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SWITCH MECHANISM AND SIGNAL

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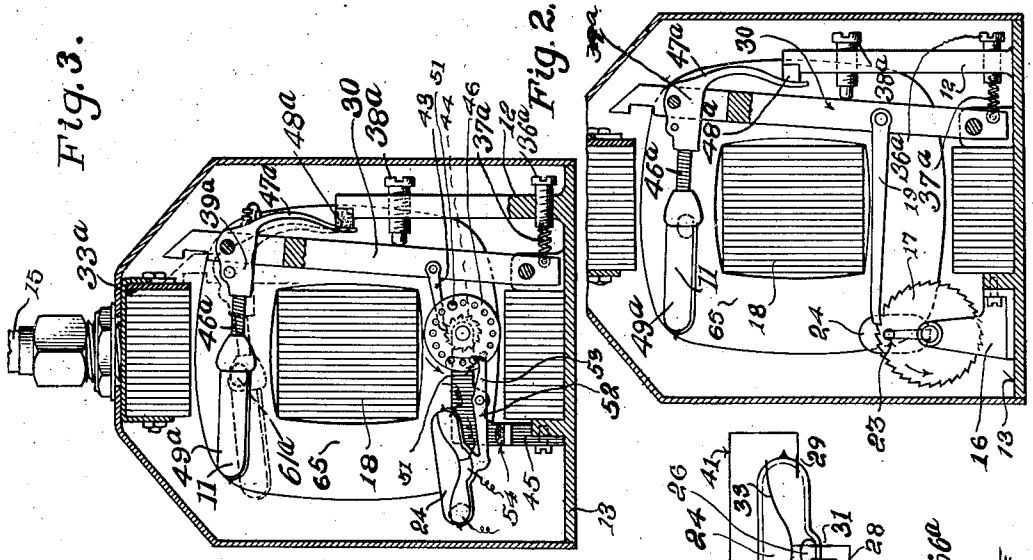


Fig. 3.

Fig. 2.

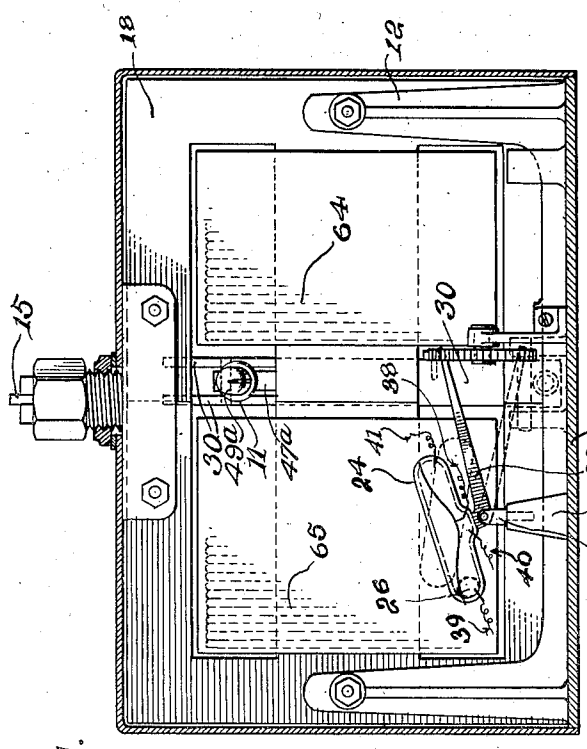


Fig. 1.

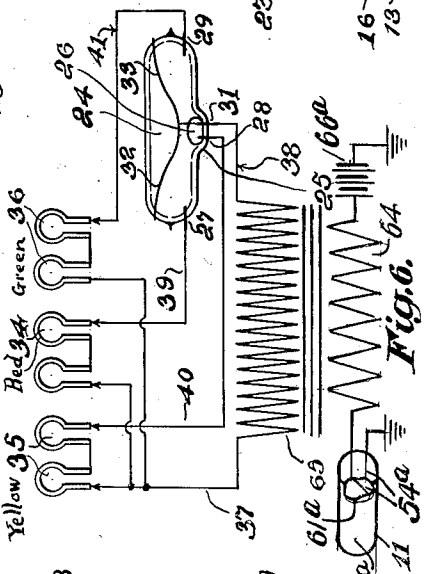


Fig. 6.

