Feb. 23, 1937. H. J. BRANDENBURGER 2,071,494

TRAFFIC SIGNALING SYSTEM

Original Filed Feb. 14, 1931 2 Sheets-Sheet 1

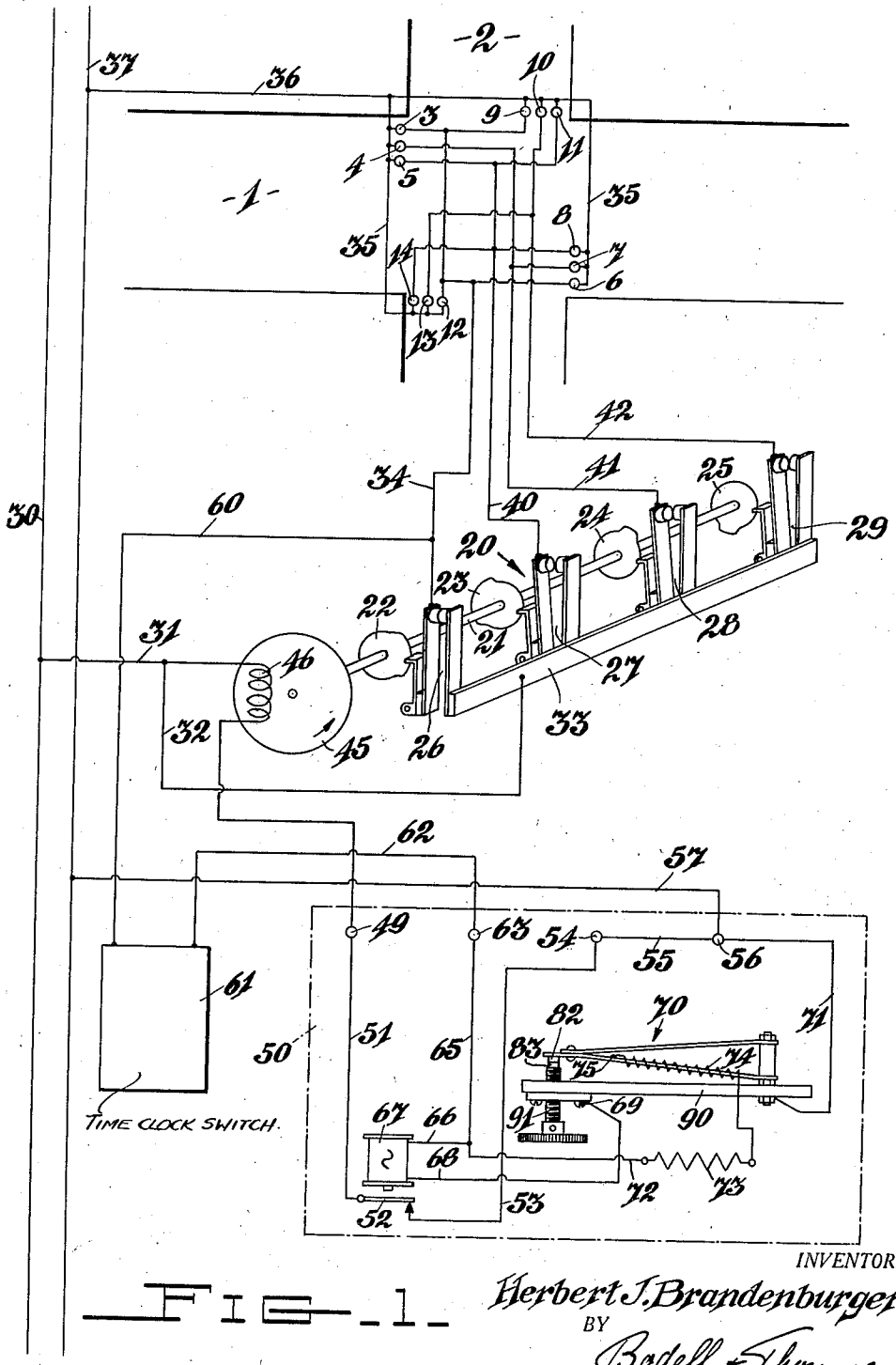


FIG. 1

INVENTOR:
Herbert J. Brandenburger,
BY
Bodell & Thompson
ATTORNEYS.

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FIG. 2.

