July 11, 1950 D. H. BUNTZMAN 2,514,836

FLASHER

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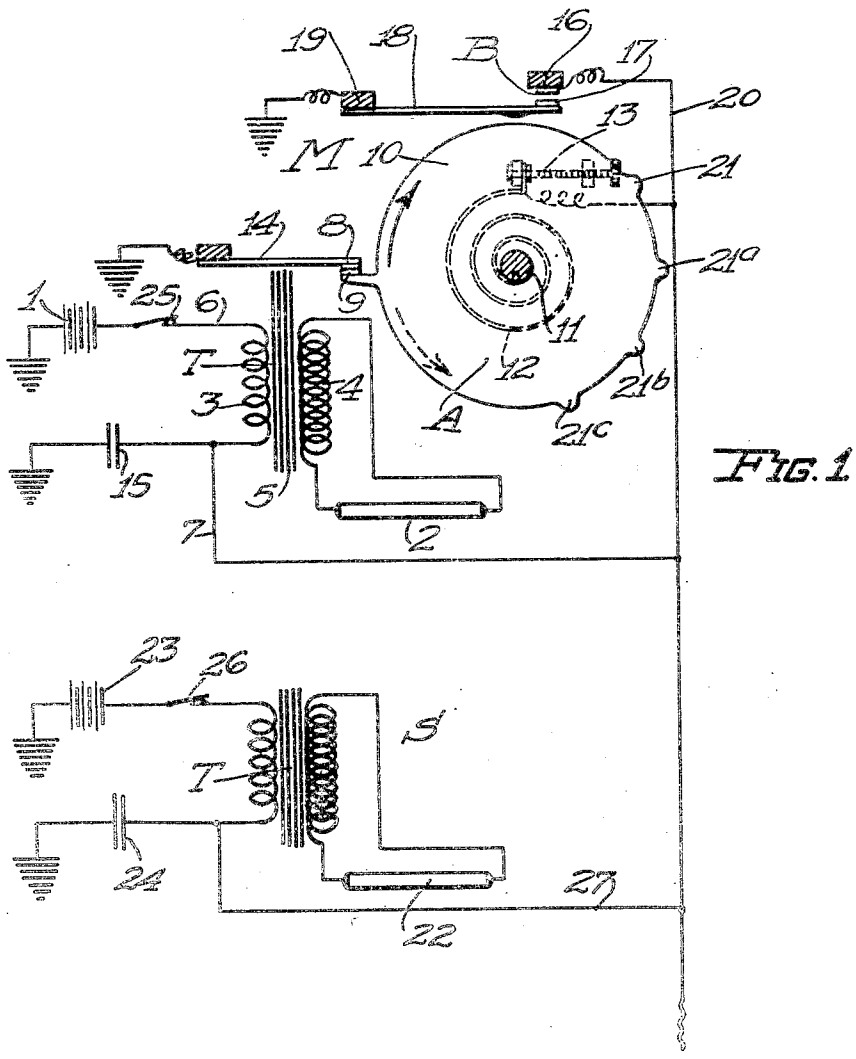


FIG. 1.

