Aug. 20, 1929 C. A. B. HALVORSON, JR., ET AL 1,725,635

SIGNAL CONTROLLER

Filed Nov. 26, 1924 2 Sheets-Sheet 1

Fig. 1.

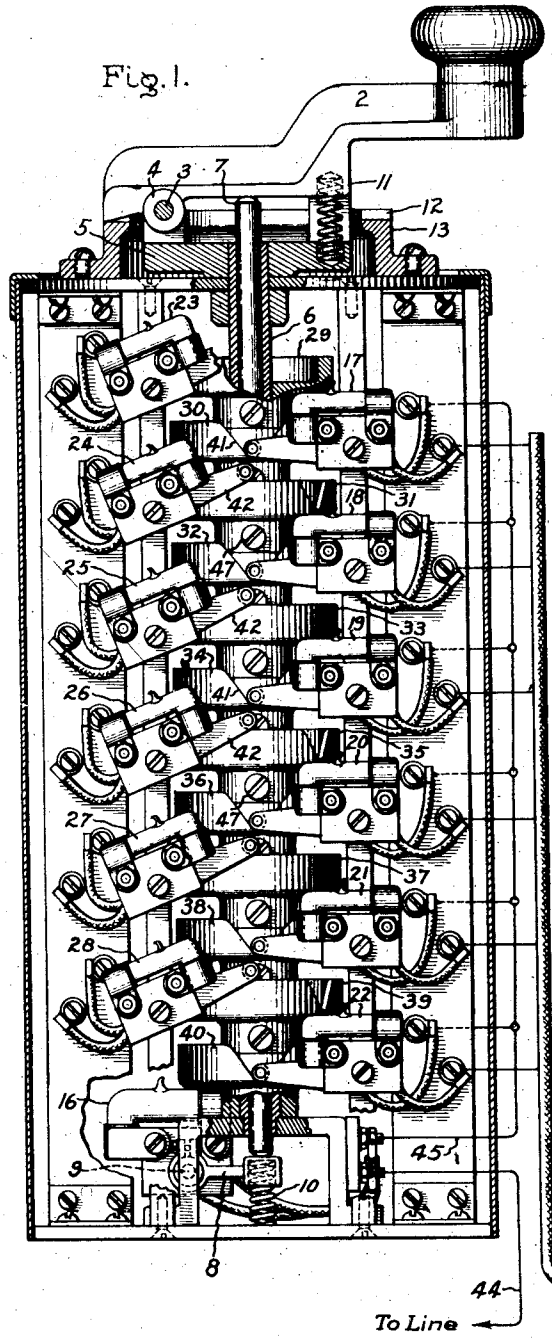
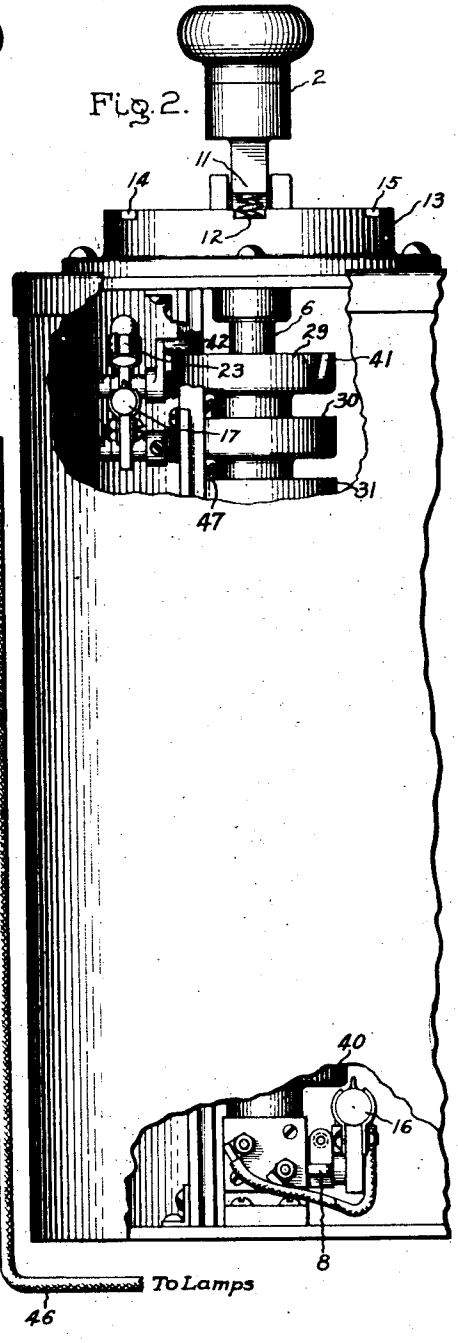