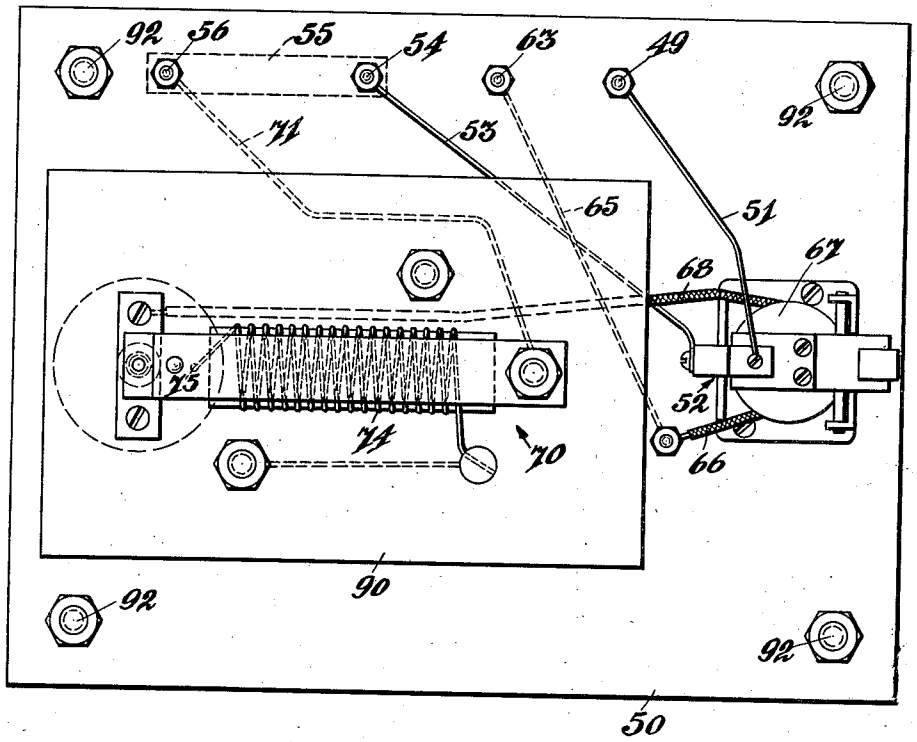
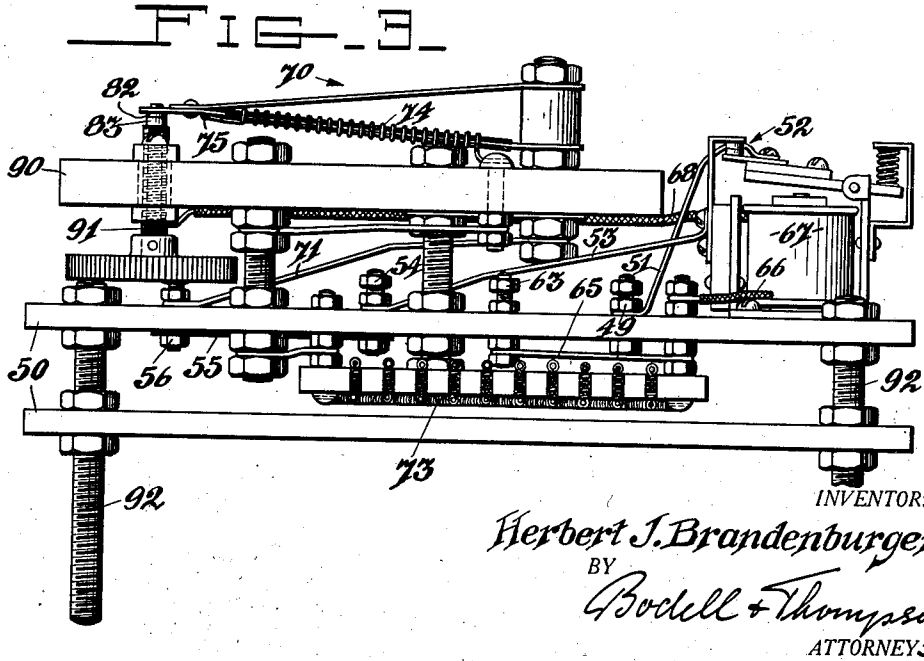


FIG. 3.



