Nov. 8, 1938. L. J. JENNINGS 2,136,191

TRAFFIC SIGNAL AND LIGHTING SYSTEM

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Fig. 1.

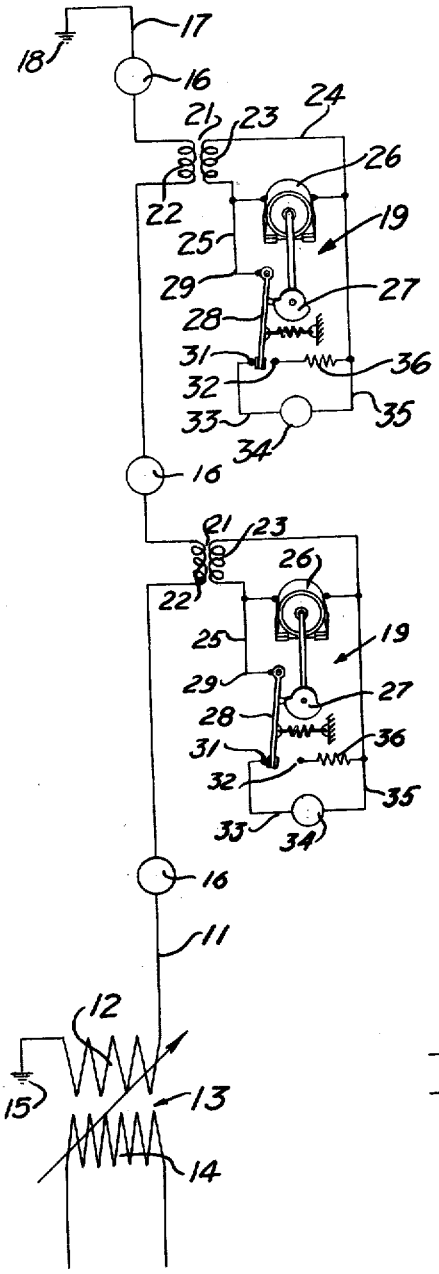
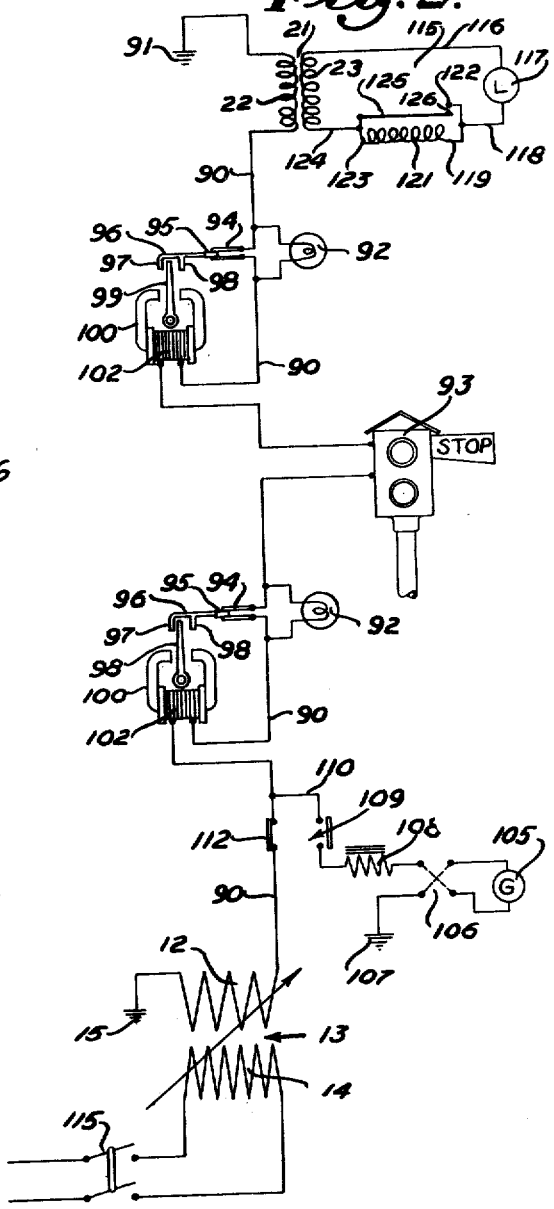


Fig. 2.



INVENTOR:
LEO J. JENNINGS,
BY Fred W. Lamie
ATTORNEY.

