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2,016,220

TRAFFIC LIGHT CONTROL

Filed Dec. 4, 1929

2 Sheets-Sheet 1

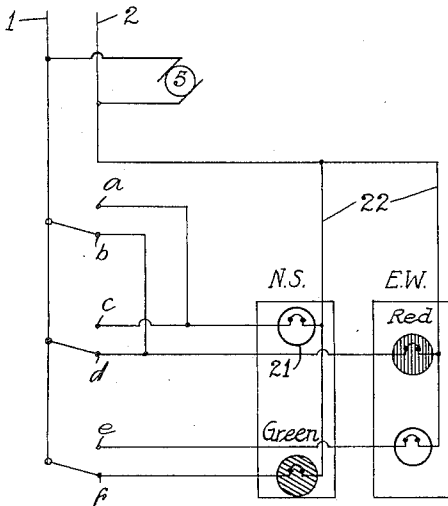


Fig. 1

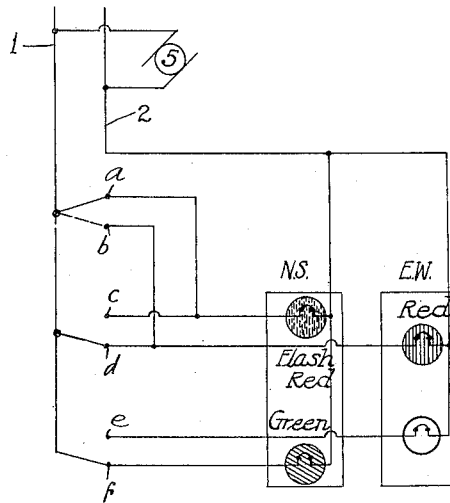


Fig. 2

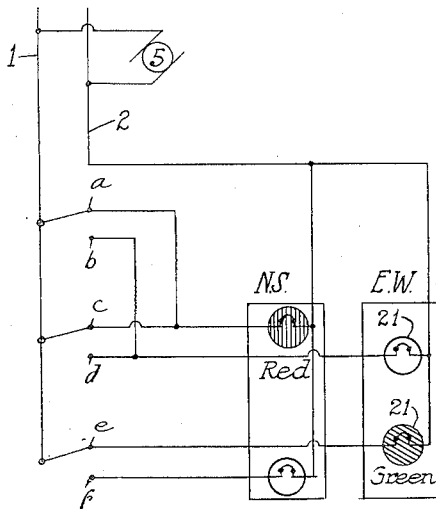


Fig. 3

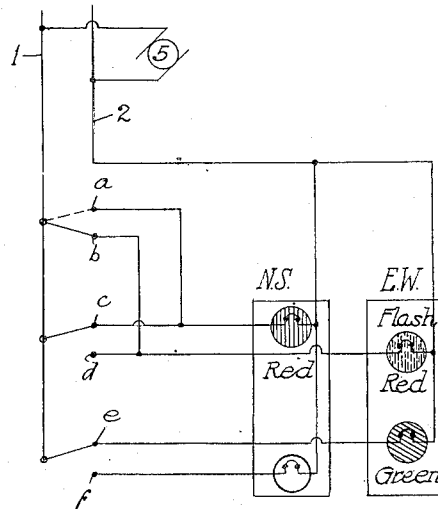


Fig. 4

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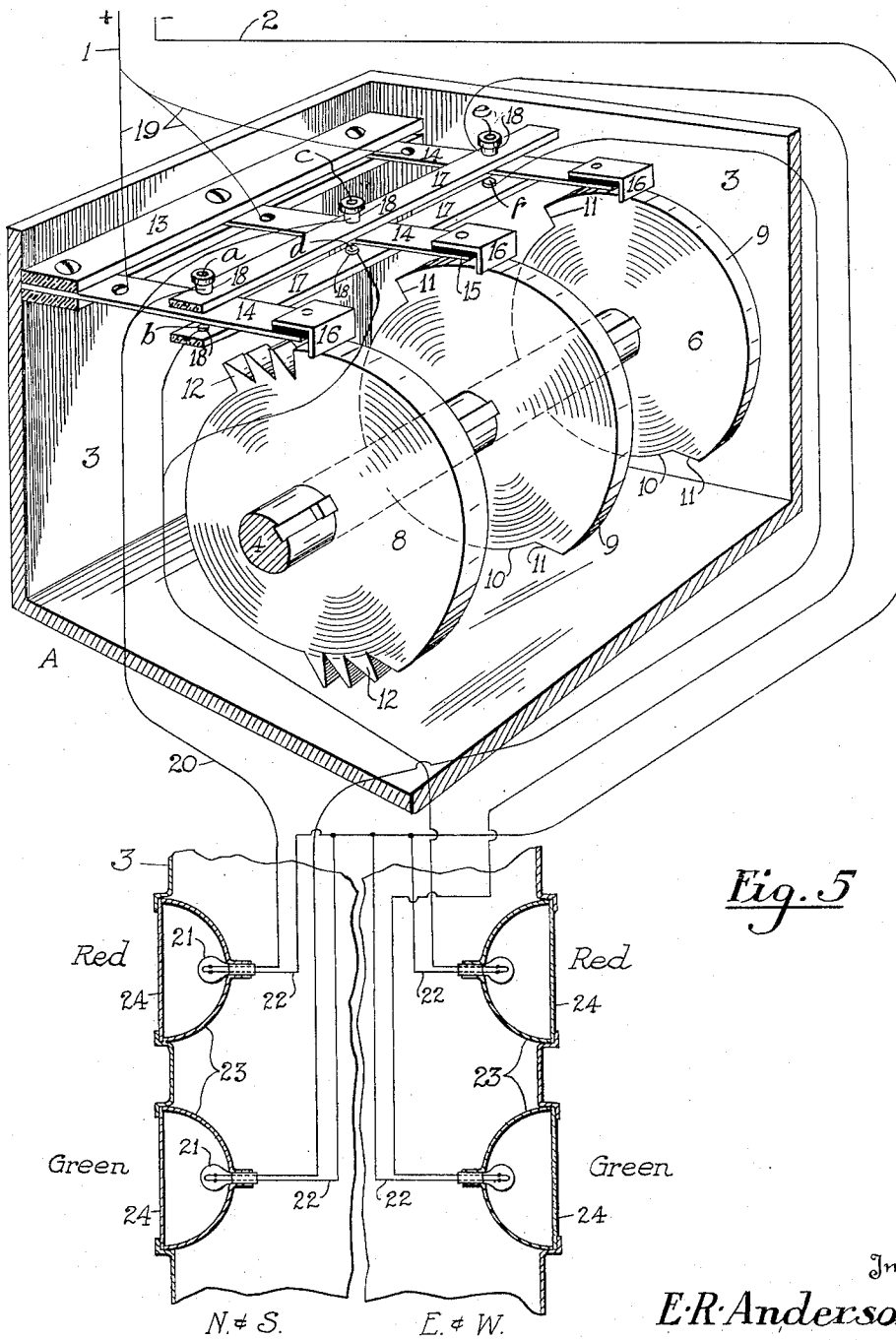
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TRAFFIC LIGHT CONTROL

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15 Claims. (Cl. 177—337)

This invention relates to street and highway intersection traffic controlling signals and has particular reference to traffic signals of the automatic electrically operated type wherein use is made of colored lights intermittently energized for regulating the movements of traffic through street and highway intersections.

It is an outstanding object of the invention to provide an electrically operated visual type of highway signal wherein each face of the signal is provided with but two lamps or lenses, usually red and green, instead of employing the customary three lenses to indicate red, yellow and green. Heretofore the yellow signal has been employed between the energized periods of the red and green signals in order to produce a period of warning permitting of the clearing of the intersection prior to the change in the movement of the direction of traffic. In accordance with the present invention the use of this yellow or amber signal is dispensed with in order that the signal structure as a whole may be more simplified in operation and economically constructed but without loss of the functions heretofore secured through the use of the yellow or caution signal.

