June 13, 1933. J. BRUIJNES ET AL 1,914,074

LUMINOUS TUBE SIGN

Filed June 18, 1930 2 Sheets-Sheet 1

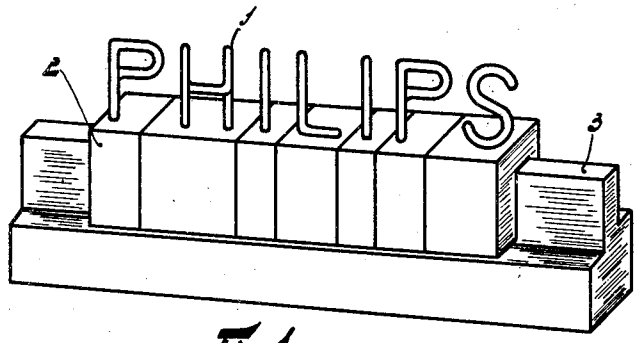


Fig. 1.

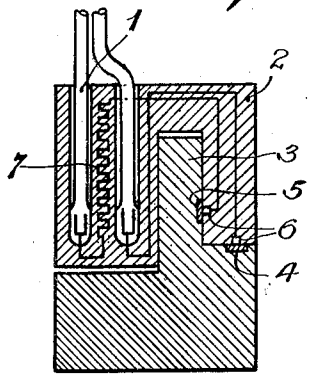


Fig. 2.

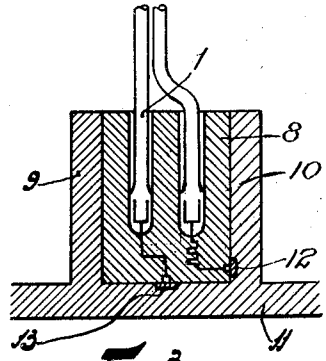


Fig. 3.

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Fig. 4

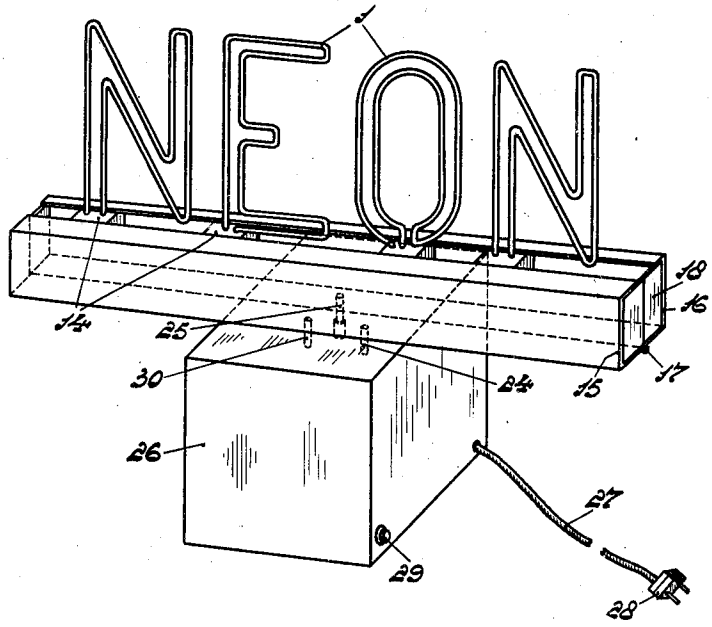
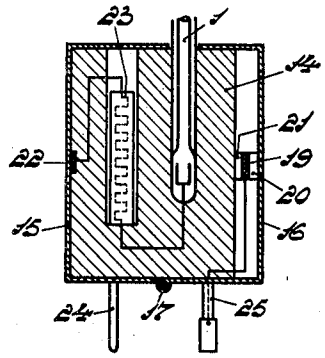


Fig. 5.



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UNITED STATES PATENT OFFICE

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LUMINOUS TUBE SIGN

Application filed June 18, 1930, Serial No. 462,066, and in the Netherlands August 8, 1929.

It is commonly known to use electric discharge tubes for outlining characters and other designs in luminous lines, especially for sign and advertising displays. The discharge tubes used in this case are shaped as a character or as the design they have to represent and are filled with a suitable gas or vapour filling, for example with neon (the discharge tubes of the type here involved are therefore often referred to as "neon tubes"). When a suitable voltage is supplied to the electrodes of the tubes, the tubes as a result of the electric discharge struck therein radiate light the colour of which is determined by the nature of the material of which the wall of the discharge tube is made and by the nature of the gaseous filling. If the tubes contain neon, the light obtained will be reddish, whereas a blue colour is obtained when the discharge is struck in mercury vapour.

