

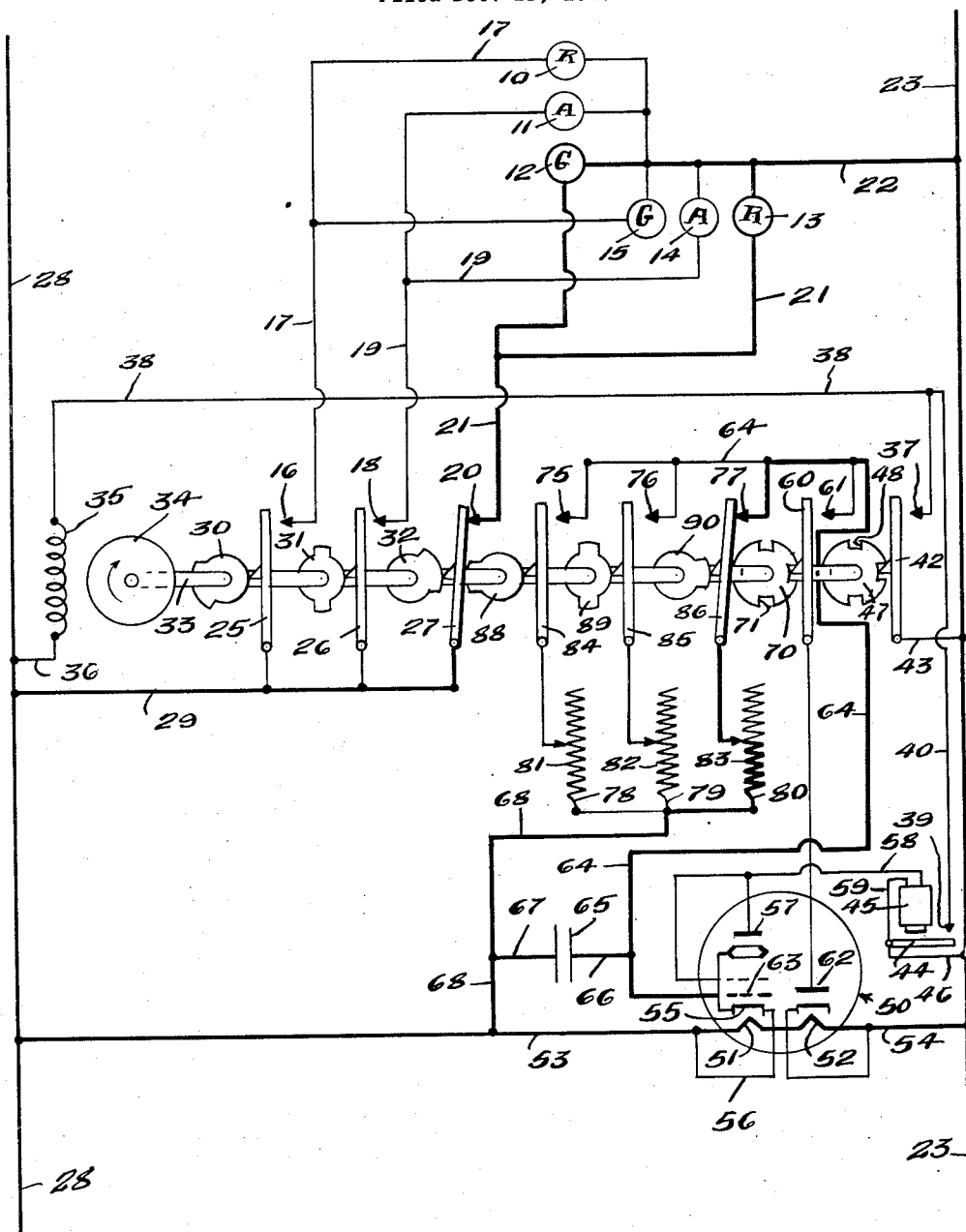
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W. M. JEFFERS

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CYCLE TIMER CONTROL APPARATUS FOR TRAFFIC SIGNALS

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INVENTOR.
Walter M. Jeffers
BY Rodell & Thompson
ATTORNEYS.

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CYCLE TIMER CONTROL APPARATUS FOR
TRAFFIC SIGNALSWalter M. Jeffers, Syracuse, N. Y., assignor to
Crouse-Hinds Company, Syracuse, N. Y., a cor-
poration of New York

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The invention relates to cycle timer control apparatus for traffic signals and has as an object a control apparatus embodying a construction which is particularly economical to manufacture and operate and which includes means whereby the timer is quickly and conveniently adjustable to vary the signal periods of the cycle independently.

