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APPARATUS FOR MAKING PHOTOGRAPHS BY MEANS OF ARTIFICIAL LIGHT

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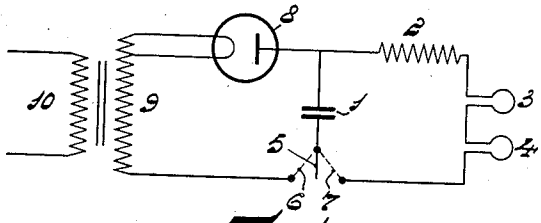


Fig. 1.

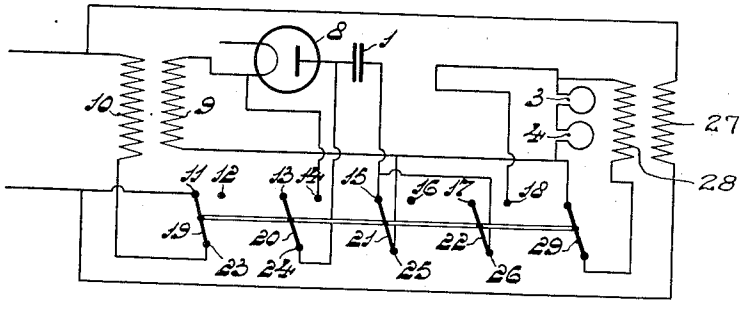


Fig. 2.

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APPARATUS FOR MAKING PHOTOGRAPHS BY MEANS OF ARTIFICIAL LIGHT

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7 Claims. (Cl. 171—97)

This invention relates to a method and an apparatus for making photographs by means of artificial light and has for its purpose to obtain in a simple manner the high intensity, short duration exposure required for making a photograph by means of artificial light.

When taking evening exposures in the dusk or under insufficient lighting conditions it has hitherto been customary to use a quantity of magnesite powder which is caused to ignite. The gases formed by the ignition are received in a device particularly adapted therefor.

This method is inconvenient and in addition it does not permit of taking a plurality of rapidly succeeding photographs.

Of late lamps have been suggested containing a quantity of magnesium powder inserted in a closed vessel. This powder is ignited electrically and the vapours formed remain within the bulb. However, such a lamp can only be used once, which is objectionable in many cases.

The present invention is based on the short time overloading of an electric lamp or discharge tube.

For this purpose a quantity of electric energy may be accumulated in a container capable of storing for a more or less extended time interval a substantially definite amount of electrical energy, which energy is then caused to discharge abruptly through an electric lighting device capable of producing the required intensive illumination of short duration.

The exact nature of the container of electrical energy is not essential to practice the present invention. The seat of the accumulated energy may be a magnetic field or an electric field.

Generally an electric field will be better adapted, for this purpose, since the energy accumulated in this manner may be more easily stored. As a means for storing the energy an electrical condenser is used.

In principle, however, it is also possible to use a magnetic field which is set up by an electric current traversing an inductance coil. The latter method is mainly used if only direct current is available.

Finally it is also possible to use a simple alternating current transformer in combination with a device by means of which the current is interrupted after a predetermined time.

According to the invention an electric incandescent lamp or a discharge tube may be used as a light source, the required short duration illumination being obtained by a discharge through this lamp of the energy stored in the accumulator.

Since overloading of the light source is only of very short duration a single lamp may be used for making a large number of photographs before it becomes defective.

When using a condenser as an energy container, according to the invention, an inductance coil may be connected in series with the lamp. The inductance coil, the condenser and the lamp may be selected in such a manner that the discharge circuit is aperiodic or almost aperiodic, thus obtaining a discharge of a given time interval which time interval may be determined at will. Owing to the inductance the greater part of the energy is caused to discharge, and the current strength remains substantially constant.

As a lamp a carbon filament lamp may be used, such a filament being capable of withstanding for a short time much higher temperatures than the well known metallic filament lamps. However, it is also possible to use lamps of the latter type.

Since with the overloading of the light source very high temperatures are obtained the amount of light which has great actinity (short rays) greatly increases. By using a lamp comprising a bulb and a lens made of quartz the effect may be further increased.

The condenser may be charged from an alternating current network by means of a rectifier. However, the rectifier need only supply a small continuous current and smoothing devices are not required.

The invention will be more clearly understood by reference to the accompanying drawing, the Figs. 1 and 2 of which represent by way of example, two embodiments thereof.

In Fig. 1 a condenser is denoted by 1, an inductance coil by 2, incandescent lamps by 3 and 4, a switch adapted to occupy positions 6 and 7, by 5, a rectifier tube by 8; 9 is the secondary winding of a transformer of which the primary winding 10 may be connected to an alternating current network.

If the switch 5 occupies the position 6 the condenser is charged. The discharge is effected by moving the switch into the position 7.

The following values of the different electric magnitudes entering into account have given excellent results: a condenser voltage of 1300 volts, a capacity of about 40 microfarads and a self induction of the coil 2 of about 20 henries.