Fig. 2.



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SIGNAL CONTROLLER

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Fig. 3.

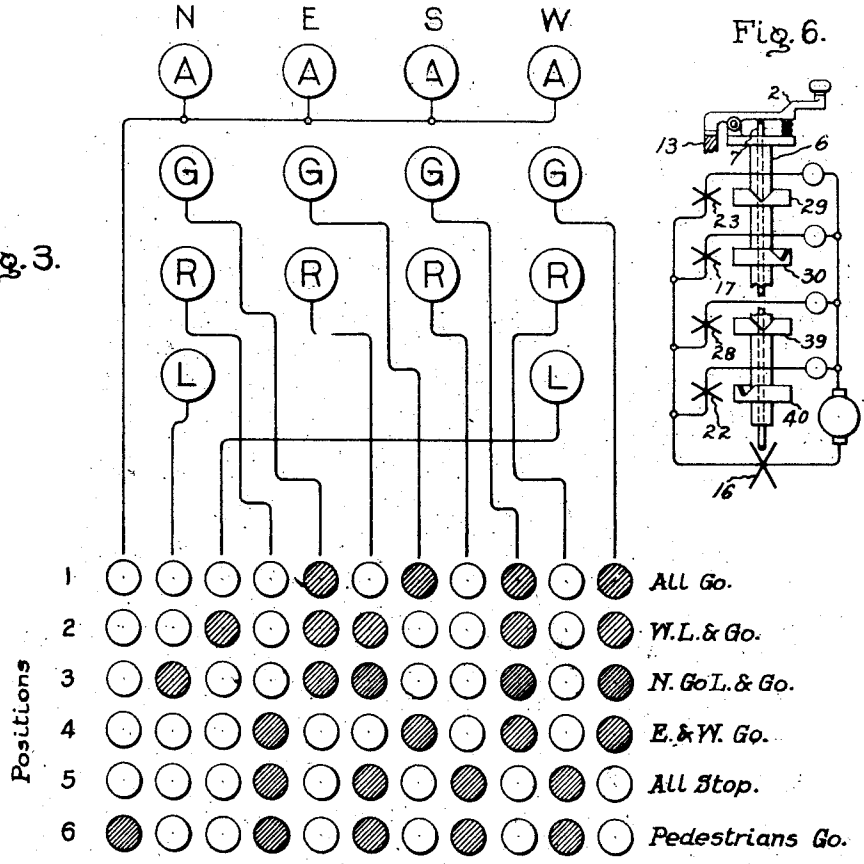


Fig. 6.

Fig. 4.

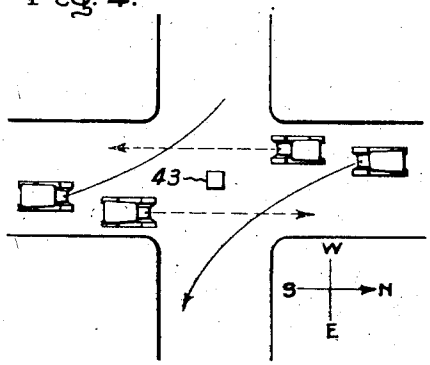
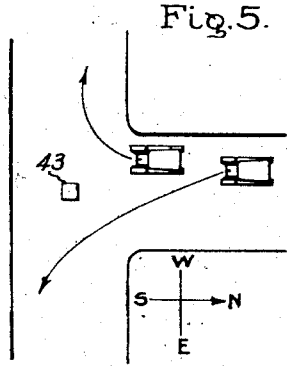


Fig. 5.



