terminals to the receptacle terminals in parallel relation, an annular toothed portion on the receptacle and spring means in the casing which is ratchet-engageable with said toothed portion whereby the insertion of a lamp in the receptacle will operate the ratchet means and serve to upset the electrical contact of the metallic particles within the shunt.

12. In combination, an insulated lamp casing having a longitudinally disposed open end cavity terminating in a counterbore, an enlarged portion at the open end of the casing, a lamp receiving receptacle adapted to threadably receive an electric lamp, a flange on the receptacle journalled in the counterbore, spaced radially extending ratchet teeth on said flange, means removably securing the flange in rotatable position, a hollow shunt member within the lower end of the cavity and containing loose metallic particles, means rigidly securing the shunt to the receptacle and electrically connecting it in parallel relation therewith, the enlarged portion of the casing having a recess, and a spring within said recess resiliently engageable with the ratchet teeth whereby a lamp may be screwed into the receptacle and operate the ratchet to upset the position of the metallic particles within the shunt.

13. In a series connected Christmas tree lighting circuit, an insulated lamp casing, a receptacle rotatably mounted in the casing and adapted to threadably receive a lamp, a hollow shunt member within the casing and containing loose metallic oxidizable particles, leads rigidly supporting and electrically connecting the shunt across the receptacle, an annular flange at the upper end of the receptacle, peripherally spaced ratchet teeth on the flange, and springs supported by the casing and engageable with said teeth permitting a snap rotation of said receptacle in the direction to which the lamp would normally be screwed in and preventing a reversed rotation of said receptacle whereby a lamp may be entered in a receptacle and thereafter operate the ratchet device to upset the position of the metal particles.

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