The present invention therefore embodies a circuit control so constructed and operated that at or about the time of termination of the energizing of the green or go signal an intermittent flashing or energizing of either the green or red signal is produced, whereby oncoming drivers will be notified of the impending change in the signal from the green or go period to the red or stop period, the intermittent flashing of one or the other of said signals providing the necessary warning in order to provide for the stopping of oncoming vehicles and to permit of the clearing of the street intersection.

For a further understanding of the invention reference is to be had to the following description and the accompanying drawings wherein:

Figure 1 is a diagrammatic view illustrating the controlling circuit employed in governing the energizing of the incandescent lamps employed in the signal. In this figure the stop or red lamp controlling east and west traffic is shown as energized and the green signal employed in controlling north and south traffic is energized.

Figure 2 is a similar view of the controlling circuit showing the flash switch closed for intermittently energizing the red signal governing north and south traffic, the green signal for governing north and south traffic energized and the

red signal for governing east and west traffic energized.

Figure 3 is another diagrammatic view illustrating a third circuit governing position wherein the red signal for north and south traffic and the green signal for east and west traffic are energized.

Figure 4 is a similar view showing the circuit arrangement wherein the green signal for east and west traffic and the red signal for north and south traffic are energized and wherein the red signal for east and west traffic is being intermittently energized to indicate the termination of the go or clear period provided by the green signal of the east and west traffic, and

Figure 5 is a perspective view of the circuit controller illustrating diagrammatically the associated lamps governed thereby.

Referring more particularly to the drawings, the numeral 1 indicates the current input line 20 which leads from any suitable source of energy, for the signal, while the numeral 2 indicates the return line. The line 1 extends to a circuit controller A which is preferably mounted within the casing 3 of the traffic signal which is adapted to be positioned in any suitable manner in connection with a street intersection in order that it may be conveniently viewed by approaching vehicle drivers.

The controller A consists of a rotatably journaled shaft 4 which is constantly rotated at a predetermined speed of rotation by, for example, an electrical motor 5, shown in Figure 1, which is shunted across the lines 1 and 2. The shaft 4 has keyed or otherwise secured thereto a plurality of switch cams, the numeral 6 indicating the cam employed in controlling the energizing of the green or go signals, the cam 7 indicating the cam employed in controlling the red or stop signals, and the cam 8 being employed in controlling the intermittent energizing of one of the previous signals, preferably the red signal, at approximately the period of termination of the green signal. The cams 6 and 7 are practically identical in construction and each includes a peripheral area 9 of maximum diameter and a peripheral area 10 of reduced diameter, the peripheral surfaces 9 and 10 being joined by abrupt shoulders 11. The flash cam 8 substantially duplicates the construction of the cams 6 and 7 with the exception that its surface 9 terminates in a plurality of serrations or teeth 12 by which rapid opening and closing movements are imparted to an associated switch to intermittently energize a complementary circuit.

Stationarily arranged within the casing 3 and suitably supported therein is a fixed shelf 13 formed from insulating material. To this shelf there is suitably secured the fixed inner ends of a plurality of resilient and metallic contact bars 14. These bars have their outer or free ends provided with insulating pads 15 in order to alternately space the bars 14 from a plurality of contact brackets 16 which are rigidly carried by the resilient outer ends of the bars 14. The vertical legs of the brackets 16 engage with the peripheral surfaces 9, 10, 11 and 12 of the cams 6, 7 and 8, in order that the rotation of the cams may govern the operating positions of the bars 14.

The bars 14 are positioned between upper and lower contact strips 17 of insulating material which extend at right angles to the bars 14 and are stationarily supported in any suitable manner in the casing 3. The strips 17, opposite the bars 14, are provided with oppositely disposed metallic contacts 18 which are adapted to be engaged with the bars 14 by the operation and positions of the cams 6, 7 and 8.