The invention has reference to such an arrangement comprising a plurality of luminous tubes each of which constitutes a character or design, and has for its object to provide an installation in which the various designs represented by the discharge tubes are very well visibl and can be readily placed in position and replaced.

In an arrangement according to the invention each discharge tube is freely arranged in space and secured to a foot which consists at least partly of insulating material, a resistance connected in series with the discharge tube being joined to the foot or the tube. Each of the discharge tubes being arranged on a separate foot, it is possible to alter the outline formed by the various discharge tubes in a very simple manner by replacement of the discharge tubes. In addition, the outline formed by the discharge tubes will be very well visible in the day-time as well as at night when the discharge tubes are in use, particularly if the installation is such that a suitable back-ground is provided therefore.

By means of the insulating feet the discharge tubes are arranged on a supporting device. The feet may, for example, be provided with a slot and clasp a rim of the supporting member. In another form of construction the feet of the discharge tubes are arranged within a slot of the supporting member. Advantageously, this supporting member may be made of two parts articulated to each other which when closed constitute a partially closed slot. For replacement of the various discharge tubes, the said supporting member can be opened, whereupon each discharge tube can be individually removed from the supporting member, whereas in the closed position of this member the feet of the discharge tubes are almost entirely enclosed.

The supporting member on which the discharge tubes are arranged may be provided with one or more current supply bus-bars adapted to contact with contact members enclosed within the feet and connected to the electrodes of the tubes. In this arrangement the current limiting resistance joined to the foot or the tube is connected in series with the tube. Preferably, the arrangement should be such that the discharge tube cannot be removed until after the current supply bus-bars have been cut out of the electric circuit. Thus the possibility of contacting with the current supply bus-bars under tension when replacing the discharge tubes is avoided.

Frequently it is desirable that the discharge tubes should be arranged on a case containing a transformer supplying the power for the discharge tubes. If the discharge tubes are arranged on a supporting member which consists of two articulated parts as described hereinbefore, this supporting member may be arranged with advantage on the transformer case so that the member cannot be opened until after it has been detached from the case, whereby the connection between the current supply bus-bars and the transformer is simultaneously broken. A highly suitable form of that construction consists in mounting on each of the articulated parts one or more contact members, for example studs, which can be connected only to corresponding contact members, for example to contact bushings in the transformer case, when the articulated parts are closed. For

the sake of still greater safety, one of the articulated parts may have secured to it a stud which, if the supporting member is arranged on the case, when closed, closes a contact included in the primary of the transformer.

Very advantageously the various electric discharge tubes may be shaped such that they outline in double lines the sign to be represented. The spacing between the ends of the discharge tubes is thus equal for all the displays or characters so that the various feet of the discharge tubes may all have the same size.

The methods described of arranging the discharge tubes permit of each tube being removed from the installation singly and independently of the adjacent tubes, and if desired of replacing with another tube. Moreover it is not necessary to make special connections to the current supply bus-bars so that there is no risk of making faulty connections. The installation is therefore particularly adapted for handling by technically unskilled persons, as is very often the case, for example in display and advertisement installations. The replacement of the tubes and the change in coordination of the various displays so as, for example, to form other words can be effected by any one and requires no special technical skill; in addition it does not involve any risk of touching parts under tension.

In order that the invention may be clearly understood and readily carried into effect some embodiments of the invention will be described more fully with reference to the accompanying drawings, in which

Figure 1 shows diagrammatically and by way of example one arrangement according to the invention,

Figure 2 is a sectional view of the foot of a discharge tube having the form of the character P for use in the arrangement shown in Figure 1,

Figure 3 shows a further form of construction of the foot and of the supporting member,

Figure 4 shows diagrammatically an embodiment in which the feet are arranged in a slot formed by articulated parts of the supporting member, and

Figure 5 is a sectional view of the supporting member shown in Figure 4, a foot of a discharge tube being arranged therein.

