May 5, 1959 L. W. CURTIS 2,885,589

MULTI-VOLTAGE LAMP

Filed Aug. 8, 1956

Fig. 1.

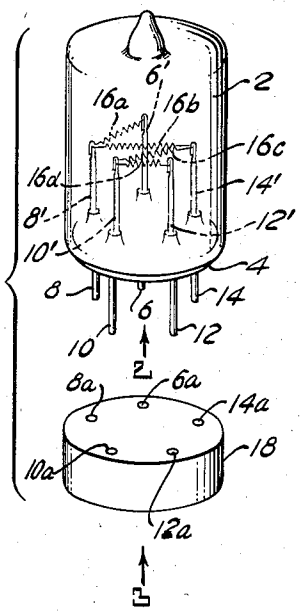


Fig. 4.

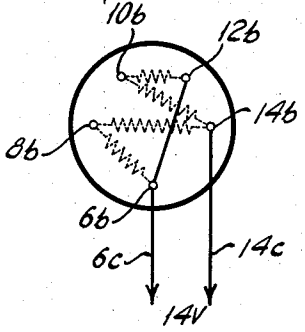


Fig. 2.

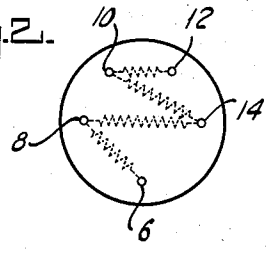


Fig. 5.

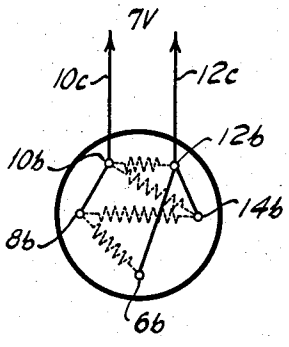
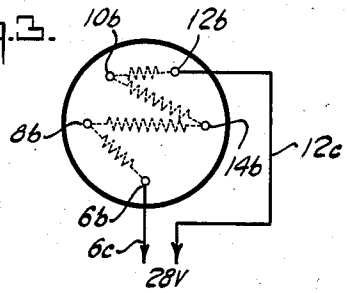


Fig. 3.



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MULTI-VOLTAGE LAMP

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1 Claim. (Cl. 313—279)

The present invention relates to incandescent lamps, specifically miniature type incandescent lamps, and comprises a multi-voltage lamp of simple construction which operates at equal efficiency at different voltages. The new lamp is of particular value for use by the military services as it would avoid the necessity of stocking various different types of lamps and would thus conserve storage space. For example, a military jeep uses 7 volts for its lighting circuit whereas many military trucks use 14 volts and heavy tanks use 28 volts.

In general, the new lamp comprises a single filament conductively supported at a number of spaced locations thereby dividing the filament into a plurality of sections preferably of equal resistance. The supporting conductors are mounted in a glass button base and terminate in pin type terminals. The lamp, depending upon the wiring of the socket into which the lamp is mounted, operates at one voltage when the socket wiring connects all sections of the filament in series, operates at a lower voltage when the socket wiring connects certain sections of the filament in series parallel and at a still lower voltage when the socket wiring connects all sections of the filament in parallel. Irrespective of the socket, when the filament sections are of equal resistance neither the lamp wattage nor the candle power will vary.

For a better understanding of the invention and of a preferred embodiment thereof reference may be had to the accompanying drawing of which:

Fig. 1 is an isometric view of a completed lamp and socket embodying the invention;

Fig. 2 is a bottom view of the lamp of Fig. 1; and

Figs. 3, 4 and 5 are bottom views of sockets into which the lamp of Fig. 1 may be inserted, the views showing diagrammatically the different circuit connections of the socket for different lamp voltages.

The lamp of Fig. 1 comprises a glass envelope **2** having a glass button type stem **4** through which are molded five wires providing, externally of the envelope, contact terminals **6**, **8**, **10**, **12** and **14** of the type employed in conjunction with radio tube sockets. Within the envelope, the wires are of smaller diameter nickel and serve as leads and supports **6'**, **8'**, **10'**, **12'** and **14'** respectively for a filament **16**. The filament **16** is of tungsten and formed from a continuous length of wire into four segments, **16*a***, **16*b***, **16*c*** and **16*d*** of equal resistance separated by short straight portions (for example 2 mm. in length) of the filament wire. Lead **6'** is clamped or welded to one end of the filament and lead **12'** is clamped or welded to the other end of the filament. Leads **8'**, **14'** and **10'** are clamped or welded to the straight portions of filament wire separating the respective sections **16*a*—16*b***, **16*b*—16*c*** and **16*c*—16*d***. The lamp terminals **6**, **8**, **10**, **12** and **14** are adapted to fit into holes **6*a***, **8*a***, **10*a***, **12*a*** and **14*a***, respectively, in a receptacle or socket **18**. In the particular embodiment illustrated the terminals are located on a circle concentric with the axis of the button stem **4** with the arcuate spacing between terminal **6** and either terminal **8** or **14** greater than that between the other

terminals. Thus the lamp may be inserted into the socket in one position only.

