July 5, 1938. M. PIRANI ET AL 2,122,436

LIGHTING SYSTEM INCLUDING ELECTRICAL DISCHARGE TUBES

Filed March 31, 1936

Fig. 1

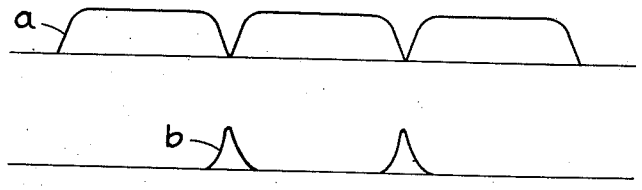
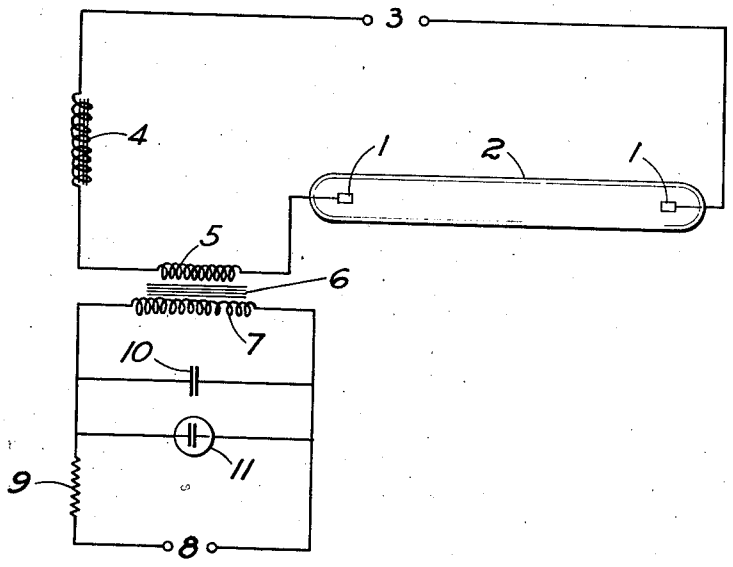


Fig. 2



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Patented July 5, 1938 2,122,436

UNITED STATES PATENT OFFICE

2,122,436

LIGHTING SYSTEM INCLUDING ELECTRICAL DISCHARGE TUBES

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Application March 31, 1936, Serial No. 71,880
In Germany April 1, 1935

1 Claim. (Cl. 176—124)

Our invention relates to improvements in lighting systems including electrical discharge tubes, and more particularly in systems in which the lighting tubes have a supply of alternating current or intermittent direct current. In such systems the light intensity is reduced whenever the alternating current passes through zero or the intermittent current is interrupted, which is objectionable for many purposes. It has heretofore been proposed to superpose a high frequency or high voltage component on the circuit of the tube. While such systems cause an earlier ignition and thereby a reduction of the space of reduced light intensity in each period of the current, yet the said space is not completely filled out. Further, it has been proposed to superpose a constant direct current in order to prevent the light intensity from being reduced to zero in each period. But in this system the variation of the light intensity of the tube is not reduced, because the curve of the light intensity is changed only as to its distance from the axis of abcissae, while its form is not altered. Further, the operation of the system is complicated and expensive because means for supplying direct current must be provided in addition to the source of alternating or intermittent current. Finally it has been proposed in multi-phase currents to bridge the said spaces by phase displacement and by using several electrodes. However, this method is effective only where three phase current is used, while the curve of the light intensity is still wavy where only two tubes of different phase are used, and therefore in this case only a glimmering light is obtained.

The object of the improvements is to provide a system of the class indicated and comprising a lighting tube charged with alternating current or with intermittent direct current which emits a light which is steady, and with this object in view our invention consists in charging the tube with an additional current the phase of which is displaced relatively to the phase of the main current, the said current being transformed into intermittent current impulses which are adapted to produce a light emission which is complementary to the light emission of the main current, and which therefore exactly fills out the dark spaces intermediate the light emission periods of the tube, the result being that the curve of the light intensity is the same as that of a continuous current.

