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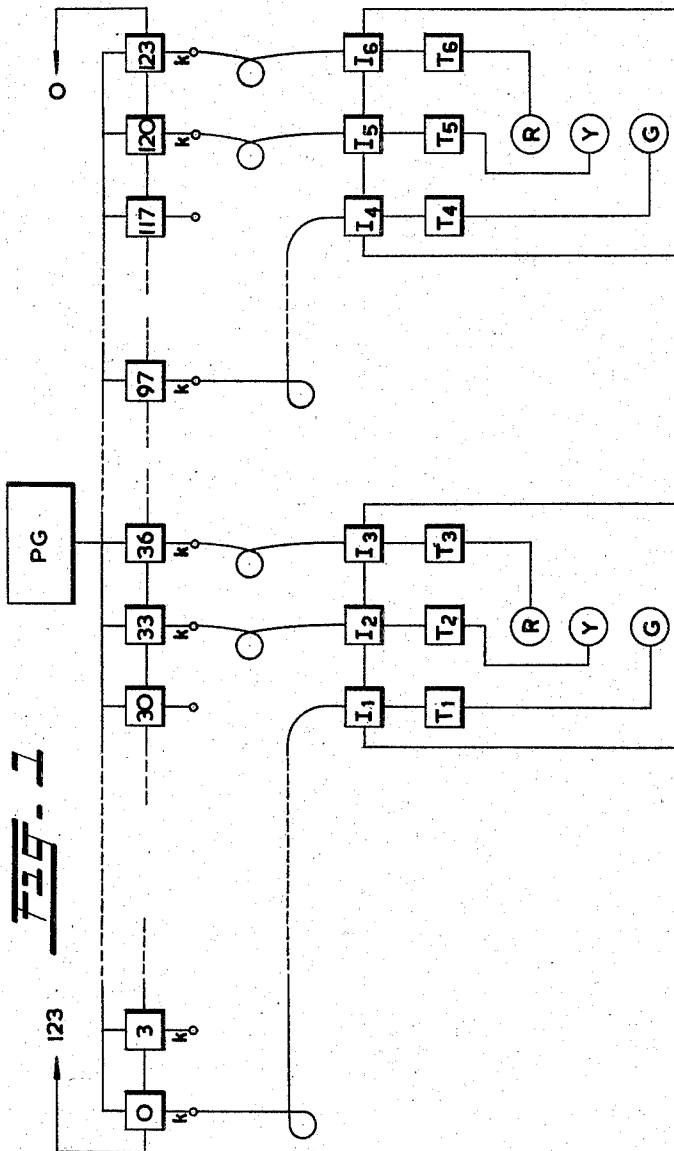
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TRAFFIC LIGHT SWITCHING ARRANGEMENT

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2 Sheets-Sheet 1



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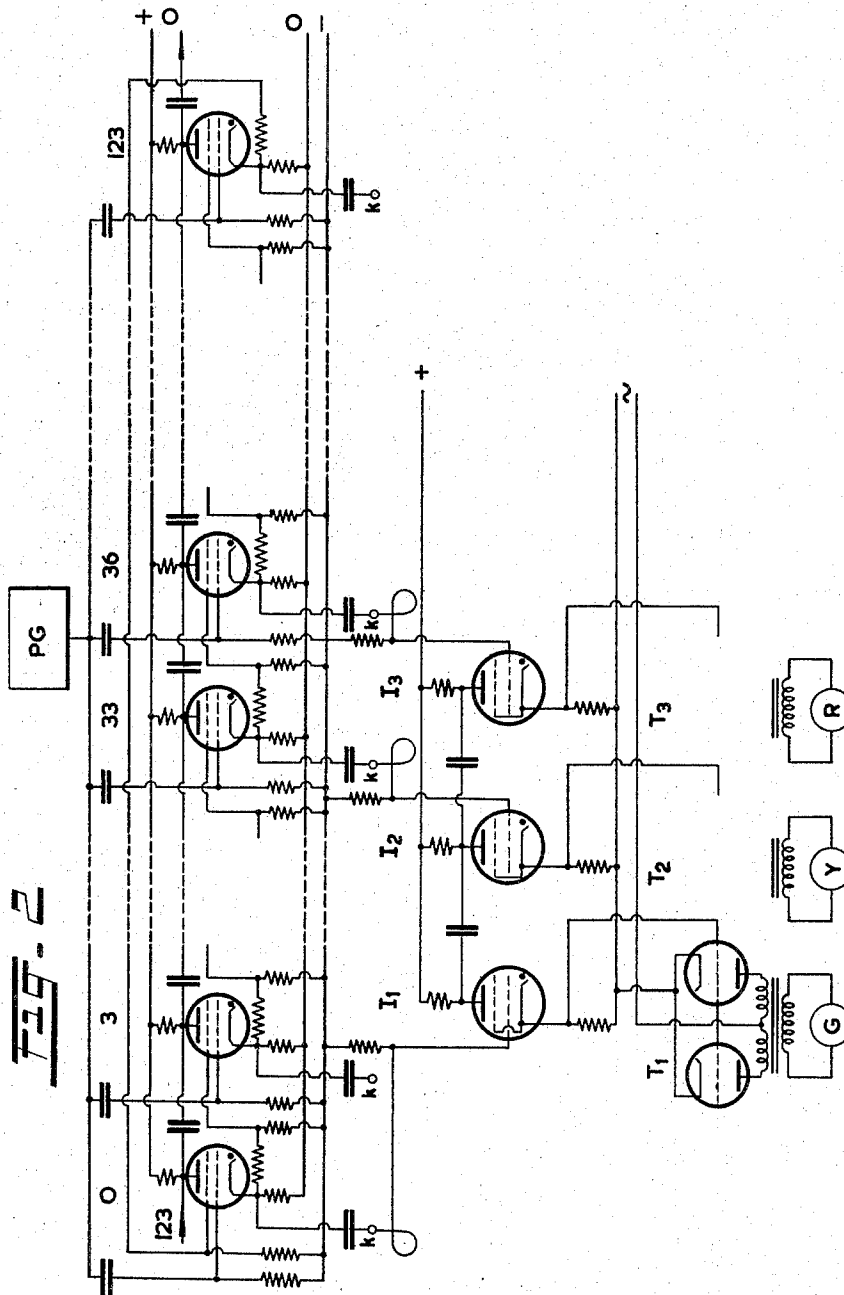
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TRAFFIC LIGHT SWITCHING ARRANGEMENT