In Figs. 3, 4 and 5 which represent bottom views of sockets such as socket **18** of Fig. 1, conductors therein which are electrically connected to the pin terminals **6**, **8**, **10**, **12** and **14** of the lamp when the lamp is in the socket are identified by **6*b***, **8*b***, **10*b***, **12*b*** and **14*b*** respectively. For clarity the filament connections are also shown in Figs. 3, 4 and 5. If the filament sections are to be connected in series and the lamp operated at 28 volts, for example, then a socket such as that of Fig. 3 would be employed wherein none of the conductors **6*b*** etc., are internally interconnected and conductors **6*b*** and **12*b*** are connected to external leads **6*c*** and **12*c*** across which the 28 volts may be impressed. When the lamp is inserted in such socket all four sections of filament **16** will be connected in series across the source of voltage. When the lamp is to be connected across a source of say 14 volts, then a socket is used in which conductors **6*b*** and **12*b*** are internally connected together as indicated in Fig. 4. One side of the source of voltage is connected through lead **6*c*** to conductor **6*b*** and the other terminal of the source is connected through a lead **14*c*** to conductor **14*b***. When all four sections of the filament are to be connected in parallel across a voltage of say 7 volts, a socket is employed wherein conductors **6*b***, **12*b*** and **14*b*** are connected together and conductors **8*b*** and **10*b*** are connected together as indicated in Fig. 5. One side of the source is connected through lead **10*c*** to conductor **10*b*** and the other side of the source is connected through lead **12*c*** to conductor **12*b***.

The invention has now been described in connection with one specific embodiment thereof wherein the filament is divided into four sections. Preferably, as in the described embodiment, the filament sections are of equal resistance to insure equal efficiency and candle power irrespective of the socket connections.

Although a four section filament lamp suitable for use with three different voltages has been described obviously the filament could be formed with a fewer or greater number of sections and for corresponding operation at fewer or greater number of voltages. For example, the lamp could have a six section filament and sockets could be provided therefor to permit operation, with equal efficiency, at full voltage, half voltage, one third voltage and one-sixth voltage or the lamp could have a two section filament for operation at full or half voltage depending upon socket connections.

The lamp may be gas filled or vacuum exhausted as desired and any desired life characteristics and candle power ratings may be designed into its structure. Other variations within the scope of the accompanying claim will occur to those skilled in the art.

The following is claimed:

The combination comprising a multi-voltage incandescent lamp including an envelope, a filament therein formed of four sections of equal resistance, conductive supports for the ends of said filament and for the junctions of the filament sections, said supports being sealed through said envelope and terminating externally thereof in pin terminals, and three sockets each adapted for reception of all of said pin terminals, one of said sockets having a pair of conductors therein each of which is connectable through a pin terminal with a different end of the filament, a second one of said sockets having a pair of conductors therein one of which is connectable through pin terminals with both ends of said filament and the other of which is connectable through a pin terminal with the junction at the mid point of the filament, and the third socket having a pair of conductors therein of which one is connectable through the pin terminals with both ends of the filament and with the junction

at the mid point of the filament and the other is connectable through the pin terminals with both of the remaining two junctions between filament sections whereby when the pin terminals are received in the first mentioned socket all sections of the filament are connected in series across the pair of conductors thereof, when the pin terminals are received in the second mentioned socket halves of the filament are connected in parallel across the pair of conductors thereof when the pin terminals are received in said third socket all four filament sections are connected in parallel across the pair of conductors thereof, said pin terminals being so spaced that they may only be received in the first of said sockets in the position wherein the pair of conductors thereof connect with the ends of the filament, and may only be received in the second of said sockets in the position wherein one of the pair of conductors thereof connects with both ends of the filament and the other of the pair of conductors connect

with the junction at the mid point of the filament, and may only be received in said third socket in the position wherein one of the pair of conductors thereof connects with both ends of the filament and with the junction at the mid point of the filament and the other of the pair of conductors thereof connects with both of the remaining two junctions between filament sections.

References Cited in the file of this patent

UNITED STATES PATENTS

1,661,928	Dawson	Mar. 6, 1928
1,788,231	Ceader et al.	Jan. 6, 1931
1,985,915	Chelioti	Jan. 1, 1935
2,022,988	Thompson	May 9, 1938
2,120,870	Roper	June 14, 1938
2,400,011	Liebmann	May 7, 1946
2,688,711	Camillerapp	Sept. 7, 1954