Electrical energy enters the controller by way of the line 1 and then by means of the branch wires 19 is transmitted to each of the contact bars 14 and thence through said bars to the stationary contacts 18. Wires 20 extend from the contacts 18 to the incandescent lamps 21 which are used in providing the visual signals secured by the operation of the apparatus, and conductors 22 lead from the return sides of the lamps 21 to the return line 2 of the system. The respective pairs of binding posts are designated by the reference characters *a*, *b*, *c*, *d*, *e* and *f*, as clearly shown in Figure 5 of the drawings.

As shown in Figure 5, the traffic signal comprising the present invention embodies on each signalling side but two lamps one for the purpose of producing a red or "stop" signal and the other for producing a green or "go" signal. The lamps 21 are surrounded by reflectors 23 and the open sides of these reflectors are closed by means of colored glass lenses 24.

In Fig. 5, one side of the electrical supply 1, through 19, is connected to contact carrying cam followers 14, over cams 6, 7 and 8. Stationary contact *c* is connected to north and south stop, *d* is connected to east and west stop, *e* is connected to east and west go and *f* is connected to north and south go signal indications. The other side of the source of electrical supply (2) is common to all signal indications. Thus, if only two cams 6 and 7 actuating their respective cam followers 14, between stationary contacts *e* and *f* and *c* and *d* were involved and the high and low portions of said cams were respectively positioned in alignment, upon rotation of said cams 6 and 7, they would effect a simultaneous energization of the east and west go and the north and south stop signal indications while on the high portions of the cams and make an abrupt change from the above condition to that of energizing the north and south go and the east and west stop signal indications upon cam followers 14, riding the low portion of cams 6 and 7.

Obviously, if the stationary contact *c* is connected by jumper to contact *a*, the north and south stop signal indications may be energized through either or both of these contacts, similarly, if in the same manner contacts *b* and *d* are interconnected the east and west stop signal indications may be energized through either or both of these contacts, therefore, if a third cam, 8, having

a series of serrations or notches 12, at the beginning and the end of its high portion is so positioned with respect to cams 6 and 7, that a given number of notches 12, are effective in advance of the high portion 9, of the latter cams, it is obvious that while cam followers 14 over 6 and 7 are adjacent to the low portion of these cams that cam follower 14, over cam 8, upon reaching notches 12, will rise and fall and thus produce an intermittent energization of the north and south stop signals through contact *a*, simultaneous with steady energization of the north and south go signals through contact *f*, and the east and west stop signals through contact *d*. Upon cam followers 14, reaching the high portion of their respective cams, contacts *a* and *c* function in unison to steadily energize north and south stop signals and contact *e*, to energize east and west go signals, therefore, if the notches 12, at the end of the high portion of cam 8 are in advance of and terminate at the beginning of the low portions of cams 6 and 7, it necessarily follows that upon cam follower 14, over cam 8, reaching lowermost positions in said notches, it will intermittently energize east and west stop signals through contact *b* during the steady energization of the east and west go signal and the north and south stop signals. Thus in this particular arrangement an intermittent flashing effect is imparted to the stop signals prior to the termination of the period of activity of the go signals in any given direction, while an abrupt change from stop to go signal condition is effective in any given direction. The flashing effect of the stop signal combined with the steady energization of the go signal serves as a notification to moving traffic of an impending change in directional traffic movement and provides a period for such traffic to come under control preparatory to stopping, while the abrupt change from stop to go signal condition precludes the tendency to pre-start as is the general practice where a caution or other signal indication is displayed following the stop signal, and before the go signal is effective.

In operation, the shaft 4 is constantly rotated at a predetermined or fixed rate of speed by the operation of the motor 5, and, if desired, suitable speed reducing gearing (not shown) between the armature shaft of the motor and the cam shaft. This results in the synchronous rotation of the cams 6, 7 and 8. With the parts of the controller positioned as shown in Figures 3 and 5, it will be seen that the lamp governing the green signal controlling the traffic moving east and west is energized and likewise the red signal for governing north and south traffic is energized. In this position, however, the green signal on the east and west traffic is about to be extinguished to permit of the energizing of the red signal. In ordinary apparatus of this kind it is customary to deenergize the green signal and energize a yellow or amber signal which remains energized for a short interval when it is extinguished and the red signal is energized. In accordance with the present invention, however, immediately prior to the extinguishing of the green signal the teeth 12 of the cam 8 cooperate with the associated bar 14 to intermittently energize the red signal disposed immediately above the green signal which is about to be extinguished. This produces an intermittent flashing of the red signal which notifies oncoming traffic drivers of the impending change of the traffic controlling signals and the conse-

quent flow of traffic at the street intersection protected by the signals.