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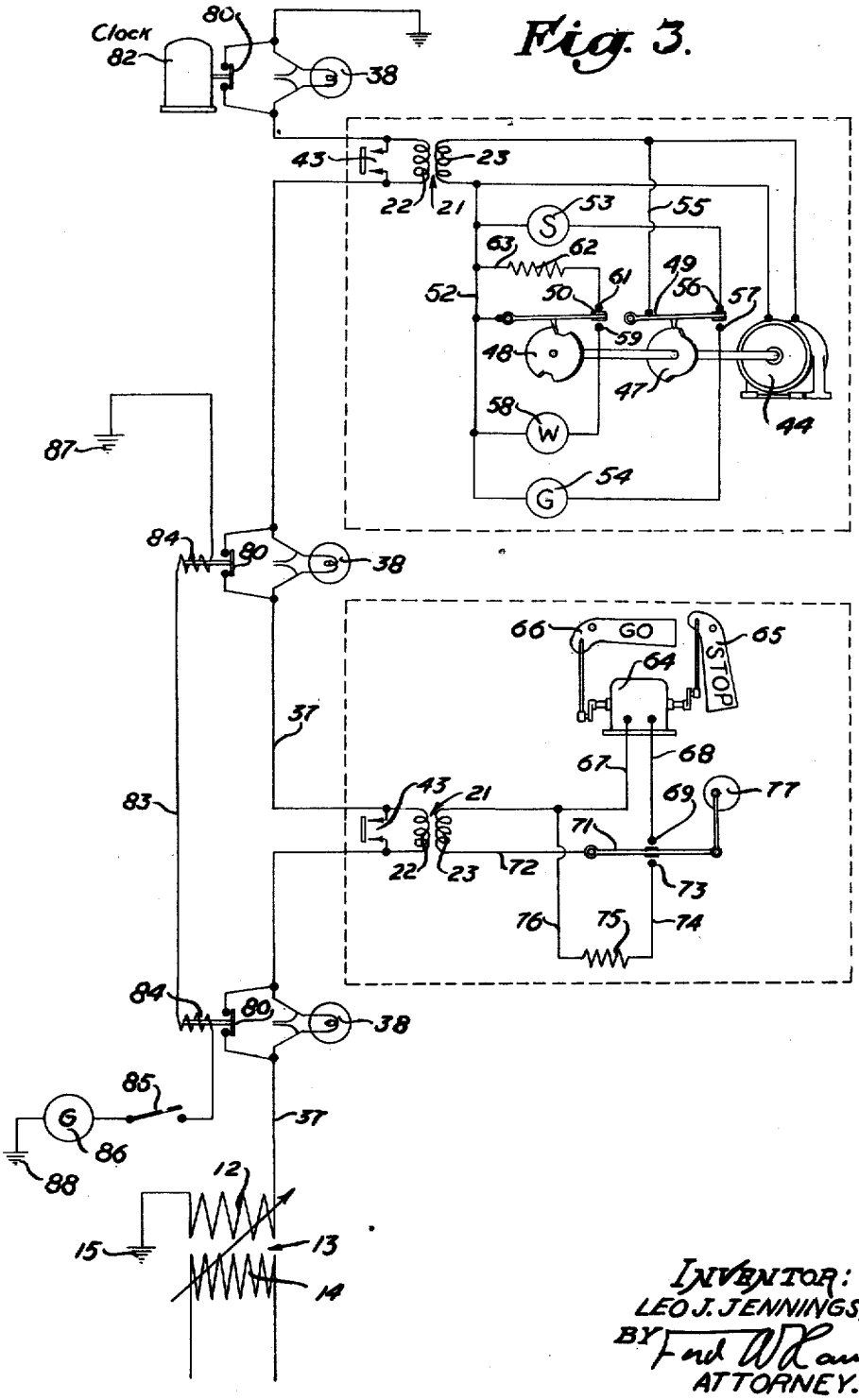
Fig. 3.



INVENTOR:
LEO J. JENNINGS,
BY Ford W. Rains
ATTORNEY.

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TRAFFIC SIGNAL AND LIGHTING SYSTEM

Leo J. Jennings, Beverly Hills, Calif.

Application May 5, 1936, Serial No. 77,975

3 Claims. (Cl. 171—97)

My invention relates to a combined traffic signal and street lighting system, wherein both the street lights and traffic signals may be operated from a single series circuit.

In many street lighting systems the street lamps, whether of incandescent or arc character, are connected in a series circuit fed by a variable voltage transformer which is regulated so as to deliver through the series lighting circuit a constant amperage. My present invention makes it possible to operate traffic signals from such series lighting circuits, thereby avoiding the necessity of running separate electric circuits for traffic signals. It is an object of my invention to provide a traffic signal, such as a flashing lamp signal, which includes a signal circuit including a transformer connected in series in the constant current series street lighting circuit the signal circuit including a flashing lamp and a conductance connected in series in the signal circuit, there being a motor driven switch means energized by the signal circuit and operable to alternately energize the lamp and the conductance, the energization of the conductance during the intervals in which the lamp is de-energized preventing an increase of voltage to the motor of the switch means during the time the lamp is de-energized.