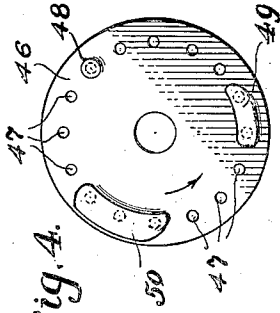


Fig. 4.



Fig. 5.

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SWITCH MECHANISM AND SIGNAL

Robert R. Gonsett, Los Angeles, Calif.

Application May 5, 1932, Serial No. 609,528

1 Claim. (Cl. 177—337)

The invention has for an object to make a new signal device. The invention relates more particularly to application to use in successively flashing luminous gas signals which may be in color or otherwise distinguished for various purposes. In the present instance it is adapted to control traffic on intersecting streets, so that a "go" signal will be displayed alternately on the streets, and a "stop" signal be displayed in each street in the intervals between the "go" signals, with or without an intervening "caution" signal operated by the same mechanism. It may, however, be used to flash respective sign units, or otherwise used.

It is an important object of the invention to enable the accomplishment of all these ends by the use of extremely low voltage batteries to effect the necessary mechanical movements and also energize the neon or other signal. The means for energizing the gas tube may be understood readily from my prior applications Serial Number 546,950 filed June 26, 1931; Serial Number 588,796, filed January 25, 1932, now Patents Numbered 2,025,235 of December 24, 1935, and 1,984,881 of December 18, 1934, respectively, and the present invention utilizes the same mechanism disclosed in my last numbered application, with certain additions which will be explained.

In view of the fact that I have found it possible to operate my prior flasher and also energize a neon tube from a one-and-one-half volt cell, it is a particularly important aim of this invention to enable the accomplishment of the same ends and in addition the operation of the necessary intersection light variation system and mechanism on the same low voltage.

It is also an aim to present a novel mercury switch control for a three-circuit system of lighting.

Additional objects, advantages and features of invention reside in the construction, arrangement and combination of parts involved in the embodiment of the invention, as may be more readily understood from the following description and accompanying drawing, wherein

Figure 1 is a side elevation of my flasher unit as in application Serial No. 588,796, with an intersection control incorporated thereon, the case in section.

Figure 2 is a cross section of the last mentioned construction.

Figure 3 is a similar cross section, showing a modification of the mechanism.

Figure 4 is a detail of the cam wheel of Figure 3.

Figure 5 is a detail perspective of a cam of Figure 4 showing the side which is concealed in Figure 4.

Figure 6 is a diagram of the secondary circuit of an intersection signal utilizing the apparatus above set forth, and more particularly described hereinafter.

There is illustrated in Figure 1 a transformer interrupter neon flasher unit as described in detail in my prior application last referred to, including a base frame 12 on which the operative mechanism and transformer are mounted, the transformer including the core 18, primary and secondary coils 64 and 65, and the armature 30 thereof on which there is mounted a peculiar interrupter and timing switch 11 all as particularly described in the earlier application. The base includes a bottom plate 13 around which is fitted a case 14 and the mechanical unit is provided with a hanger 15 by which it may be suspended.

At the side of the base opposite the mounting of the armature, there is attached or integrally formed a bracket 16 having upstanding arms between which there is revolubly mounted a ratchet wheel 17, and pivoted on the armature there is a very light long pawl, 19 (see Fig. 2) resting on the ratchet, gravity being sufficient to maintain its proper engagement therewith.

Longitudinally spaced from the bracket 16 there is a second bracket 20 in the top of which there is a step bearing receiving revolubly a pin 21 bifurcated at its upper end, a lever 22 having one end pivoted in the fork for oscillation vertically. The ratchet is formed with an aperture 23 therethrough, and the extremity of the lever is loosely fitted in the aperture for universal pivotal operation. The pin 21 constitutes a universal pivot for the lever. The ratchet and pawl may be termed a slow motion operative connection between the interrupter and rocking switch 24. On the lever immediately over the pin and preferably centered thereover, there is a rocking mercury tube switch 24. This tube, as shown, is substantially cylindrical and may be rectilinear, but at its middle it is provided with a slight bowl or recess 25 at the lower side. In the tube there is a globule 26 of mercury which is preferably of a size to roll out of the bowl after a partial—moderate—inclination of the tube by the operation of the lever 22. At one end of the tube near the lower side, in the bowl part of the tube, and at the other end of the tube, there are respective secondary distributor electrodes 27, 28, 29, and in the bowl spaced from the electrode 29 therein there is a lead-in electrode 31, which

is branched within the tube and its respective arms 32 and 33 extend into proximity with the electrodes 27 and 29 at the respective ends of the tube. The globule of mercury is of a size to make a bridge contact across the electrodes at either end or in the bowl, according to its position.