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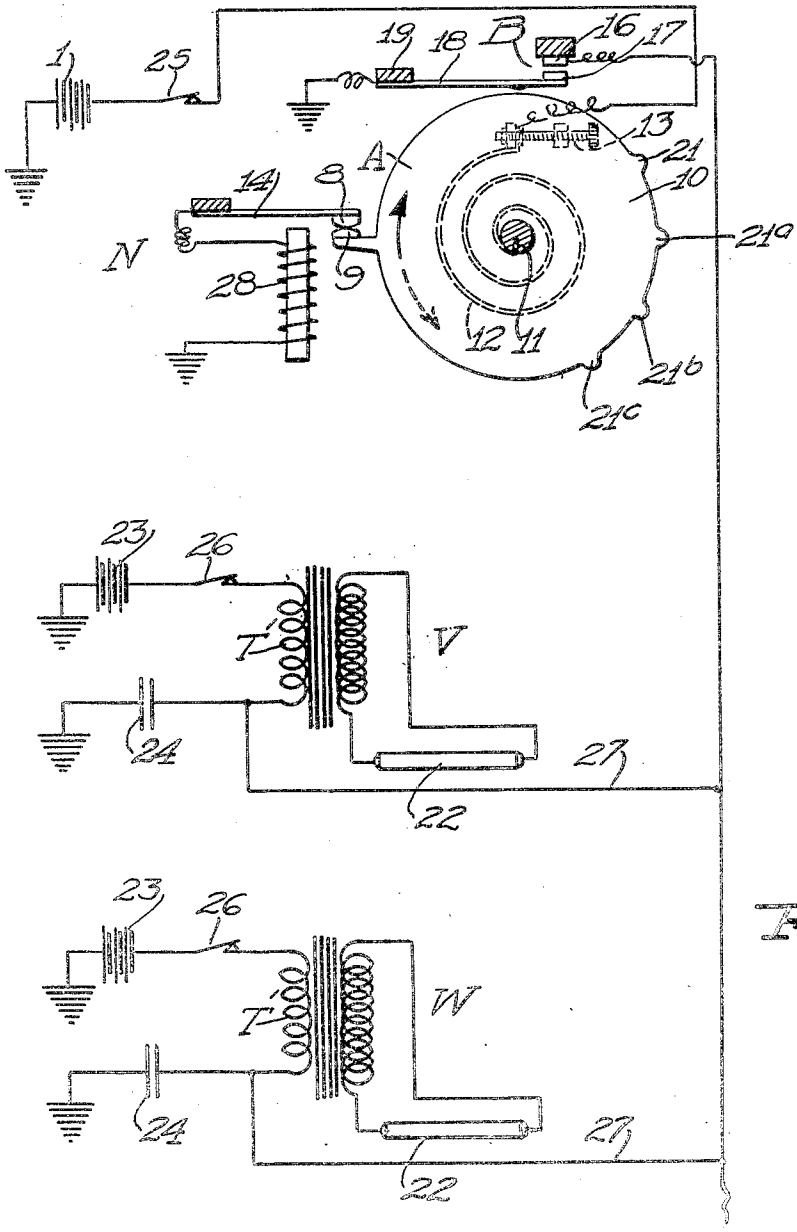


FIG. 2.

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FLASHER

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4 Claims. (Cl. 171—97)

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My present invention relates to power-converting units and systems for creating light flashes in lamps, particularly of the neon-gas type tube.

One of the principal objects of this invention is to provide a power-converter unit of this class capable of transforming a low potential input current to produce output current at high potential for creating light flashes in lamps of the type mentioned and units of this class which are relatively simple and economical to manufacture, very simple and economical to operate, and particularly one requiring a source of relativey low potential input current and one resulting in a small drain upon the primary source.

An important object of this invention is to provide, in a unit of this class, a novel current interrupter for producing a considerably extended period between successive interruptions and consequent flashes, and also simple means for varying the period.

Another important object of this invention is to provide a current interrupter, in a unit of this class, for producing periodic flashes, and one having other current interrupting means for producing one or a series of flashes within the period of the main interrupter.

A further important object of this invention is to provide a system of lighting elements, comprising a master unit, for lighting a predetermined length of neon-gas type tube, which is so constructed that another or other secondary units may be conveniently connected thereto for lighting a proportionately greater length or further lengths of tube, or a system of this class wherein generally as many units may be connected together as is desired to illuminate a proportional length of a neon-gas type tubing.

With these and other objects in view, as will appear hereinafter, I have provided an illuminating or flashing means having certain novel features of construction, combination, and arrangement of parts and portions, as will be hereinafter described in detail, and particularly set forth in the appended claims, reference being had to the accompanying drawings and to the characters of reference thereon, which form a part of this application, in which:

Fig. 1 is a circuit diagram showing, in one form, my system of illuminating or producing flashes in a neon tubing; and,

Fig. 2 is another circuit diagram thereof, in a slightly modified form.

In the preferred embodiment of my invention, the master unit of my system is operated or energized by a power source 1 which may be a six-volt storage battery, although satisfactory results by four one and one-half volt dry cells may be obtained.

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The neon tube 2 is illuminated by the battery through a converter which comprises a step-up transformer T having a primary winding 3, a secondary winding 4, and a soft iron core 5 which may be of the laminated closed type construction. One end of the primary winding 3 is connected, through a circuit 6, to one terminal of the battery. The secondary 4 is connected to the neon tube 2. The other terminal of the battery is shown connected to ground, which may be the frame for the mounting of the unit.

The other end of the primary is also connected through a circuit 7 to ground through the interrupter A. This interrupter comprises a relatively stationary contact 8 and a movable contact 9, which contacts are normally engaged and connected, closing the circuit 7 and the connection to ground. The interrupter is arranged periodically to break the connection between the two contacts.