INVENTOR:
Herbert J. Brandenburger,
BY
Bodell & Thompson
ATTORNEYS.

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TRAFFIC SIGNALING SYSTEM

Herbert J. Brandenburger, St. Louis, Mo., assignor to Crouse-Hinds Company, Syracuse, N. Y., a corporation of New York

Application February 14, 1931, Serial No. 515,722
Renewed October 24, 1934

4 Claims. (Cl. 177—337)

This invention relates to systems such as traffic signaling systems where elements as signals pass through repeated traffic cycles and are controlled by means of a timer having various predetermined time characteristics with respect to each of the traffic periods controlled thereby, and has for its object a particularly simple means for changing the relative time allotted to the various traffic periods or sub-divisions of a traffic cycle by the timer during any desired portions of the day.

The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawings, in which like characters designate corresponding parts in all the views.

Figure 1 is a diagrammatic view of this traffic signaling system and the control therefor as applied to one of the traffic periods.

Figure 2 is a plan view of the unit containing the electro-magnetic and thermostatic switches, which control in conjunction with a clock timed switch, the prolongation of predetermined signals and the restarting of the system through its cycle.

Figure 3 is an elevation of the parts seen in Figure 2.

The signals are electrically operated and the timer comprises switch means for opening and closing the signal circuits in a certain order. The total time it takes for the signals or timer to make a complete cycle from go to stop on one street, stop to go on the intersecting street and back to go on the first street and stop on the intersecting street is called a traffic cycle. The sub-divisions, that is the times the go and stop signals are displayed on each street and the intermediate warning signal, if employed, are periods of the traffic cycle.

The invention generally comprises a timer for controlling the operation of the signals through repeated traffic cycles, means for stopping the timer or the timer circuit during certain periods of time stopping or retarding means to stop or retard the timer during each traffic cycle in said period when predetermined signals are displayed and thereby prolonging these signals, and additional means for cutting out or rendering ineffective the stopping or retarding means.

The word "prolonging" is relative only and a signal may be prolonged relative to the other signals by shortening the latter, but in the illustrated embodiment of my invention, the time extent of the signals prolonged is actually extended beyond their normal time.

Although I have illustrated my invention as applied to traffic signaling systems, it is obvious that it might be applied to other work cycle periods.

1 and 2 respectively designate a main street and a cross street. 3, 4, and 5 designate respectively go, intermediate and stop signals displayed in one direction on the main street; 6, 7 and 8, the green, intermediate and stop signals displayed in the other direction on the main street. 9, 10 and 11 designate respectively the stop, intermediate and go signals displayed in one direction on the cross street, and 12, 13, 14 the stop, intermediate and go signals displayed in the opposite direction on the cross street. These signals are electrically operated and are usually different lamps with different colored lenses, green, amber and red for go, warning and stop, respectively.

The circuits for the signals are connected in any suitable manner, so that for instance the green is displayed on one street while the red is displayed on the intersecting street and the amber or intermediate signal is displayed prior to a change of signals, or following one signal as the green signal only. The closing of the various signal circuits is controlled by switch means of a suitable timer.

20 designates the timer, which may be of any suitable size, form and construction, it being here shown for the purpose of illustration as comprising a timer shaft 21 having suitable cams 22, 23, 24 and 25 thereon, which operate switch means 26, 27, 28 and 29 in the various signal circuits. The switch means here illustrated are pairs of separable contacts, the opening and closing of which are controlled by the cams. When the switch means 26 is closed, the circuit through the green signals 3 and 6 presented on the main street is closed, and also the circuit through the red signals 9 and 12 on the cross street is closed. The circuit is as follows:

From feed wire 30 through branch circuit wire 31, wire 32 to conductor 33, common to like contacts of all the switches 26, 27, 28 and 29 through the contacts of the switch 26, when closed, conductor 34, which through branches leads to the green signals 3, 6 on the main street and red signals 9 and 12 on the cross street, thence through common return wires 35, 36 to feed wire 37.

When the contacts of the timer switch 27 are closed, the circuit is completed as before to the

common conductor 33, switch means 27, wire 40 and branches to the red signal lamps 5 and 8 presented on the main street 1 and through the green signal lamps 11 and 14 presented on the cross street, then through the common return wires 35, 36 to the feed wire 37.