It is an object of the invention to provide a traffic signal having an electric current consuming member, such, for example, as a lamp or a motor, fed from the secondary of a transformer which has its primary in series with the series street lighting circuit, there being means for keeping a substantially constant load on the secondary circuit of the transformer.

It is a further object of the invention to provide a signal and lighting system of the above described character, wherein the signal may be operated regardless of whether the lamps are illuminated or not, and it is a further object of the invention to provide means whereby control may be accomplished by imposing electrical impulses on the series circuit. For example, high frequency or radio impulses, or direct current impulses, may be directed along the conductor forming the series circuit to accomplish various types of control of electrically operated devices by the series circuit.

It is a further object of the inventtion to provide a lighting and traffic signal system having simple means for eliminating the street lighting lamps from the series circuit without interfering with the operation of the traffic signal devices.

Further objects and advantages of the invention will be made evident throughout the following part of the specification.

Referring to the drawings, which are for illustrative purposes only,

Fig. 1 is an electrical diagram showing a simple form of my invention.

Fig. 2 is an electrical diagram showing a manner of superimposing electrical control impulses on the series lighting circuit.

Fig. 3 is an electrical diagram showing a form of the invention wherein means separate from the series circuit are employed to control the turning on and off of the street lamps without interfering with the operation of the traffic signals.

In the simple form of my invention shown in Fig. 1, a series lighting circuit is shown including a conductor 11 leading from one side of the secondary 12 of a variable automatic regulating transformer 13 having a primary winding 14. As shown at 15, the opposite side of the secondary 12 is grounded. In the conductor 11 a relatively large number of lamps 16 are connected in series, and the end 17 of the conductor is grounded as indicated at 18. The voltage output of the secondary 12 is automatically regulated to preserve a given amperage flow through the secondary circuit which includes the lamps 16. The current flow in the secondary circuit may be established at a value such as 7½ amperes.

Into the series lighting circuit represented by the conductor 11, I connect any desired number of electric current consuming devices 19 which in the present disclosure are in the form of traffic signals of the character used at boulevard stops, such signals ordinarily employing a flashing lamp to attract the attention of motorists to the fact that a stop should be made. The devices 19 each include a transformer 21 having a primary winding 22 connected in series with the conductor 11, and a secondary winding 23 connected by conductors 24 and 25 with a small timing or flashing motor 26 which drives a cam 27. This cam 27 is adapted to periodically reciprocate a lever member 28 constituting the movable part of a switch. This member 28 is connected by means of a wire 29 with the conductor 25 and is adapted to alternately engage contacts 31 and 32. When the member 28 is in contact with the contact 31, electric current from the secondary winding 23 will flow through a conductor 33, a signal lamp 34, and a conductor 35 which is connected to the conductor 24, so that at this time the lamp 34 will be illuminated. Revolution of the cam 27 results in movement of the member 28 away from the

contact 31 into engagement with the contact 32 so that the lamp 34 will be de-energized but a circuit will be completed through a current consuming member or conductance 36 which is connected between the contact 32 and the wire 35. The conductance 36 has the same resistance as the lamp 34, with the result that when the lamp 34 is de-energized, it is replaced in the circuit by a current consuming member 36 of the same value; therefore, there will be no change in the load placed on the transformer 21 and in turn on the series lamp circuit represented by the conductor 11. It will be understood that even though there are a large number of lamps 34 being continuously turned on and off, there will not be a fluctuation in the current flow through the street lighting lamps 16 owing to the fact that whenever a lamp 34 is deenergized, it is replaced in the electrical system by an equivalent current consuming element 36.

In the form of the invention shown in Fig. 1, the lamps 34 can be illuminated only when the circuit represented by the conductor 11 is energized. Accordingly, the lamps 34 can be used only during the time the street lamps 16 are illuminated. In the form of the invention shown in Fig. 3, I show a means whereby signals operated from a series street lighting circuit may be continuously operated through the use of means for eliminating the street lighting lamps from the series circuit as desired. Here, I show the voltage regulating transformer 13 connected so that its secondary 12 will feed a conductor 37 having a plurality of electric lamps 38 connected in series therewith. Operative from the series circuit, I show a signal device 39 and a signal device 41. Each of these devices 39 and 41 employs a transformer 21 having a primary winding 22 connected in series with the conductor 37, and each device may have a by-pass or bridging switch 43 connected across the ends of the primary winding 22.