The interrupter comprises a weighted metallic disc 10 rotatably mounted by an axial shaft 11 and carrying the contact 9. These contacts are normally closed by a spiral spring 12, the tension of which may be adjusted by a stationary adjusting screw 13. As shown, the circuit 7 is connected to the spiral spring 12 and therethrough to the disc 10, and from the disc to ground through the contacts.

The contact 8 is mounted at the free end of a leaf spring 14 which serves as an armature and is located within the magnetic influence at one end of the core 5 of the transformer.

As the transformer is energized, the core 5 attracts the armature 14 forcefully moving the contact 8 against the contact 9 and causing the disc 10 to be rotated in the direction of the dotted arrow against the action of the spring 12. The momentum of the disc 10 causes the contacts 8 and 9 to separate a variable distance, depending upon the tension of the spring 12. The rotation in the structure shown may be approximately 270°.

A condenser 15 may be connected in parallel to ground across the interrupter; that is, the circuit 7, or the last mentioned end of the primary, may be connected to ground through the condenser.

The interrupter A is designed so that periodic flashes are produced in the neon tube 2 during each oscillation of the disc 10, the flashes being

made at the break of the contacts 8 and 9. At the moment of break between the contacts 8 and 9 the condenser 15 is charged through the primary 3, and, in charging, the circuit containing the primary 3 and the condenser 15 acts as a series resonant circuit, and the voltage developed across the primary 3 is equal to EQ where E is the battery voltage and Q is the figure of merit of the primary coil. This causes greater voltage for illumination or flashing of the neon tube, and thereby producing brighter illumination.

Further flashes of the neon tube, during the period of the aforementioned flashes produced by the break of the contacts 8 and 9, are made by an interrupter B which consists of a stationary contact 16 and a movable contact 17 carried by the free end of the leaf spring 18 which is mounted at its other end on a support 19 connected to ground. The contact 16 is connected by a wire 20 to the circuit 7.

The disc 10 of the interrupter A has one or more lugs 21 at its periphery, these lugs being designated 21, 21^a, 21^b, and 21^c. As the disc 10 is forced in the direction of the broken arrow, the lugs 21, 21^a, 21^b, and 21^c, successively engage the spring 18 and connect the contacts 16 and 17, causing successive make and break of the circuit with the ground, and thereby producing repeated flashes of the neon tube 2, as above described. The four lugs on the disc cause four flashes when the disc rotates in the direction of the broken arrow, and another four flashes when the disc returns in the direction of the solid arrow. The flashes produced by the lugs are in addition to the flashes produced by the break of the contacts 8 and 9. Thus, many and variously timed flashes may be produced.

The unit described above may be referred to as a master unit M for producing flashes in 30" to 35" of neon tubing. To this master unit may be connected other secondary units S for producing flashes in additional lengths of neon tubing, designated 22. Each secondary unit is energized by a separate battery 23 and has a step-up transformer T', and also a condenser 24. Only the master unit M carries the interrupters A and B, and these control the flashing of the neon tubes in the secondary units S. Switches 25 and 26 may be provided in the battery circuits of the main and secondary units. Obviously one switch may be provided for all of the units.

In the modified form shown in Fig. 2, the master unit N is not constructed to control the illumination or flashing of a neon tube, but merely to control secondary units V and W. In this construction, the master unit has only a simple electromagnet 28 instead of the transformer in the first mentioned master unit, and only the secondary units V and W are arranged and constructed to light neon tubes 22. Each of the secondary units V and W are energized by batteries 23 and have step-up transformers T', and also condensers 24, as in the secondary units S described above.

In the mo ified structure, the secondary units are not connected through the contacts 8 and 9 and the interrupter disc 10, and therefore do not utilize the initial break in the circuit afforded by these contacts. But only the interrupter B, as in the first described structure, is employed.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

I claim:

1. A power controller for a gaseous conduction lamp which includes: a rotatably mounted disc; spring means resiliently urging said disc to rotate in one direction; a generally radially extending contact projecting from said disc for movement therewith; a cooperating contact adjacent said disc and located to engage said movable contact, said spring means urging said disc so that said movable contact tends to bear against said cooperating contact to form a first pair of separable contacts; an electromagnet having a pivotally mounted armature whose free end is adjacent said disc and that carries said cooperating contact on said free end; a second pair of separable contacts adjacent said disc but peripherally spaced from said first pair of contacts, said second pair of contacts including a fixed contact and a movable contact between said fixed contact and said disc, normally spaced from said fixed contact; an outwardly extending projection on said disc located to wipe against said movable contact of said second pair of contacts and force said movable contact against said fixed contact, said projection being peripherally spaced from said generally radially extending contact and in substantially the same plane; and means for connecting said first pair of contacts in series with said electromagnet and to a source of electrical energy, whereby said armature is periodically moved to cause said cooperating contact to drive said movable contact against the urging of said spring and thereby oscillate said disc.