The terms "continuously", "predetermined" and "active" as used are meant to define the steady display of the signal lights for their entire time. The term "effective" is that portion of such time in which one signal light alone is displayed to indicate distinctly "stop" or "go" traffic, depending on which particular signal is displayed.

By this method of operation and construction I reduce the number of lamps required in a traffic signal assembly with corresponding simplicity of construction, economy in manufacture and with accompanying decreased repairs and replacements of parts, without loss of function of the caution signal. It is, of course, within the scope of the invention to intermittently flash the green or red lamp at the end of any signal period to provide the caution warning, and I, therefore, do not limit myself to the precise structural features and method of operation hereinbefore set forth, but reserve the right to employ all such modifications and equivalents thereof which fall within the scope of the following claims.

What is claimed is:

1. The method of regulating the operation of highway intersection traffic signals by means of stop and go visual electrical light signals, which includes energizing the go signal for a predetermined period, intermittently flashing the stop signal immediately prior to the termination of the period of activity of the go signal and subsequently continuously energizing the stop signal for its active period at the termination of the active period of the go signal.

2. The method of regulating the operation of highway intersection traffic signals by means of stop and go visual electrical light signals, which includes energizing the go signal for a predetermined period, intermittently flashing the stop signal immediately prior to the termination of the period of activity of the go signal and subsequently continuously energizing the stop signal for its active period at the termination of the active period of the go signal and then again continuously energizing the go signal for its active period immediately upon the termination of the period of activity of the stop signal.

3. The method of regulating the operation of highway intersection traffic signals by means of stop and go visual electrical light signals, which includes energizing the go signal for a predetermined period, intermittently flashing the stop signal immediately prior to the termination of the period of activity of the go signal, and subsequently continuously energizing the stop signal for its active period substantially at the termination of the active period of the go signal.

4. The method of regulating the operation of highway intersection traffic signals by means of stop and go visual electrical light signals, which includes energizing the go signal for a predetermined period, intermittently flashing the stop signal immediately prior to the termination of the period of activity of the go signal, and subsequently continuously energizing the stop signal for its active period substantially at the termination of the active period of the go signal, and then again continuously energizing the go signal for its active period immediately upon the termination of the period of activity of the stop signal.

5. The method of regulating the operation of highway intersection traffic signals to indicate

go, caution and stop periods, by means of two visual electrical light signals, which includes first indicating go by the continuous illumination of one of the signal lights for an effective period, then indicating caution by the continuous illumination of one of the signal lights simultaneously with the flashing of the other signal light for an effective period, and then indicating stop by the continuous illumination of the second signal light for an effective period.

6. The method of regulating the operation of highway intersection traffic signals by means of stop and go visual electrical light signals, which includes energizing the go signal for its effective period, then immediately thereafter intermittently flashing the stop signal, then subsequently continuously energizing the last mentioned signal for its effective period, then deenergizing the last mentioned continuously energized signal and reenergizing the first mentioned signal for an effective period.

7. The method of regulating the operation of highway intersection traffic signals by means of stop and go visual electrical light signals, which includes energizing the go signal for its effective period, then immediately thereafter intermittently flashing the stop signal, then subsequently continuously energizing the last mentioned signal for its effective period, then deenergizing the last mentioned continuously energized signal, and successively repeating the aforesaid cycle of signal energization.

8. In a two light signal system for controlling traffic at highway intersections, stop and go visual electrical light signals, means for energizing the go signal for its effective period, means for immediately thereafter intermittently energizing the stop signal to create an intermittent flashing thereof, and additional means for then continuously energizing the last mentioned signal for an effective period, and means for continuously repeating the operation of the aforesaid means.