The signal device 39 shown in Fig. 3 has a timing motor 44 connected by means of conductors 45 and 46 with the secondary 23 of a transformer 21. This timing motor 44 drives cams 47 and 48 for operating switch means 49 and 50. By means of a conductor 52, "stop" and "go" lamps 53 and 54 are connected to the wire 46. From the wire 45 a conductor 55 extends to the switch member 49 which, under operation of the cam 47, is adapted to alternately engage contacts 56 and 57 which are respectively connected to the lamps 53 and 54. As the switch member 49 is operated, the lamps 53 and 54 are alternately brought into circuit with the secondary 23 of the transformer 21, with the result that the load on the circuit occasioned by these lamps is substantially constant. Between the "stop" and "go" lamps, I show a "wait" lamp 58, one side of which is connected to the conductor 52 and the other side of which is connected to a switch contact 59. The cam 48 is adapted to move the switch member 50 alternately back and forth, in a desired timed relation, between the contact 59 and a contact 61 which is connected to a conductance 62 having the same resistance as the lamp 58. This conductance 62 is connected through a wire 63 with the conductor 52, and the switch member 50 is connected to the conductor 45, the result being that as the cam 48 moves the switch member back and forth, the "wait" lamp 58 will be thrown into circuit, and then when the "wait" lamp is disconnected from the circuit by movement of the switch member 50 toward the contact 61, the current consuming member 62 will be substituted for the lamp 58.

In the signal device 41 I show a motor 64 adapted to operate "stop" and "go" signal arms 65 and 66. One terminal of the motor 64 is connected through a conductor 67 with the secondary 23 of a transformer 21, and the other terminal of the motor 64 is connected through a conductor 68 with a switch contact 69 placed on one side of a reciprocating switch member 71 which is connected through a conductor 72 with the secondary 23. On the opposite side of the member 71 from the contact 69 is a switch contact 73 which is connected through a conductor 74 with a current consuming element 75 which is in turn connected through a conductor 76 with the wire 67. A timer 77 may be employed to reciprocate the switch member 71 so that it will alternately engage the contacts 69 and 73, thereby first energizing the motor 64 through a prescribed cycle, and then de-energizing the motor 64 and substantially instantaneously connecting the current consuming element 75, which may be a resistance winding, into the secondary circuit of the transformer 21 in place of the motor, thereby keeping a substantially constant load on the electric supply system so that noticeable fluctuations will not be produced therein.

So that the lamps 38 may be turned off and on as desired, I provide by-pass switches 80 bridged across the lamps 38 as shown. When these switches 80 are closed, the lamps 38 will be by-passed and accordingly will not be illuminated by the flow of electric current through the series circuit. As shown in the upper part of Fig. 3, automatic means, such as a clock 82, for example, may be employed to close a by-pass switch 80; or, as shown in the lower part of Fig. 3, a conductor 83 forming part of a series control circuit may be extended parallel to the conductor 37 with solenoids 84 connected in series with the conductor 83. When a switch 85 is closed so as to connect a current supply source, such as a generator 86, with the conductor 83, current will flow through the solenoids 84 and then to ground at 87, and the current flow will return through ground to the ground connection 88 of the generator 86. When the solenoids 84 are thus energized, the switches 80 associated with the control circuit represented by the conductor 83 will be closed, and the associated lamps 38 will not be illuminated, but current from the transformer 13 of Fig. 3 will continue to flow through the conductor 37 for energization of the electrical elements of the signals 39 and 41.

For the purpose of exercising control in lighting and signal systems of the character hereinbefore described, electrical energy of different characteristics may be imposed in the series street lighting and signal circuit upon the alternating current flow impressed in the line by a transformer such as the transformer 13. In Fig. 2 I show a transformer 13 of automatic voltage regulating type adapted to automatically maintain a prescribed current value in a series conductor 90, one end of which is connected to the secondary winding 12 of the transformer 13 and the other end of which is grounded as indicated at 91. This conductor 90 is connected in series with a plurality of streets lamps 92 and in series with a number of signal devices 93 of the general character hereinbefore described. By-pass contacts 94 are bridged across each of the lamps 92, and when illumination of the lamps 92 is not desired, a knife or plug contact 95 is