In Figure 6 there is illustrated an adaptation of the device to operate a red signal 34, a yellow signal 35, and a green signal 36, the yellow signal occurring for a short period as the change from red to green or green to red is made, as in a traffic signal for street intersections. The particular form of the mounting for such lights and the particular forms of the discharge tubes which are to be energized for the illumination indicated may be varied through a wide range of construction, and as such housings are well known the details are not illustrated. There are indicated however, a pair of red signal lamps at 34, comprising neon or other gaseous electrical discharge tubes connected in series, and the yellow and green signals 35 and 36 comprise similar sets of lamps or tubes, which may have such gases therein as are respectively suited to the signal desired. From one end of the secondary coil 65 a bus lead 37 is extended, connected to one terminal of each set of all tubes. From the other end of the secondary coil a lead 38 is extended to the electrode 31 of the switch 24. From the electrode 27 at the left end of the switch, wire 39 leads to the red series of tubes; from the electrode 28 in the bowl of the switch wire 40 extends to the yellow series of tubes, and from the electrode 29 at the remaining end of the switch wire 41 leads to the green series of tubes; each of these last named connections being at the signal terminal opposite the terminal to which the bus lead 37 is connected.

The armature 30 is held yieldingly in position retracted from the core 18 by means of the spring 37—*a* adjustable by a screw 36—*a*. Retractive movement of the armature is limited by an armature stop screw 38—*a* mounted on an extension of the frame 12. Pivoted on the extremity of the armature there is a lever 39—*a*, projecting between the primary and secondary coils above the core 18. At this extremity of the lever there is secured an extremely flexible spring 46—*a*, projecting longitudinally and carrying at its extremity a mercury switch tube 49—*a* of elongated form projecting longitudinally from the spring. The tube is provided with two contacts 54—*a* at its inner end and has a globule of mercury 61—*a* therein by which a circuit from the electrical source 66—*a* is closed across the contacts and through the primary of the transformer, when the armature is in initial or retracted position. At the initial position the tube is slightly inclined upwardly toward its outer end. The tube is so held by an arm or heel piece 47—*a* extended integrally downwardly from the lever 39—*a* near its pivot, and resting against a cushion 48—*a*, the rearward or outward pressure of the upper part of the armature causing this arm 47—*a* to be pressed in, and so lifting the tube 49—*a* which with its contacts and mercury comprises the switch 11. Immediately on closing of the circuit in this manner, the field produced about the core 18 draws the armature inwardly. This causes the mercury to bank against the contacts and adjacent end of the tube and be carried therewith as the armature moves inward. The armature is abruptly stopped by striking of its upwardly projected end portion against the cushion 33—*a* on the upper arm of the core or other fixed support. By reason of the movement so imparted to the mercury, this stoppage of the tube causes the mercury to be projected ballistically toward the far end of the tube. As the arm 47—*a* leaves its rest 48—*a* the outer end of the tube is caused to drop abruptly, and as the armature returns pressure of the rest on the arm 47—*a* quickly lifts the tube again. Both actions produce an extensive vibratory oscillation of the tube by reaction of the spring 46—*a*, its outer end describing an arc having a center in the spring 46—*a*, and this swinging movement produces a material centrifugal force acting on the mercury to hold it at the outer end of the tube for a period which may be regulated by adjustment of the screw 36—*a* and armature stop 38—*a*.

In the operation of this device, on each actuation of the armature, the primary circuit of the flasher will be interrupted inducing a high-tension current in the secondary 65 and a flash in whatever lamp there may be connected in the secondary circuit by the switch 24. At the same time the pawl will move the ratchet 17 one step, repetition of this action causing a slow step-by-step rotation of the wheel 17. For each turn of the wheel the switch 24 will be moved through the range indicated in Figure 1—that is, from one extreme inclination to the opposite one and back. It will be appreciated that a number of operations of switch 11 must occur for each operation of the switch 24, as will be apparent from the number of teeth on the wheel 17, one tooth passing the pawl 19 on each operation of the armature 30.