When the contacts of the switch means 28 are closed, the circuit to the amber lamps 4 and 7 presented on the main street is closed, and when the contacts of the switch means 29 are closed, the amber lamps 10 and 13 on the cross street are illuminated, it being understood that there is a choice of several ways in the order of the amber lamp illumination. Two cams 24, 25 and two switches 28, 29 are provided for the purpose of adjusting the timing of the amber signals. The amber light circuits are from the feed line 30 to the common conductor 33 through the contacts of switches 28, 29 when closed, wire 41 and branches to the amber lamps 4, 7 on the main street and wire 42 and branches to the amber lamps 10, 13 on the cross street, thence through the common return wires 35, 36 to feed wire 37.

The timer is actuated by an electric motor 45, this motor being usually of the induction disk type. 46 are the driving coils in a motor circuit consisting of wire 31 from one feed wire 30 to binding post 49 on base 50, wire 51, a normally closed switch 52, wire 53, to binding post 54 on base 50, wire 55 to binding post 56 and wire 57 to the other feed wire 37.

In the normal operation, the motor runs and the signals pass through repeated traffic cycles. At certain periods of the day, when traffic is congested on the main street, as for instance from seven to nine o'clock in the morning or from five to seven o'clock in the evening, it is desirable to have a relatively longer go period than normal on the main street, and hence a longer stop period than normal on the cross street without varying the other periods.

In the illustrated embodiment of my invention, this result is effected by certain switch means in a timer stopping circuit coupled with switch means of the timer and preferably, this switch means in the stopping circuit is controlled by the switch 26, which controls the display of the green lights on the main street and the red lights on the cross street. Preferably the timer is stopped by stopping the motor rather than disconnecting it from the motor and the motor stopped by breaking the circuit through its driving coils. The stopping circuit includes a conductor 60 leading from the conductor 34 controlled by the timer switch 26, a switch 61 operable independently of the timer, conductor 62 connected to a binding post 63 on the panel 50, a conductor 65 connected by wire 66 to the windings of an electro-magnet 67, which windings are connected by a conductor 68 to binding screw 69 of an electrically operated switch, usually a thermal electric switch 70, which is normally closed, return wire 71 to post 56, thence through return wire 57 to feed wire 37. The conductor 65 is also connected by a wire 72 through a resistance 73 to a heating coil 74 of the thermal switch 70, the coil being connected at 75 to the body of the switch 70, so that the circuit is completed therethrough through wires 71 and 57. The normally closed switch 52 is the armature of the electro-magnet 67 and when attracted by the magnet breaks the circuit through the motor driving coils 46. The conductor 60, switch 61, when closed, conductor 62, conductors 65, 66 electro-magnet 67, wire 68, thermostat switch 70, conductors 71 and 57 constitute a timer or motor stopping circuit in connection with the switch means 26, conductor 33, wires 32 and 31. The electro-magnet 67 connected in the motor stopping circuit is means in the motor stopping circuit for opening the switch 52 in the driving circuit for the motor in order to stop the motor. The thermostatic switch 70 constitutes means for opening the motor stopping circuit after the timer has been stopped, and the display of the signals prolonged a predetermined period, and the switch 26 of the timer constitutes part of the means for stopping the timer when predetermined signals are displayed. The switch 61 is preferably a timed switch operated by any timed means as a clock movement. The switch 61 may be of the type described in Sales Circular 133 of the Sangamo Electric Company, Springfield, Illinois.

In operation, when the contacts of the timer switch 26 engage, and the clock operated switch 61 is closed, the current passes through the conductors 34, 60, clock operated switch 61, conductors 62 and 65 through the windings of the electro-magnet 67 so that the armature 52 is attracted to break the circuit through the conductors 51 and 53 and hence through the driving coils 46 of the motor, so that the motor stops and hence, the timer stops with the predetermined signals displayed as green signals on the main street and red signals on the cross street. The current also passes from the conductor 65 to the heating coils 74 of the thermal switch 70 and when the coils have generated enough heat to cause the thermal switch to warp, the circuit through the electro-magnet 67 is broken by the separating of the contact 82 from the contact 83 of the thermal switch. When the electro-magnet is thus de-energized, its armature 52 drops so as to again close the circuit through the conductors 51, 53 and hence, through the driving coils 46 of the motor 45 so that the timer continues to be actuated. The circuit through the heating coil 74 of the thermal switch 70 remains closed during the remainder of the portion of the cycle controlled by switch 26, thus preventing the re-establishment of the circuit through the windings of the magnet 67. When the normal cycle of operation of the timer has opened switch 26, the circuit through heating coil 74 of the thermal switch 70 is opened and the effect of cooling restores the connection between contacts 82 and 83 leaving the thermal switch in position for a repetition of its operation. This relative prolongation of the predetermined signals as green on the main street and red on the cross street thus occurs during each traffic cycle at the time switch 26 is closed, provided the clock timed switch 61 is closed. The closing of the clock timed switch establishes the circuit through the wires 60 and 62 only at predetermined periods of the day, as for instance during certain rush hours.