disposed between and in connection with the contacts 94. This knife contact 95 is connected to a yoke 96 having downwardly extending lugs 97 and 98 adapted to be alternately engaged by an armature 99 of a polarized relay 100 connected in series with the conductor 90 as indicated. As long as there is merely an alternating current flow through the conductor 90 and through the winding 102 of each polarized relay 100, the armature 99 will remain in a centralized position. A direct current flow through the conductor 90, either while the alternating current is turned off, or superimposed on the alternating current, will cause the armature 99 to move either to the left or to the right depending upon the polarity of the direct current flow. Accordingly, should it be desired to move the knife blades 95 leftwardly into open position relative to the contacts 94, a direct current flow is passed through the conductor 90 and the windings 102 in series therewith, of proper polarity to cause the movement of the armatures 99 in leftward direction whereby the extremities thereof will engage the lugs 97 of the yokes 96, moving the yokes 96 in leftward direction. A reversal of the polarity of the direct current flow will cause the armatures 99 to move rightwardly, engaging the lugs 98 and moving the yokes 96 rightwardly so as to force the knife blades 95 back into engagement with the contacts 94. For this purpose I have shown a direct current generator 105 connected through a polarity reversing switch 106 with a conductor 107 connected to ground and with a reactance or choke coil 108 connected to a switch 109 which is in turn connected through a conductor 110 with the conductor 90 of the series lighting circuit. I have also shown a switch 112 in the conductor 90 between the secondary 12 and the point where the conductor 110 engages the conductor 90, so that the alternating current supply to the lighting and signal circuit may be turned off before the closing of the switch 109 to send a momentary direct current impulse out through the conductor 90. Likewise, I have shown a switch 115 for the primary 14 of the transformer 13. Should the switch 109 be closed through the conductor 90, the reactance 108 will prevent any substantial alternating current flow through the generator 105.

In the upper part of Fig. 2 I show a flashing type of signal 116 operated from the series street lighting system. A transformer 21, having a primary 22 connected in series with the conductor 90, has its secondary 23 connected to a conductor 118 which extends to a lamp 117. From the lamp 117 a conductor 118 extends to the end 119 of a heater element 121, and is also connected to a switch contact 122. The remaining end 123 of the heating element is connected through a conductor 124 with the secondary 23. The conductor 124 is also connected to a thermostatic element 125 carrying a contact 126 adapted to engage the contact 122. When the contacts 122 and 126 are separated, current will flow through the heater 121 and the lamp 117 with the result that the lamp 117 will furnish a very dim light. The heat generated by the heater 121 will cause the thermostatic element 125 to move the contact 126 into engagement with the contact 122 so that the current flow through the secondary circuit will bypass the heater, causing the lamp 117 to burn at full capacity. The subsequent cooling of the thermostat element 125 moves the contact 126 out of engagement with the contact 122, so that there will again be a reduced flow of current through the heater 121. The intermittent opening and closing of the switch formed by the contacts 122 and 126 results in a continuous flashing of the lamp 117.

I claim as my invention:

1. In combination in a street lighting and signaling system: a constant current series lighting circuit; a transformer having the primary thereof connected in series in said lighting circuit; a load circuit connected in circuit with the secondary of said transformer; an electrically energizable element connected in series in said load circuit; a conductance connected in series in said load circuit; a motor energized by potential induced in said load circuit; and switch means operated by said motor and arranged to intermittently close said load circuit through said electrically energizable element to intermittently operate the same and to close said load circuit through said conductance during the intervals when said lamp is de-energized.

2. In combination in a street lighting and signaling system: a constant current series lighting circuit; a load circuit including a lamp inductively connected to said series circuit and including a motor energized by potential induced in said load circuit; switch means operated by said motor and intermittently energizing said lamp to flash the same; and a conductance having substantially the same current-consuming characteristic as said load lamp connected in series with said lamp in said load circuit, said switch means operated by said motor and closing said load circuit through said conductance during the intervals when said lamp is de-energized to maintain the load on said series lighting circuit substantially constant.

3. In combination in a street lighting and signaling system: a constant current lighting circuit; a transformer having the primary thereof connected in series in said lighting circuit; a load circuit having the secondary of said transformer connected in series therewith; an electrically energizable element connected in series in said load circuit; a conductance connected in series in said load circuit and having substantially the same current consuming characteristics as said electrically energizable means; a motor energized by potential induced in said load circuit; and switch means including a contact and a cam operated by said motor for moving said contact to intermittently close said load circuit through said electrically energizable element and said conductance, whereby the load on said constant current circuit is maintained substantially constant.

LEO J. JENNINGS.

CERTIFICATE OF CORRECTION.

Patent No. 2,136,191. November 8, 1938.

LEO J. JENNINGS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, first column, line 50, for "inventtion" read invention; page 3, second column, line 41, claim 2, strike out the word "load"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 27th day of December, A. D. 1938.

Henry Van Arsdale

(Seal) Acting Commissioner of Patents.