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 drawing which is an across the line schematic wiring diagram of the control apparatus embodying my invention.

This control apparatus is operable to cause the traffic signals at one or more intersections to be displayed through repeated traffic cycles. The conventional red, amber and green signals for the north-south street are designated at 10, 11 and 12, and the complementary signals 13, 14 and 15 are displayed to the intersecting or east-west street. It will be understood that when the green or go signal is displayed in one street, the red or stop signal will be simultaneously displayed to the intersecting street. In the arrangement here shown, the amber or change signals 11, 14 are displayed to both streets between the signal changes.

The signals are operated by contacts comprising part of a motor driven cam unit. The signals 10, 15 are connected to a stationary contact 16 through a conductor 17. The change signals 11, 14 are connected to a stationary contact 18 through a conductor 19, and the signals 12, 13 are connected to the contact 20 through a conductor 21. All of the signals are connected to conductor 22 extending to the common side 23 of the line. Contacts 25, 26 and 27 are arranged to be moved into and out of engagement with the contacts 16, 18 and 20 respectively, these movable contacts being connected to the hot side 28 of the line through a conductor 29. The contacts 25, 26 and 27 are operated by cams 30, 31, 32 respectively, these cams being secured to and rotatable with a cam shaft 33 driven by a motor 34 which is operable, upon energization of the coil 35, to effect rotation of the shaft 33 sufficient to shift the signal indications from one street to the other, and to effect display of the change signals 11, 14. The coil 35 is connected to the hot side 28 by a conductor 36 and to a stationary contact 37 through conductor 38 and also to a stationary contact 39 through conductor 40.

The contact 37 is connected to the common

side 23 through a movable contact 42, conductor 43. The contact 39 is connected to the common return 23 through armature 44 of relay 45 and conductor 46. The contact 42 is moved into and out of engagement with the contact 37 by a cam 47 mounted on shaft 33. The contacts 37, 42 are normally open. The armature 44 is moved into engagement with contact 39 by energization of relay 45, and when the contacts 39, 44 are in engagement the circuit is completed through the motor coil 35. The wire 40, contacts 39, 44, wire 46, constitute a starting circuit for the motor 34, and the contacts 37, 42, wire 43 constitute a running circuit for the motor 34.

The operation of the motor 34 is controlled by a thermionic tube designated generally at 50. This tube consists of a power amplifier unit and a half wave rectifying unit in a single envelope. The filament 51 of the amplifying unit and the filament 52 of the rectifying unit are connected in series directly across the line by conductors 53, 54. The cathode 55 of the amplifying unit is connected to the wire 53 by conductor 56, and the output from the plate 57 is connected to relay 45 through conductor 58, the opposite side of the relay being connected to wire 46 through wire 59. With this arrangement, the relay 45 is energized by the plate current of the tube and the armature 44 maintained in engagement with the contact 39 thus establishing the starting circuit to the motor coil 35.

The cam 47 is provided with notches 48 complementary to the lobes on the signal circuit contact cams 30, 31, 32, and the arrangement is such that immediately upon rotation of the shaft 33, contact 42 is moved into engagement with contact 37 thus establishing the running circuit for the motor 34, which circuit remains closed until the shaft 33 has been rotated sufficiently to change from one signal indication to the other, whereupon the contact 42 is permitted to move out of engagement with the contact 37 disrupting the motor running circuit. During the rotation of the shaft 33, contact 60 is moved into engagement with contact 61, the engagement of these contacts being substantially simultaneous with the engagement of contacts 37, 42. The movable contact 60 is connected to the plate 62 of the rectifying element of the tube, and the contact 61 is connected to the grid 63 of the amplifying unit through conductor 64.

The potential on wire 64 is applied to one side of a condenser 65 through conductor 66, the opposite side of the condenser being connected to the wire 53 through wires 67, 68. Accordingly,

line voltage is applied to the condenser and the same becomes rapidly charged at substantially line voltage, effecting a high negative potential on the grid 63 with respect to the cathode 55 and accordingly, reducing the current output from the plate 57 to a value permitting armature 44 to move out of engagement with contact 39. The starting circuit to the coil 35 is thus opened previous to the disengagement of the contacts 37, 42, whereby when these latter contacts are open the shaft 33 comes to rest and the signals have been shifted from one indication to the next.

The contact 60 is actuated by a cam 70 provided with notches 71 complementary to the notches 48 in cam 47, whereby the contacts 37, 42 and 60, 61 are moved into and out of engagement in unison.