The number of teeth on the wheel 17 and the period of operation of the armature determine the duration of the maintenance of the contacts in the circuits of the lights 34, 35, 36, all of which may be varied to meet requirements. Thus, the switch 11 may be adjusted to operate at intervals of one-half second, and if the bowl 25 is properly shaped the contact time for light 34 in switch 24 will be shorter than the duration of the other two contacts made thereby. If greater frequency of the impulses in the secondary circuit is required the number of teeth on the wheel may be increased so that change of color of the signal will be at sufficiently long intervals. In the position of the switch shown in Figure 1 the red signal will be energized by closing of the circuit across electrode 27 and branch 32 of electrode 31. As the ratchet wheel moves, the arm of the lever is moved gradually downward at its extremity, and the tube finally reaches level position and passes to an opposite inclination. The mercury promptly moves with a gentle motion, from the left end of the tube to the bowl at the middle of the tube, where it closes the circuit from the electrode 31 to electrode 28, energizing the yellow signal. By having the bowl quite shallow, the mercury passes therefrom after a short time to the right hand extremity of the tube, closing the circuit from electrode 29 to the branch 33 of the electrode 31, which energizes the green signal 36. The tube becomes further inclined, retaining this circuit closed until the arm of the lever is raised sufficiently to incline the tube slightly downward toward the left, when the mercury gently returns to the bowl again, and after a short interval again falls to the left hand end of the tube as at first. The operation then continues as before described.

In Figures 3 to 5 inclusive there is illustrated a modification in which a small ratchet wheel 44 is mounted closer to the armature on a bracket 45 extending between the primary and secondary coils 64 and 65 of the transformer. It is operated

by a short pawl **43** from the armature **30**, and this carries a variable cam disc **46** having a concentric series of uniformly spaced apertures **47** therethrough near its periphery. On the other side of this disc there are provided adjustable cams **48**, **49**, **50**, each of which is formed with one or more pins **51** insertable in the apertures of the disc. On the bracket **45** there is also mounted a lever **52** of the first class in line with the plane of rotation of the cams, and having the extremity of its operating arm **53** disposed in position to be engaged and depressed by the cams as the disc **46** rotates. The lever carries on its opposite arm a mercury switch **24** constructed and connected as previously described, or otherwise as desired. In Figure 4 the cam **48** is of slight circumferential measurement, while the cams **49** and **50** are successively longer. The length of the cam determines the length of time of contact at the right hand end of the switch for green, while the spacing between the cams determines the length of contact at the left for red signals. The number of teeth on the ratchet **44** also must be in number proportionate to the period of the armature in order to secure the desired duration of the different color periods. The cams may be all of the same length if desired, or may be otherwise varied as desired. The switch tends to be moved to and held inclined downward at the left by gravity, and the cams serve to move it toward the opposite inclination as may be understood, with the change of circuits by movement of the mercury as first described, except with a possibility of variation of the duration of the red and green signals, as may be understood, by substituting shorter or longer cams, or adjusting the cams circumferentially on the disc **46**, to affect the green or red lights respectively.

A cushion **54** is provided to receive the load or switch arm of the lever as it falls by gravity.

In the first described form of the invention the timing of the red and green periods may be determined by the frequency of actuation of the armature, or by varying the length of the ratchet teeth circumferentially, or by changing the pivot of the pawl longitudinally of the armature **30**.

I claim:—

In a system of the character described, the combination of a multiple light system of high potential gaseous discharge light sources; a transformer having a primary, a secondary and a highly magnetic metal core; a low voltage direct current source and a mercury switch in series with the primary, an armature normally retracted but capable of being attracted and moved by energization of said primary, a resilient flexible mounting connecting said switch to said armature to be normally closed when said armature is retracted and open when the armature is attracted whereby the primary circuit will be interrupted at a rapid rate, separate switch means to selectively connect respective of said light sources in series with said secondary, and operative connections between the armature and the last named switch operated by movement of the armature to operate the last named switch at a much slower rate than the first named rate and connect the light sources respectively to the secondary for periods each including a plurality of interruptions of the primary circuit.

ROBERT R. GONSETT.