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5 Claims. (Cl. 315—163)

The present invention relates to a switching arrangement by means of which the light points belonging to a traffic light or to a group of traffic lights may periodically be switched on and extinguished. Per traffic light mostly three light points are used which respectively radiate a green, a yellow and a red light. For operating a traffic light a mechanically driven controller and a relay are used as a rule. Both the contacts and the driving mechanism of the controller, as well as the relay give rise to breakdowns in the long run which, when the traffic is heavy, may cause great difficulties and even accidents.

The object of the invention is to provide a more reliable switching arrangement in which all of the above elements that may cause break-downs, can be dispensed with.

According to the invention this object is accomplished in that the periodical switching on and switching off of the light points belonging to the traffic light or to the traffic lights of a group is effected by means of an uninterrupted series of pulses supplied to each of a number of discharge tubes connected in a closed circuit, which discharge tubes are adapted to be brought into a conductive condition by said pulses and which each upon reaching said condition render the preceding tube of the circuit non-conductive and prime the subsequent tube for ignition by the subsequent pulse.

According to the invention an electronic device connected with one of the discharge tubes is preferably provided per light point, which device under the influence of the change in the conductive condition of the relative tube generates an extinguishing and an ignition voltage which are passed to two of the light points respectively.

According to another feature of the invention a thyatron is preferably series-connected with each light point, which thyatron receives its ignition and extinguishing voltages from two of the said electronic devices respectively.

The invention is illustrated hereinafter with reference to the accompanying drawing. This drawing illustrates in the form of a block diagram a manner of applying this invention to a group of two traffic lights shown in Figure 1, Figure 2 showing one of the possible elaborations of said block diagram.

The apparatus in substance comprises a series of 42 discharge tubes to which every three seconds a pulse is supplied by a generator which, for example, may consist of a multivibrator.

The tubes shown in the block diagram of Figure 1 by the reference numerals 3, 6 . . . 30, 33, 36 . . . 97 . . . 117, 120 and 123 in accordance with the point of time of their ignition in each cycle, are interconnected in a cyclic excluding circuit arrangement in which only one tube at a time is made conductive, while as each tube becomes conductive the preceding tube automatically becomes non-conductive and the subsequent tube is automatically primed. Such circuit arrangements are known per se. As a rule they are constructed with gas filled tubes, the type of tube comprising the so-called cold cathode being the most suitable. However, thyatrons

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are also suitable, as will appear from the description of Figure 2.

The tubes 3, 6 etc., therefore, are successively ignited with intervals of three seconds, during which ignition a change of voltage manifests itself in the terminal *k* connected with the relative tube. Said changes in voltage are used to periodically light and extinguish the light points of the group, six in number here, via electronic devices I and thyatrons T controlled thereby. The light points are combined in the conventional manner into groups of three points which radiate a red, yellow and green light respectively. They are designated by R, Y and G, respectively.

