March 2, 1937. R. A. KAMM 2,072,337

SAFETY LIGHTING CIRCUIT

Filed May 5, 1936

Fig. 1

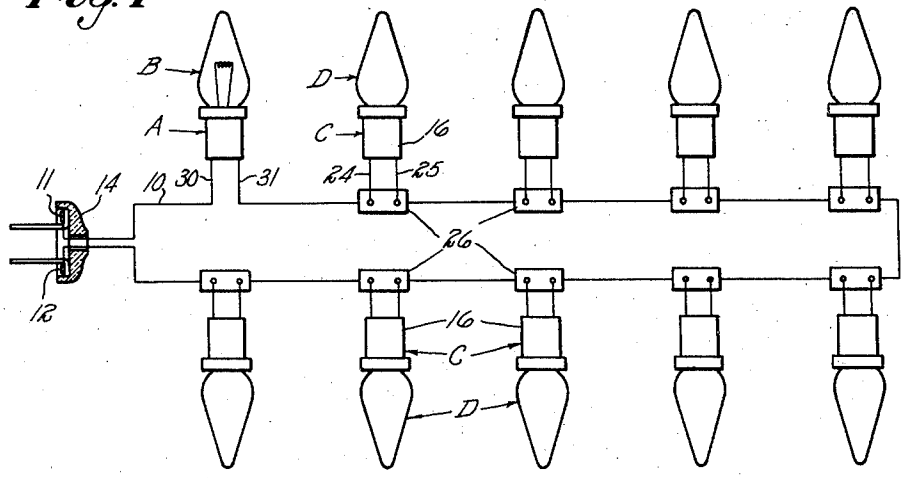


Fig. 2

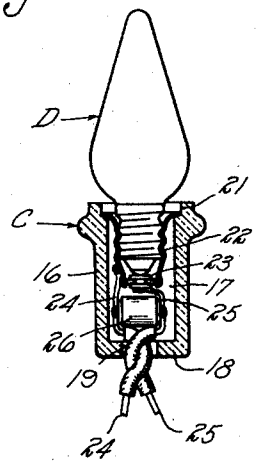


Fig. 3

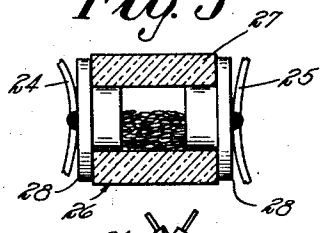
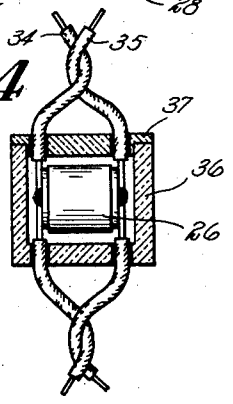


Fig 4



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SAFETY LIGHTING CIRCUIT

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Application May 5, 1936, Serial No. 77,991

4 Claims. (Cl. 171—97)

This invention relates to a safety electric lighting circuit which is prevented from overloading, and particularly to a Christmas tree lighting circuit including several incandescent lamps in series connection and so arranged that one or more lamps may burn out without breaking the circuit.

Heretofore, it has been contemplated to provide a series lighting circuit for Christmas tree illumination embodying several lamps and wherein each lamp was bridged by a resistance coil. Whenever a lamp burned out, the circuit was maintained to other lamps through the bridging resistance. However, these resistances have not only taken an additional amount of current, but they have passed more and more current as the lamps successively burned out, thus resulting in abnormal heating of the circuit and presenting a serious fire hazard to the highly inflammable Christmas tree. Hence, with prior circuits of this type, it will be appreciated that a considerable current would pass through the circuit even when all the lamps burned out. At this time, it would not be evident that the circuit was connected, and the fire hazard would be at a maximum.

It is, therefore, the primary object of the present invention to provide an electrical lighting equipment such as employed for a decorative effect on a Christmas tree and embodying safety features which prevent excessive overheating of the circuit.

It is a further object of this invention to provide a series circuit wherein one or more lamps in the circuit may burn out without breaking the circuit or causing an excessive current flow therethrough.

It is a further object to employ a series circuit including a master control lamp which serves to break the circuit when the current flow therethrough becomes excessive to the other lamps.

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 accompany 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:

Figure 1 is a diagrammatic illustration of my safety circuit showing the various lamps in series connection;

Fig. 2 is a sectional view through a socket of one of the lamps in the series and illustrating the shunt connected therewith;

Fig. 3 is an enlarged sectional view through the shunt member; and

Fig. 4 illustrates a modified construction wherein the shunt is supported in a separate container.

In accordance with the present invention, I have provided an electrical circuit including a wire lead 10 in the form of a loop and respectively connected at its opposite ends to the terminals 11 and 12 of a connector plug 14 arranged for detachable connection with a suitable source of current supply. Lead wire 10 is broken in several places, and a plurality of sockets carrying electric lamps are connected therebetween to form a completed series circuit. In the present instance, ten sockets and lamps have been shown, but it will be appreciated that any number may be employed to accomplish the purposes of the present invention. One of the sockets, designated herein by the letter A, comprises a master socket arranged to support a master control lamp B. The other sockets and lamps in the circuit, herein designated by the respective letters C and D, are of duplicate form and so arranged that in the event one of the lamps D burns out, the other lamps in the circuit will continue to remain lighted with substantially the same luminosity.