The installation shown in Figure 1 comprises various discharge tubes 1 shaped as characters. These discharge tubes which are provided with a pair of electrodes and a suitable gaseous filling are secured to feet 2 of insulating material, for example of the material known under the registered trade mark "bakelite". As seen best in Figure 2, each foot has a slot by means of which it clasps an upright rim 3 of the supporting member. This supporting member contains two current supply bus-bars 4 and 5 adapted to contact with contact members enclosed within the foot 2. In Figure 2 these contact members are designated by 6. One of these contact members is connected to an electrode of the discharge tube 1 through a current limiting means or resistance member 7 housed in the insulating foot, whereas the other electrode of the tube is connected by the other contact member to the bus bar 4.

As shown in Figure 1, the feet of the various discharge tubes are adapted to each other so that they can entirely shield the current supply bus-bars in the supporting member. It is possible for the ends of the supporting member on which no discharge tubes are arranged to be shielded by small insulating blocks of the same shape as the feet of the discharge tubes but carrying no discharge tube. The current supply bus-bars 4 and 5 are connected to the transformer which supplies the voltage for striking the discharge in the various luminous tubes.

The foot 8 of the discharge tube 1 shown in Figure 3 has a rectangular section and is arranged in a slot formed between two upright rims 9 and 10 which form part of a plate 11, constituting, for example, the upper part of the case in which the transformer for operating the installation is arranged. The current is supplied to the discharge tubes by means of current supply bus-bars 12 and 13 which are entirely shielded by the various feet of the discharge tubes.

The installation shown in Figure 4 comprises various discharge tubes 1 shaped as characters which are outlined in double lines. The discharge tubes are secured to feet 14 arranged in a slot of the supporting member. As shown in Figure 5 this member consists of two channel-shaped parts 15 and 16 articulated to each other at 17. The ends of these channel-shaped parts are shut off by plates 18. The part 16 has secured to it a current supply bus-bar 19 insulated from the metal part 16 by material 20. When closed the parts 15 and 16 form an entirely closed slot in which the feet 14 are enclosed. The feet contain resilient contact members 21 adapted to contact with the current supply bus-bar 19. The feet have in addition arranged on them contact members 22 which bear on the metal part 15 and are connected to electrodes of the discharge tubes through resistances 23 arranged in the insulating foot. The electrodes that are not connected to the contacts 22 connect to the contact members 21. The part 15 of the supporting member has secured to it a metal stud 24 and the part 16 has secured to it a stud 25 the end of which is of conductive material, said conductive portion being insulated from the part 16 and connected by an insulated conductor to the current bus-bar 19.

The supporting member constituted by the parts 15 and 16 is arranged on a case 26 which contains a transformer that supplies the voltage for striking the discharge in the various discharge tubes. This transformer case, which consists of conductive material, has attached to it a cord 27 with a contact plug 28 by means of which the installation can be connected in a very simple manner to a lighting circuit of suitable voltage. For the sake of greater safety it is preferable that the case of the transformer should be grounded and for this purpose a ground-terminal 29 is mounted on the case.

The studs 24 and 25 of the supporting member of the discharge tubes are adapted to enter contact bushings of a transformer case. These studs cannot be inserted into the corresponding contact bushings until after the parts 15 and 16 of the supporting member have been closed. For the purpose of replacing the discharge tubes it is therefore necessary first to detach the supporting member from the transformer case so as to break the connection between the current supply bus-bars and the secondary circuit of the transformer. The protection from high voltage in the arrangement shown is still further improved by providing a stud 30 which is secured to the part 15 of the supporting member and by which a contact provided in the transformer case and included in the primary of the transformer is not closed until after the contact studs 24 and 25 have been partially inserted in the contact bushings.

What we claim is:

1. As a unitary structure, an electric luminous tube bent in one plane to depict a character or sign in double lines, a foot consiting at least partly of insulating material and a current limiting means connected in series with the tube, said tube being so secured to said foot that it is freely disposed in space.

2. An arrangement comprising a plurality of luminous tubes each of which is shaped as a character or sign, in which each tube is freely arranged in space and is secured to a foot consisting at least in part of insulating material, a current limiting means connected in series with the discharge tube joined to the foot of the tube, and a supporting member for the said foot having a rim thereon, the feet of the discharge tubes being provided with a slot adapted to clasp the rim of the said supporting member.

3. An arrangement comprising a plurality of luminous tubes, each of which is shaped as a character or sign, each of the said discharge tubes being freely arranged in space and being secured to a foot consisting at least partly of insulating material, a current limiting means connected in series with the discharge tube and joined to the foot of the tube, and a supporting member for the said foot, and having a slot, the feet of the discharge tube being mounted in the said slots.