9. In a system for controlling traffic at highway intersections, stop and go visual electrical light signals, means for energizing one of the signals for a predetermined period, means for intermittently energizing the other signal to create an intermittent flashing thereof prior to the termination of said period of the first mentioned signal, and additional means for continuously energizing the last mentioned signal for a predetermined period at the termination of the flashing activity thereof.

10. The method of regulating the operation of highway intersection traffic signals by means of stop and go visual electrical light signals, which includes; energizing the go signal for an active period, intermittently flashing the stop signal immediately prior to the termination of the period of activity of the go signal, and subsequently continuously energizing the stop signal for its active period substantially at the termination of the active period of the go signal, and successively repeating the aforesaid cycle of signal energization.

11. In a system for controlling traffic at highway intersections, stop and go visual electrical light signals approachable by traffic on each of a plurality of different lanes, means for energizing the go signal for an active period, means for intermittently flashing the stop signal immediately prior to the termination of the period of activity of the go signal, means for subsequently continuously energizing the stop signal for an effective period at the termination of the active

period of the go signal, means for again continuously energizing the go signal for an effective period immediately upon the termination of the said period of the stop signal.

- 5 12. The method of regulating the operation of highway intersection traffic signals to indicate go, caution or warning of change in directional traffic movement, and stop, by means of visual electrical light signals having two contrasting
10 color indications, one indicating go and the other stop, approachable by traffic on each of the plurality of different lanes, which includes; energizing the first of the said signals for an active period, intermittently energizing the other signal
15 to create a flashing thereof prior to the termination of the active period of the first mentioned signal and subsequently continuously energizing the second mentioned signal for an effective period substantially at the termination
20 of the flashing activity thereof, then deenergizing the last mentioned continuously energized signal, and again continuously energizing the first mentioned signal.

13. In a system for controlling traffic approaching highway intersections on each of a plurality
25 of different lanes, visual electrical light signals having two contrasting color indications, one indicating go and the other stop, means for energizing the first of the said signals for an active period, means for intermittently energizing the
30 other signal to create a flashing thereof prior to the termination of the active period of the first mentioned signal, means for subsequently continuously energizing the second mentioned signal
35 for an effective period substantially at the termination of the flashing activity thereof, means for deenergizing the last mentioned continuously energized signal, and means for reenergizing the first mentioned signal.

- 40 14. The method of regulating the operation of highway intersection traffic signals to provide; traffic movement, caution or warning of directional change in traffic movement, and traffic stop periods, by means of visual electrical light

signals having two distinct color indications, normally indicating stop and go, approachable by traffic on each of a plurality of different lanes, which includes; continuously and simultaneously energizing the north and south go and the east
5 and west stop signals for an active period, intermittently energizing the north and south stop signals to create an intermittent flashing thereof prior to the termination of and concurrently with the period of activity of the north and south
10 go signals, then deenergizing the active signals and simultaneously with such deenergization, energizing the north and south stop and east and west go signals for an active period, intermittently energizing the east and west stop signals
15 to create an intermittent flashing thereof prior to the termination of and concurrently with the active period of the east and west go signals, then deenergizing the active signals and successively repeating the aforesaid cycle of signal
20 energization.

15. In a system for controlling traffic at highway intersections, visual electrical light signals having two distinct color indications, normally indicating stop and go, approachable by traffic
25 on each of a plurality of different lanes, means for continuously and simultaneously energizing the north and south go and the east and west stop signals for an effective period, means for intermittently energizing the north and south stop
30 signals to create an intermittent flashing thereof after the termination of the effective period of the north and south go signals, means for deenergizing the displayed signals, means for thereafter energizing the north and south stop and east and west
35 go signals for an effective period, means for intermittently energizing the east and west stop signals to create an intermittent flashing thereof after the termination of the effective period of the east and west go signals, means for deenergizing the
40 displayed signals, means for successively repeating the aforesaid cycle of signal energization.

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