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UNITED STATES PATENT OFFICE.

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SIGNAL CONTROLLER.

Application filed November 26, 1924. Serial No. 752,477.

Our invention relates to signal controllers and in particular to controllers especially adapted for use in the control of traffic signals.

It is an object of our invention to provide a device of the above character by means of which a multiplicity of signals at a street intersection may be controlled from one point.

The means for accomplishing the foregoing are hereinafter more fully set forth and claimed, reference being had to the accompanying drawings in which Fig. 1 shows the controller in side elevation and in section; Fig. 2 is a front view of the controller, portions of the casing being broken away to show the location of the cams and switches; Fig. 3 is a diagrammatic schematic arrangement of the connections for controlling a particular scheme of signals applicable, for example, to a T intersection where two streets come together; Fig. 4 represents the intersection of two streets; Fig. 5 represents a T traffic point; Fig. 6 is a schematic diagram of the unit and its circuits.

Referring more in detail to the drawings, it will be seen that the controller comprises a controller handle 2 pivoted about the pin 3, which latter rests in a bearing 4 on the outside of a disc 5 which latter is secured to the shaft 6. This shaft is hollow and through the center thereof there passes a rod 7 which is adapted to slide lengthwise within the shaft 6. The lower end of the rod 7 rests upon the lever 8 which is adapted to oscillate about the pivot 9. The forward end of the lever is maintained in engagement with a spring 10 which latter is adapted to maintain the lever 8 pressed upward and which is also adapted to maintain the rod 7 in its highest position corresponding to the position of the controller arm 2 shown in Figs. 1 and 2.

When the controller arm is depressed the rod 7 is depressed and in the position shown in Fig. 2 the heel 11 is in the notch 12 which corresponds with one of the positions of the controller. This notch, as shown, appears on the upper face of the ring 13 which latter is secured to the top of the controller. For each position of the controller one such notch is provided. In Fig. 2 three of the six positions are indicated by the notches 12, 14 and 15. By depressing the lever 7 the operator causes the depression of the lever 8 at the bottom of he controller. This lever tilts a mercury switch 16 which serves as a main circuit switch for a number of other circuit connections through similar mercury switches 17 through 28. By tilting the mercury switch 16 the operator effectively breaks the circuit connections through all of the mercury switches and thereby prevents false signals from being communicated or displayed during the shifting of the controller from one position to another. It will be understood that although the controller shows twelve auxiliary mercury switches and one main mercury switch, the number of auxiliary switches may be varied depending upon the number of signals to be operated and upon the character of the combinations desired. One such arrangement is indicated by the schematic, diagrammatic drawing in Fig. 3.

Secured to the hollow shaft 6 there are a number of cams 29 through 40. Each of these cams is provided with one or more low points, such as the V depression 41 and one or more high points. Each of the mercury switches is pivotally mounted and is controlled through the medium of an arm 42, the forward end of which arm is provided with a roller that rolls along the upper rim of the corresponding cam. If necessary, a suitable spring may be secured beneath each mercury switch support in order to give the latter arm sufficient tension to insure that the forward end of the mercury switch lever will fall into the V depression of the cam. Such a spring may be provided with its lower end secured to the frame. The upper end of the spring may be made to rest against the lower left hand heel of the carriage, Fig. 1, that carries the mercury switch.