As lamps two series-connected 220 volts lamps

were used having a power of 75 watts. Of course, it is also possible to use a single lamp.

Furthermore the coupling arrangement may be such that one of the windings of the transformer, usually the secondary winding, serves also as an inductance coil which is connected in series with the light source. In this case the arrangement must be slightly modified and the rectifier must be short-circuited during the discharge, while at the same time the transformer is preferably disconnected from the network.

It has been found that in certain cases it is desirable to preheat the lamps to some extent so as to reduce the influence of the thermal inertia. This may be achieved by arranging the switch 5 in such a manner that when occupying the charging position it also connects the lamps to the network, either directly or through a transformer. When switching over for discharging the condenser, the lamps must be connected in the discharge circuit before the discharge circuit itself is closed.

This may be obtained by a slight modification of the switch.

Fig. 2 represents schematically the arrangement set out above.

By 11, 12, 13, 14, 15, 16, 17, 18 are denoted contact points of four contact levers 19, 20, 21, 22, pivoting at 23, 24, 25, 26. Preferably the four contact levers are movable from the left to the right and conversely, by a single movement.

In the lefthand position of the contact levers the winding is connected to the network, while the condenser is connected in series with the secondary winding and with the rectifier. In this case the lamps 3 and 4 have one of their poles disconnected.

In the right hand position of the contact levers the rectifier is short circuited and the condenser may discharge through the secondary winding 9 and the lamps 3 and 4.

The preheating of the lamps 3 and 4 is effected by means of the transformer 27/28, which may remain switched on in both positions of a switch.

If desired, however, the secondary winding may be disconnected during the discharge by means of the switch 29 which is operated together with the other switches.

In order to throw as much light as possible on the object to be exposed, reflectors may be used.

What we claim is:

1. An apparatus for taking photographs by artificial light, comprising an incandescent filament lamp, a container of electric energy, means for charging the container to a voltage in excess of the normal voltage of said lamp, means for discharging the container over the incandescent lamp, the container being so dimensioned as to cause an overload of the lamp without destroying it, during a time sufficient for a momentary exposure.

2. An apparatus for taking photographs by artificial light, comprising an incandescent filament lamp, an electric condenser, means for charging the condenser to a voltage in excess of the normal operating voltage of said lamp, means for discharging the condenser over the incandescent lamp, the condenser being so dimensioned as to cause an overload of the lamp without destroying it, during a time sufficient for a momentary exposure.

3. An apparatus for making photographs by artificial light, comprising an incandescent filament lamp, terminals for connecting the lamp to an alternating current source, an electric condenser, a rectifier connected in series with the said terminals and the condenser for charging the condenser to a voltage in excess of the normal operating voltage of the incandescent lamp, switching means for disconnecting the condenser from the alternating current supply and connecting it to the incandescent lamp, the condenser being so dimensioned as to cause an overload of the lamp without destroying it, during a time sufficient for a momentary exposure.

4. An apparatus for making photographs by artificial light, comprising an incandescent filament lamp, an electric condenser, a choke coil connected in series with the said condenser, means for charging the condenser to a voltage in excess of the normal operating voltage of the said lamp, means for discharging the condenser over the series combination of incandescent lamp and choke coil, the condenser being so dimensioned as to cause an overload of the lamp without destroying it, during a time sufficient for a momentary exposure.

5. An apparatus for taking photographs by artificial light, comprising an incandescible carbon filament lamp, a container of electric energy, means for charging the container to a voltage in excess of the normal operating voltage of said lamp, means for discharging the container over the incandescent lamp, the container being so dimensioned as to cause an overload of the lamp without destroying it, during a time sufficient for a momentary exposure.

6. An apparatus for making photographs by artificial light comprising an incandescent filament lamp, terminal means for connecting an electric supply circuit to the incandescent lamp, a container of electric energy, means for charging said container from the supply circuit to a voltage in excess of the normal operating voltage of the incandescent lamp, switching means for disconnecting the container of electric energy and the incandescent lamp from the supply circuit and for connecting the container in series with the incandescent lamp, the container being so dimensioned as to cause an overload of the lamp without destroying it, during a time sufficient for a momentary exposure.

7. An apparatus for making photographs by artificial light comprising an incandescent filament lamp, terminal means for connecting an electric alternating current supply circuit, a transformer means for connecting the primary winding to the said terminals, a rectifier, a condenser, means for connecting the secondary transformer winding, the rectifier and the condenser in series so as to charge the condenser to a voltage in excess of the normal operating voltage of the incandescent lamp, a second transformer, means for connecting the primary winding to the said terminals, and the secondary in series with the incandescent lamp, switching means for disconnecting the transformer windings and for connecting the condenser in series with a transformer winding and the lamp, the condenser being so dimensioned as to cause an overload of the lamp without destroying it, during a time sufficient for a momentary exposure.

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