4. An arrangement comprising a plurality of luminous tubes, each of which is shaped as a character or sign, each of the said discharge tubes being freely arranged in space and being secured to a foot consisting at least partly of insulating material, a current limiting means connected in series with the discharge tube and joined to the foot of the tube, and a supporting member for the said feet and having a slot therein, the said supporting member comprising two articulated parts which when in closed position form a partially closed slot, the feet of the discharge tube being mounted in the said slot.

5. An arrangement comprising a plurality of luminous tubes each of which is shaped as a character or sign, in which each tube is freely arranged in space and is secured to a foot consisting at least in part of insulating material, a current limiting means connected in series with the discharge tube joined to the foot of the tube, a supporting member for the said feet and having a rim thereon, and at least one current supply bus-bar mounted on the supporting member, the feet of the discharge tubes being provided with a slot adapted to clasp the rim of the supporting member and having contact members enclosed within the feet and adapted to cooperate with the said bus-bars.

6. An arrangement comprising a plurality of luminous tubes, each of which is shaped as a character or sign, each of the said discharge tubes being freely arranged in space and being secured to a foot consisting at least partly of insulating material, a current limiting means connected in series with the discharge tube and joined to the foot of the tube, a supporting member for supporting the said feet and having a slot therein, and at least one bus-bar mounted on the said supporting member, the feet of the discharge tubes being adapted for mounting in the said slot, and having contact members therein adapted to cooperate with the said bus-bars.

7. An arrangement comprising a plurality of luminous tubes, each of which is shaped as a character or sign, each of the said discharge tubes being freely arranged in space and being secured to a foot consisting at least partly of insulating material, a current limiting means connected in series with the discharge tube and joined to the foot of the tube, and a supporting member for supporting the said feet, the said supporting member comprising two articulated parts which when closed form a partially closed slot, and at least one current supply bus-bar mounted in the said supporting member, the feet of the discharge tube being adapted to be mounted in the said slot and having con-

tact members therein adapted to cooperate with the said bus-bars.

8. An arrangement comprising a plurality of luminous tubes each of which is shaped as a character or sign, in which each tube is freely arranged in space and is secured to a foot consisting at least in part of insulating material, a current limiting means connected in series with the discharge tube joined to the foot of the tube, and a supporting member adapted to receive the said feet and having a rim thereon, each of the said feet being provided with a slot adapted to clasp the said rim, the said supporting member forming part of the casing of the transformer by which the discharge tube is operated.

9. An arrangement comprising a plurality of luminous tubes, each of which is shaped as a character or sign, each of the said discharge tubes being freely arranged in space and being secured to a foot consisting at least partly of insulating material, a current limiting means connected in series with the discharge tube and joined to the foot of the tube, a supporting member for supporting the said feet and having a slot therein adapted to receive the said feet, the said supporting member forming part of the casing of the transformer for operating the said discharge tubes.

10. An arrangement comprising a plurality of luminous tubes, each of which is shaped as a character or sign, each of the said discharge tubes being freely arranged in space and being secured to a foot consisting at least partly of insulating material, a current limiting means connected in series with the discharge tube and joined to the foot of the tube, and a supporting member for supporting the said feet and comprising two articulated parts which when closed form a partly closed slot adapted to receive the said feet, the said supporting member forming part of the casing of the transformer by which the said tubes are operated.

11. An arrangement comprising a plurality of luminous tubes, each of which is shaped as a character or sign, each of the said discharge tubes being freely arranged in space and being secured to a foot consisting at least partly of insulating material, a current limiting means connected in series with the discharge tube and joined to the foot of the tube, a supporting member for the said feet and comprising two articulated parts which when closed form a partially closed slot adapted to receive the said feet, and adapted to carry the electrical connections from the tubes to a transformer, and a transformer having a casing of which the said supporting member forms part, and at least one contact member on each of the articulated parts of the supporting member which can be connected to corresponding contact members in the transformer casing only when the articulated parts are in their closed position.

12. An arrangement comprising a plurality of unitary luminous tubes, each of which is shaped as a character or sign freely mounted in space and secured to a foot consisting at least in part of insulating material, a current limiting means connected in series with the discharge tube and joined to the foot of the tube, a supporting member for the said feet and comprising two articulated parts which when closed form a partially closed slot adapted to receive the said feet, and adapted to carry the electrical connections from the tubes to a transformer, and a transformer having a casing of which the said supporting member forms parts, the said transformer having a contact included in the primary thereof, which contact is normally open, and one of the articulated parts of the supporting member having a stud secured thereto which when the articulated parts are mounted on the transformer is adapted to close the said contact.