For the purpose of explaining the invention an example embodying the same has been shown in the accompanying drawing in which the same reference characters have been used in all the views to indicate corresponding parts. In said drawing,

Fig. 1 is a diagram showing the light emission of a tube charged with sinusoidal alternating current and the light emission produced by subsidiary or superposed current impulses, and

Fig. 2 is a diagrammatical view showing the lighting tube and the electrical connection thereof.

As is shown in Fig. 1 the curve *a* of the intensity of the light emitted from a tube charged with the sinusoidal alternating current of 50 periods comprises successive periods of light emission and dark spaces. The curve *b* shows the light emission of a subsidiary alternating current the phase of which is displaced with relation to that of the main current, and which is shaped so as to produce comparatively short current impulses, the period and the shape of the curve *b* being exactly complementary to the shape of the curve *a*, so that by addition of the said curves a line is obtained which is straight and parallel to the zero axis. Therefore in service the tube has uniform light intensity which is independent of the oscillations of the alternating current and it emits a perfectly steady light.

As is shown in Fig. 2, the lighting tube **2** is provided with two electrodes **1** which are connected in a main circuit **12** including a source of alternating current **3** and a choking coil **4**. Further, the main circuit **12** includes the secondary **5** of a transformer **6**, the primary **7** of which is included in a subsidiary circuit **13** which is connected to a source of alternating current **8**. The phase of the alternating current supplied from the source **8** is displaced with relation to the phase of the alternating current supplied by the source **3** so that current impulses are produced in the circuit **13** during the dark portions of the light emission produced by the main alternating current. Where the sources **3** and **8** are connected to the same net any known or preferred means for displacing the phase of the current supplied to the source **8** may be provided such for example as suitably dimensioned condensers and choking coils. Such means are known in the art and we do not deem it necessary to describe the same in detail. The circuit **13** includes a resistance **9**, and connected in shunt to the primary **7** there is a condenser **10** and a cathode glow lamp **11**. By the alternating current supplied from the source **8** the condenser and the cathode glow lamp are charged

up to the ignition voltage of the glow lamp, and thereafter the cathode glow lamp is ignited, and the quantity of electricity stored in the condenser is delivered, so that the voltage at the ends of the primary 7 of the transformer 6 is reduced. By this sudden reduction of the voltage a current impulse is induced in the secondary of the transformer which is supplied to the lighting tube 2 through the secondary 5, the said current impulse being displaced in phase relatively to the main alternating current supplied from the source 3. By providing a resistance 9, a condenser 10, a cathode glow lamp 11 and a transformer 6 of the proper dimensions a current impulse is produced in each half wave of the subsidiary current which exactly corresponds as to shape and intensity to the dark spaces of the light emission produced by the main current, and which completes the curve of the light emission to a straight line.

While in describing the invention reference has been made to specific means for producing a superposed alternating current of different phase, we wish it to be understood that our invention is not limited to the said means. Further, we wish it to be understood that we do not limit ourselves to a construction in which the secondary 5 is connected to the main electrodes 1, and that separate subsidiary electrodes may be provided for the secondary of the transformer.

We claim:

An illuminating system comprising in combination, a gaseous electric discharge lamp device, means for supplying a main current of varying intensity to said device to cause said device to emit light of varying intensity and means for supplying a subsidiary current to said device which current is displaced in plase with respect to said main current, and which is capable of causing said device to produce light which is complementary to the light caused by the main current in said device, and completes the curve of the light emission of the device to a straight line, said last named means comprising a transformer having the secondary thereof connected in series with said lamp device and the primary thereof connected across the terminals of an alternating current source, a condenser and a cathode glow lamp connected in shunt with the primary of said transformer and a resistance in series with said transformer primary, the breakdown potential of said cathode glow lamp being less than the potential supplied by said current source.

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