Each of the sockets C is provided with an insulating casing 16 substantially cup shaped and having an inner cavity 17 open at its upper end and terminating at its lower end in a wall 18 provided with an aperture 19 through which the connection wires may pass. The upper end of aperture 17 terminates in a counterbored portion 21 within which any well-known type of socket may be spring pressed to removably maintain it within casing 16. In the present instance, this socket is shown as a screw threaded receptacle 22 having a lower insulating portion supporting a center terminal 23 so that a standard type of incandescent electric lamp may be screwed therein. Leads 24 and 25 respectively soldered to receptacle 22 and terminal 23 are connected across each break in wire 10 to complete the circuit through each electric lamp.

Cavity 17 is preferably of sufficient depth to also include a shunt member 26 arranged to complete the circuit in the event that lamp D

becomes burned out. While different types of shunts may be used in the circuit, there is herein illustrated the shunt disclosed and claimed in my copending application, Serial No. 104,641 filed October 8, 1936. As shown in Fig. 3, shunt **26** preferably comprises an insulating tube **27** provided with metal plugs **28** inserted in its opposite ends and respectively connected to the lead wires **24** and **25**. In the present instance, these leads are shown connected to the respective plugs **28** as by solder, but it will be evident that any suitable electrical connection, such as a familiar type of quick detachable clip or other connection, would accomplish the same purpose and lies within the scope of the present invention. Plugs **28**, as herein shown, are frictionally received within tube **27**, but may be secured therein by other means if desired.

The cavity between the inner ends of plugs **28** is partially filled with minute metallic clips which tend to oxidize. In the present instance, I preferably employ chips of aluminum, but it will be appreciated that other oxidizable metals such as brass, iron, etc., may be employed for the same purpose. Due to the contact of these aluminum chips with the air, each chip becomes coated with a thin layer of oxide which increases the resistance to electrical flow through the chips, normally preventing any appreciable flow of electrical current between the plugs **28** and causing it to take the easier path through a lamp. The cavity between the plugs, as indicated in Fig. 3, is preferably a little more than half filled with these loose aluminum chips so that the chips will not become compacted but will be free to oxidize under influence of the air in said cavity.

In the event that a lamp D burns out, the current flow in the circuit will not become broken but will pass through the metallic chips. Hence, it will be appreciated that several lamps in the circuit may become burned out without breaking the circuit, and if these lamps comprise part of a series circuit such as is commonly used in lighting a Christmas tree, it will immediately be evident which lamps are burned out, and they may be quickly replaced with a minimum of effort, thus obviating the usual procedure of removing and testing each lamp in turn to find which one is burned out. When a burned out lamp has been replaced, it is only necessary to lightly tap the socket and upset the position of the aluminum chips whereupon other portions of their oxide coatings will contact and current will again flow through the lamp.

Heretofore, it has been contemplated to employ a wire resistance for the purpose of applicant's shunt and to associate one of these resistances with each lamp in a series circuit. However, it has been found that after several lamps become burned out, the current flow through the circuit is greatly increased above the normal carrying capacity of the wire, frequently resulting in overheating the circuit and igniting an easily inflammable Christmas tree with disastrous results. The present invention has been devised with thought to overcoming the inherent disadvantages of these prior types of shunted series circuits and consequently includes the master lamp B located in socket A. This master lamp is removably positioned in a standard type of socket A connected by means of leads **30** and **31** in series relation to loop **10** so that whenever the current flow through the lamps and shunts forming the rest of the circuit becomes excessive due to the fact that many of the lamps D have become burned out, this excessive current flow will serve to burn out the filament of lamp B and break the circuit. Hence, it will be appreciated that lamp B not only serves the same decorative effect as lamps D and may be interchangeable therewith, but also provides a safety feature for the circuit which prevents fire hazard or excessive current flow through shunts **26** which would tend to injure them. In the present instance, the individual resistances of shunts **26** are preferably so chosen that master lamp B will burn out and break the circuit when approximately half of the remaining lamps have became burned out, thereby providing an ample factor of safety and obviating the hazard of overheating and overloading the circuit.

Fig. 4 illustrates a modified construction of my invention wherein the shunt member **26** need not be supported within a socket C but is connected to a lamp D in the same manner through leads **34** and **35** and separately supported in an insulating casing **36** provided with a suitable cover **37**.

I claim as my invention:

1. A safety lighting circuit comprising a plurality of electric lamps in series connection, one of said lamps serving as a master control to prevent overloading of the circuit, and means associated with each of the other lamps automatically providing a predetermined resistance across each of said other lamps when they become burned out.

2. In a safety lighting circuit, a plurality of electric lamps in series connection, one of said lamps comprising a master control lamp and limiting the current flow through the circuit, and shunt members respectively connected across the terminals of each of the other lamps, said shunts normally resisting current flow therethrough and being arranged to maintain the circuit closed when one or more of the lamps associated therewith becomes burned out.

3. A safety lighting circuit comprising a plurality of interchangeable electric lamps in series connection, one of said lamps serving as a safety control for the circuit and limiting the maximum current flow therethrough, said other lamps each having a shunt member connected therewith arranged to maintain the circuit closed as said other lamps become successively burned out.

4. In a safety lighting circuit, and in combination, a plurality of electric lamps connected in series, a load carrying resistance connected across the leads of each lamp and having a predetermined increased resistance relative to the lamp, and a master control lamp connected in series with said first lamps and having a filament resistance equal to the combined resistances of a predetermined number of said load carrying resistances, whereby upon the burning out of a number of said first lamps said master control lamp will burn out and break the circuit before the dangerous overloading of the circuit is reached.

ROBERT A. KAMM.