The length of the period during which each signal indication is displayed corresponds to the period the motor 34 remains at rest and, as previously explained, the motor remains at rest until the relay 45 is again energized, or until the condenser 65 has been discharged to reduce the negative potential on grid 63 sufficiently to permit the relay 45 to be energized from the output from plate 57.

A discharge circuit is connected in shunt with the condenser 65 upon the establishment of each traffic signal period. Contacts 75, 76 and 77 are connected to the conductor 64, and the opposite side of the condenser is connected to a plurality of branch circuits 78, 79, 80, by wire 68. The branch circuits include variable resistances indicated at 81, 82 and 83 respectively. These adjustable resistances are in turn connected to movable contacts 84, 85 and 86 which are movable into and out of engagement with the stationary contacts 75, 76, 77. The movable contacts are actuated by cams 88, 89 and 90, these cams being complementary or paired with the respective signal circuit cams 30, 31, 32. The arrangement is such that when one signal circuit is closed, a corresponding one of the variable resistances 81, 82, 83 is connected in shunt with the condenser 65. Accordingly, the rate at which the condenser 65 discharges depends upon the adjustment of the resistance which is connected in the shunt circuit.

With this arrangement, each of the resistances 81, 82, 83 may be adjusted to provide the desired length of signal period. In the structure disclosed, the resistance 81 controls the length of the period during which the stop signal 10 is displayed to the north-south traffic, and the go signal 15 to the east-west traffic. The resistance 82 controls the display of the amber lights 12, 14, and the resistance 83 the period during which the green light is displayed to the north-south street and the red light to the east-west street.

It will be apparent the structure described is particularly economical to manufacture and to operate. If it is desired to use the controller for a multiple phase traffic movement, it is only necessary to add an additional signal circuit cam and an additional control circuit cam to the cam unit for each traffic phase.

What I claim is:

1. A traffic signal controller operable to effect display of the traffic signals through repeated traffic cycles comprising switching mechanism including a plurality of signal circuit contacts and a condenser discharge contact complementary to each signal circuit contact and being opened and closed in unison with the respective signal cir-

cuit contact, a motor operable to actuate said switching mechanism step by step to effect the successive operation of said signal circuit contacts and the respective condenser discharge contacts, a starting circuit and a running circuit for said motor, said starting circuit including a relay which, when energized, effects closing of said circuit, an electron discharge tube having the output thereof connected to said relay and being operable to normally energize the relay, said motor running circuit including an additional contact of said switching mechanism, said contact being normally open and being closed during each actuation of said switching mechanism, a condenser, a condenser charging circuit closed upon actuation of said switching mechanism, one side of the condenser being connected to the control grid of said tube, and a condenser discharge circuit connected through each of said condenser discharge contacts.

2. A traffic signal controller operable to effect display of the traffic signals through repeated traffic cycles comprising a cam unit including a cam shaft, a plurality of signal circuit contacts successively actuated into open and closed position upon rotation of the cam shaft, a condenser control contact complementary to each signal circuit contact and being opened and closed in unison with said respective signal circuit contacts, a condenser charging contact and a motor running contact, each of said latter contacts being normally open and being closed during at least a portion of the period during which each of said signal circuit contacts are closed, a motor operable, when energized, to effect rotation of said cam shaft, a motor starting circuit including a relay which, when energized, is effective to close said starting circuit, an electron discharge tube, a circuit connected to the output of said tube and said relay and being operable to energize the latter, a condenser connected to the grid of said tube, a charging circuit connected to said condenser through said charging contact, and a separate discharge circuit for said condenser connected through each of said control contacts.

3. A traffic signal controller operable to effect display of the traffic signals through repeated traffic cycles comprising a cam unit including a cam shaft, a plurality of signal circuit contacts successively actuated into open and closed position upon rotation of the cam shaft, a condenser control contact complementary to each signal circuit contact and being opened and closed in unison with said respective signal circuit contacts, a condenser charging contact and a motor running contact, each of said latter contacts being normally open and being closed during at least a portion of the period during which each of said signal circuit contacts are closed, a motor operable, when energized, to effect rotation of said cam shaft, a motor starting circuit including a relay which, when energized, is effective to close said starting circuit, an electron discharge tube, a circuit connected to the output of said tube and said relay and being operable to energize the same, a condenser connected to the grid of said tube, a charging circuit connected to said condenser through said charging contact, and a separate discharge circuit for said condenser connected through each of said control contacts, and each of said discharge circuits including means adjustable to vary the rate of the discharge of said condenser.

WALTER M. JEFFERS.