2. A power controller for a gaseous conduction lamp which includes: a rotatably mounted disc; spring means resiliently urging said disc to rotate in one direction; a generally radially extending contact projecting from said disc for movement therewith; a cooperating contact adjacent said disc and located to engage said movable contact, said spring means urging said disc so that said movable contact tends to bear against said cooperating contact to form a first pair of separable contacts; an electromagnet having a pivotally mounted armature whose free end is adjacent said disc and that carries said cooperating contact on said free end, said electromagnet and armature being so positioned that energization of said electromagnet attracts said armature, and said armature thereby drives said disc, against the urging of said spring, to provide an oscillatory motion of said disc; a second pair of separable contacts adjacent said disc but peripherally spaced from said first pair of contacts, said second pair of contacts including a fixed contact and a movable contact between said fixed contact and said disc, normally spaced from said fixed contact; an outwardly extending projection on said disc, located to wipe against said movable contact of said second pair of contacts to close said contacts as said disc is moved in one direction by the action of said electromagnet, thereafter passing beyond said contact, and again wiping against said movable contact to close said second pair of contacts as said disc moves in the opposite direction, under the influence of said spring; and means for connecting said first pair of contacts in series with said electromagnet and to a source of electrical energy, whereby said armature is periodically moved to cause said cooperating contact to drive said movable contact against the urging of said spring and thereby oscillate said disc.

3. A power controller for a gaseous conduction lamp which includes; a disc mounted for rotation about its axis; adjustable spring means urging said disc to rotate in one direction, whereby an oscillatory mechanism is formed whose period of oscillation is controlled by the adjustment of said spring means; a first pair of contacts including a movable contact mounted on said disc in the plane thereof for movement therewith, and a cooperating contact adjacent said disc, located to engage said movable contact, said first pair of contacts being urged together by the action of said spring means; an electromagnet having an armature normally spaced therefrom but movable toward said electromagnet when the latter is energized, said armature carrying said cooperating contact; conductor means for connecting said first pair of contacts in series with said electromagnet and to a source of electrical energy, whereby said electromagnet and said armature act to oscillate said disc at the period of the latter determined by said spring means; a second pair of separable contacts adjacent said disc but peripherally spaced from said first pair of contacts, said second pair of contacts including a fixed contact spaced from said disc, and a movable contact adjacent said disc and normally spaced from said fixed contact but movable thereagainst; and an outwardly extending projection on said disc in the plane thereof, peripherally spaced from said movable contact of said first pair of contacts, and movable with said disc to wipe against said movable contact of said second pair of contacts to close said pair of contacts first by the movement of said projection during the electromagnetically driven movement of said disc and again during the spring urged return of said disc.

4. A power controller for a gaseous conduction lamp which includes: a disc mounted for rotation about its axis; adjustable spring means urging said disc to rotate in one direction, whereby an oscillatory mechanism is formed whose period of oscillation is controlled by the adjustment of said spring means; a first pair of contacts including a movable contact mounted on said disc in the plane thereof for movement

therewith, and a cooperating contact in the plane of said disc and adjacent the latter, located to engage said movable contact, said first pair of contacts being urged together by the action of said spring means; an electromagnet having an armature normally spaced therefrom but movable toward said electromagnet when the latter is energized, said armature carrying said cooperating contact; conductor means for connecting said first pair of contacts in series with said electromagnet and to a source of electrical energy, whereby said electromagnet and said armature act to oscillate said disc at the period of the latter determined by said spring means; a second pair of separable contacts adjacent said disc but peripherally spaced from said first pair of contacts, said second pair of contacts including a fixed contact spaced radially outwardly from said disc, and a movable contact in the plane of said disc and adjacent the latter, normally spaced from said fixed contact but movable radially outwardly to bear against said fixed contact; and a plurality of peripherally spaced outwardly extending projections on said disc in the plane thereof, each peripherally spaced from said movable contact of said first pair of contacts, and movable with said disc to wipe against and move radially outwardly said movable contact of said second pair of contacts to close said pair of contacts in a timed sequence, first by the movement of said projections during the electromagnetically driven movement of said disc, and then in reverse sequence during the spring urged return of said disc.

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