Each of the light points is series-connected with one of the thyatrons $T_1 \dots T_6$. The thyatron T_1 receives its ignition and extinguishing voltages from I_1 , the thyatron T_2 receives its ignition and extinguishing voltages from I_2 and T_3 from I_3 . Each of the electronic devices I may be connected by means of a cord with each of the terminals *k*. In the case shown, in which I_1 is connected with the terminal of the tube O, I_2 with the terminal of the tube 33 and I_3 with the terminal of the tube 36, the green light to the left will start burning when the tube O is ignited. After 33 seconds T_1 is extinguished by I_2 via I_1 , so that the green light is extinguished and at the same time T_2 will be rendered conductive by I_2 , so that the yellow light to the left starts burning. Three seconds later again T_2 is extinguished by I_3 via I_2 and T_3 is rendered conductive by I_3 , so that the yellow light gives way to the red light. This red light continues burning until T_3 is extinguished by I_1 via I_3 , which takes place after a period of 90 (126-36) seconds. Each "safe" period, therefore, is followed by an "unsafe" period which is almost three times as long.

The same applies to the right hand traffic light.

By means of the cord connections it is possible to select the "safe" and "unsafe" periods within the limits of the time of the total cycle (here 126 seconds) at will. If desired, it is even possible to make two or more "safe" and as many "unsafe" periods fall within each cycle, by providing I_1, I_2 etc. with more than one cord and to connect said cord with terminals *k*, located in various places of the cycle.

It is also possible to operate two or more different groups of traffic lights from one and the same closed circuit arrangement of discharge tubes irrespective of whether the periods of said groups are mutually equal or not, provided that the time of the cycle of each of said groups equals that of the closed circuit arrangement or a whole fraction thereof.

In all of these cases the desired periodical changes from red via yellow to green and conversely take place without any mechanically moved part, such as a controller or relay, being used.

Figure 2 shows an elaboration of the block diagram of Figure 1, in which both for the tubes of the cyclic excluding circuit arrangement 0-123 and for the tubes of the switches I_1, I_2 and I_3 thyatrons are used. The thyatrons of the excluding circuit arrangement are provided with two grids and in the extinguished condition they are primed because during the ignition of the preceding tube a positive biasing potential is applied to their own outer grid. Upon the next pulse, which arrives at the inner grid, the primed tube is ignited and the preceding tube is extinguished because the anodes of the tubes are interconnected by condensers. This last is also the case with the thyatrons of the switches I_1, I_2 and I_3 , which are ignited respectively when the terminal *k* with which the relative control grid is connected receives a positive voltage pulse from the cathode of its thyatron.

As long as one of the thyatrons of the switches I remains ignited there is a positive biasing potential on

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the control grids of the two triodes of the relative switch T, which triodes are connected in parallel and are fed by alternating current and the associated lamp of the traffic light is fed via a transformer. The use of a transformer here presents the advantage that the traffic lights may be kept at a low voltage and the use of two parallel tubes renders it simple to cause the lamps of the traffic light to burn under the entire voltage (by day) or under half the voltage (in the evening and night).

The three second period chosen by way of example in the foregoing is entirely arbitrary and may be changed according to requirements which then naturally results in a proportional change in the duration of the total cycle. The adjustment of this duration may be effected by remote control, if desired, e. g. by accommodating the pulse generator PG, which must be controllable then, in a station located at some distance from the traffic light, or the group of traffic lights. Also other groups of traffic lights may then be controlled from the same station.

We claim:

1. A traffic light switching arrangement in which the light points belonging to the traffic light or traffic lights of a group are automatically and periodically switched on and off, comprising a chain of discharge tubes connected to a source of an uninterrupted series of pulses, said discharge tubes being so arranged and interconnected that they are consecutively brought in a conductive condition by said pulses, each traffic light being connected to interspaced discharge tubes of said chain, another of its light points being ignited when one of said interspaced tubes adopts its conductive state.

2. A switching arrangement according to claim 1, characterized in that per light point an electronic device con-

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nected with one of the discharge tubes is provided, which under the influence of a change in the conductive condition of the relative tube generates an extinguishing voltage and an ignition voltage which are passed to two of the light points respectively.

3. A switching arrangement according to claim 2, characterized in that the electronic devices consist of thyratrons the anodes of which are interconnected via condensers and the cathode voltages of which respectively control the ignition and the extinction of the light points.

4. A switching arrangement according to claim 2, characterized in that the light points are each fed by the secondary coil of a transformer, the primary coil of which is fed via one or two electron tubes from a source of alternating current.

5. A switching arrangement according to claim 3, characterized in that the light points are each fed by the secondary coil of a transformer, the primary coil of which is fed via one or two electron tubes from a source of alternating current.

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