As seen in Figures 2 and 3, the thermostatic switch 70 and the electro-magnet 67 and its armature 52 are carried by the base 50. The thermal switch may be of any well known construction and is carried by a suitable base 90 and the contact 83 thereof is adjustable to increase or decrease the time the contacts 82, 83 separate under the action of the heat.

As here shown, the contact 83 is the end of a screw 91 threading through the base 90. The base 50 is provided with a suitable means as screws 92 for mounting it on the support. It will be understood that the clock operated switch

61 and the base 50 are mounted in a suitable cabinet together with the motor and timer, or may be mounted in any other location.

What I claim is:

1. The combination of a cycle timer having a plurality of switches operated successively in periods thereby, an electric motor for actuating the timer having driving coils, a motor feed circuit in which the driving coils are connected, the motor feed circuit having a normally closed switch therein, an electro-magnet for opening said switch, a motor stopping circuit in which the magnet is connected, the motor stopping circuit being connected in circuit with one of the switches of the timer and operable upon operation of said one switch to stop the motor to prolong its corresponding period, a normally closed switch in series with the electro-magnet and electrically operated timed means connected in the motor stopping circuit for opening the last mentioned normally closed switch after a predetermined time and thereby cutting out the electro-magnet and permitting the switch in the motor circuit to close, start the motor and actuate the cycle timer to break the circuit through said one of the said switches of the timer; with signals and electric circuits therefor controlled respectively by the switches of the timer.

2. The combination of a cycle timer having a plurality of switches periodically operable thereby, an electric motor for actuating the timer and having driving coils, a motor feed circuit in which the coils are connected, a normally closed switch in said circuit, a motor stopping circuit having a controlling switch therein, and an electro-magnet for opening the normally closed switch in the motor feed circuit, one leg of the motor stopping circuit being connected in circuit with one of the switches of the timer to be controlled thereby, a normally closed thermal switch in the motor stopping circuit in series with the electro-magnet and timed means comprising a heating element arranged to heat the last normally closed switch, and connected in the motor stopping circuit in shunt with the magnet whereby when one of the said switches of the timer is closed and the controlling switch of the motor stopping circuit is closed, the electro-magnet is energized to open the switch in the motor feed circuit and thereby stop the motor and the heating coils are energized to heat the heating element to cause it to open the circuit through the electro-magnet and permit the switch in the motor feed circuit to close, the motor to start and actuate the timer and break the circuit through said one of the said switches of the timer.

3. In combination in an intersecting highway traffic signaling system, sets of signals which are displayed through repeated traffic cycles comprising stop and go periods, the signals being displayed during each cycle from stop to go on one street and go to stop on a second street and back to go on the first street and stop on the second street, a cycle timer including a plurality of signal control elements operated by the timer, and means operated by said control elements for effecting the display of the sets of signals respectively, an actuator for the timer, a second means normally ineffective and operated when effective by one of the control elements of the timer for stopping the timer during one of said periods and timed means operated by the second means for starting the timer after the said one of the said periods has been extended a predetermined time.

4. In a device of the class described having means for indicating the usual traffic indications, an electric motor, and means operated by said motor for normally periodically and alternatively operating said indications for the routine control of traffic, a switch and means operated by said motor for actuating said switch during repeated periods of one of said indications, means, normally in inoperative condition but when in operative condition, adapted by actuation of said switch to prolong the said normal period of the said one of said indications, means for rendering said normally inoperative means in operative condition during selected extents of time, and means operative a predetermined time after the commencement of said prolongation for reestablishing the normal operation of the second means for the next alternative indications.

HERBERT J. BRANDENBURGER.