13. Luminous tube sign, comprising a plurality of units, each unit comprising a luminous discharge tube so bent in one plane that it depicts a character or sign in double lines, a foot consisting at least partly of insulating material and a current limiting means connected in series with said tube, said tube being so secured to said foot that it is freely arranged in space, the sign comprising a supporting member to which said units are interchangeably secured.

14. Luminous tube sign comprising a plurality of units, each unit comprising a luminous discharge tube shaped as a character or sign, a foot consisting at least partly of insulating material and a current limiting means connected in series with said tube, said tube being so secured to said foot that it is freely arranged in space, the sign comprising a supporting member provided with a rim, the feet of said units being provided with slots clasping said rim.

15. Luminous tube sign comprising a plurality of units, each unit comprising a luminous discharge tube shaped as a character or sign, a foot consisting at least partly of insulating material and a current limiting means connected in series with said tube, said tube being so secured to said foot that it is freely arranged in space, the sign comprising a supporting member provided with a slot, the feet of said units being arranged within said slots.

16. Luminous tube sign, comprising a plurality of units, each unit comprising a luminous discharge tube shaped as a character or sign, a foot consisting at least partly of insulating material and a current limiting means connected in series with said tube, said tube being so secured to said foot that it is freely arranged in space, the sign comprising a supporting member containing two parts articu-

lated to each other, these parts clasping the feet of said units.

17. Luminous tube sign, comprising a plurality of units, each unit comprising a luminous discharge tube shaped as a character or sign, a foot consisting at least partly of insulating material and a current limiting means connected in series with said tube, the sign comprising a supporting member to which said units are interchangeably secured, said supporting member containing at least one bus-bar electrically connected to the electrodes of the luminous tubes of said units.

18. Luminous tube sign comprising a plurality of units, each unit comprising a luminous discharge tube shaped as a character or sign, a foot consisting at least partly of insulating material and a current limiting means connected in series with said tube, the sign comprising a supporting member containing two parts articulated to each other and clasping the feet of said units, at least one bus-bar being present in said articulated parts, the sign comprising further a case containing at least one transformer, said supporting member being arranged on said case, means being present allowing hinging open said parts only after that said supporting member has been detached from said case.

19. Luminous tube sign, comprising a plurality of units, each unit comprising a luminous discharge tube shaped as a character or sign, a foot consisting at least partly of insulating material and a current limiting means connected in series with said tube, the sign comprising a supporting member containing two parts articulated to each other and clasping the feet of said units, each part of said supporting member being provided with a contact member, the sign comprising further a case containing at least one transformer and being provided with contact means corresponding to said contact members, said parts of the supporting member hinging open only after that said contact members has been detached from said contact means.

20. Luminous tube sign comprising a plurality of units, each unit comprising a luminous discharge tube shaped as a character or sign, a foot consisting at least partly of insulating material and a current limiting means connected in series with said tube, the sign comprising a supporting member for said units containing two parts articulated to each other and clasping the feet of said units, each part of said supporting member being provided with a contact member, the sign comprising further a case containing at least one transformer and being provided with contact means corresponding to said contact members, said parts of the supporting member hinging open only after that said contact members has been detached from said contact means, the primary of said transformer including a contact closed by a stud arranged on one of said parts of the supporting member.

21. Luminous tube sign comprising a plurality of units, each unit comprising a luminous discharge tube shaped as a character or sign, a foot consisting at least partly of insulating material, said tube being so secured to said foot that it is freely arranged in space, the sign comprising a supporting member provided with a slot, the feet of said unit being arranged within said slot.

22. A luminous tube sign comprising a plurality of units, each unit comprising a luminous discharge tube bent in one plane to depict a character or sign in double lines, a foot consisting at least partly of insulating material, said tube being so secured to said foot that it is freely arranged in space, the sign comprising a supporting member to which said units are interchangeably secured.

23. An apparatus comprising a plurality of luminous tubes, each of which is shaped as a character or sign, each of said discharge tubes being freely arranged in space and being secured to a foot consisting partly of insulating material, and a supporting member for the said foot and having a slot, the feet of the discharge tube being mounted in the said slots.

In testimony whereof we have signed our names to this specification.

JOHANNES BRUIJNES.

JOHANNES PETRUS MARIA MUTSAERS.