The arrangement indicated in Fig. 3 is that for a set of signals applicable to a T intersection such as represented in Fig. 5. At the intersection the signal unit is represented near the middle of the through street by the square 43. These units may be standard and are, of course, provided with four faces or sides so as to make them applicable for a cross section as in Fig. 4. While the four faces would be used in Fig. 4, in Fig. 5 only

three of the faces are used by the vehicular traffic. In Fig. 3 lamps on the north face of the unit are shown in the column N, lamps in the east side of the unit in the column E, those in the south side in the column S, and those in the west side in the column W. With the arrangement in Fig. 3 the controller has six positions. This is represented by the six horizontal columns of circles below the lamp. The number of circles in one of these horizontal columns represent the number of mercury switches, such as the mercury switches 17 through 27 which are brought into use in operating the necessary signals of an intersection such as in Fig. 5. The dark circle in the first vertical column represents that the first mercury switch comes into use only once. The same is true of the second and third columns respectively. The fourth mercury switch comes into use three times and likewise the fifth. The sixth comes into use four times, the seventh and eighth twice, the ninth four times, the tenth twice, and the eleventh four times. It will be seen that in the first position of the controller the fifth, seventh, ninth and eleventh mercury switches come into use as indicated by the top horizontal column. The result is that circuits are closed for each one of the green lamps shown in the second horizontal column of lamps in the upper part of the figure. This combination indicates "All go." In the second position of the controller the third, fifth, sixth, ninth and eleventh mercury switches come into use with a result that a "Left turn" lamp lights up on the west face, a green lamp on the north face, a red lamp on the east face, a green lamp on the south face and a green lamp on the west face. This combination indicates—West—"Left and go." It will be understood that no attention is paid by the vehicles to the south face of the unit in Fig. 5.

In the third position of the controller the signal is—North—"Go left and go." In the fourth position the signal is—East and west "Go." The fifth position of the signal is "All stop" and the sixth position of the signal is "Pedestrians go." This is indicated by the lighting up of all of the amber lamps on all of the faces. In this case the amber signal on the south side of the unit is of assistance to the pedestrians.

In Fig. 6 circuit connection between the mercury switches and the lamps is indicated. It will be observed that all of the circuits pass first through the main mercury switch 16.

For the traffic such as necessary in connection with an intersection of the type shown in Fig. 4 eleven mercury switches and two additional lamps would be supplied under the columns east and west, Fig. 1, so that all told there would be sixteen lamps. The combination of the mercury switches in position No. 1 would be such as to indicate north and south—green, east and west—red. In the second position the indication would be east and west—green, north and south—red. In the third position the indication would be north and south—"Left," east and west—red. In the fourth position east and west—"Left," north and south—red; and in the fifth position all red and in the sixth all amber. In these signals the letter "L" stands for left, "R" for red, "G" for green and "A" for amber. The all red signal in position 5 is a signal necessary when all traffic is to be stopped as in the case of fire. In the sixth position, all amber, the vehicular traffic stops and the pedestrians go.

It will be seen, therefore, that the controller of our invention is very flexible. The number and type of signals may be indefintely varied. Left turns may be taken care of just as effectively as the right turns or the forward traffic. With the arrangement shown it is impossible for the circuits designed to actuate certain signals to become mixed with the circuits designed to actuate different signals. Heretofore this has been impossible when such a large number of signals as here contemplated have been involved.

Referring to Fig. 1, it will be seen that the conductor 44 is connected to one of the terminals of the main mercury switch 16. This conductor is connected with one side of any suitable source of power. The circuit, after passing through the mercury switch, extends along conductor 45 to the various mercury switches from there on. Each mercury switch has an individual conductor which enters the cable 46 and extends to each particular lamp as indicated in Fig. 3 except in the case of the amber lamps in which case one conductor serves for all of these lamps. In the position of the controller shown in Fig. 1 it will be observed that all of the mercury switches on the right hand side are represented as closed whereas all of the switches on the left hand side are represented as open. This arrangement may be changed by shifting around the cams 29, 30 et seq. to any position desired. This can be done by loosening any one of the screws 47 and adjusting the corresponding cam. In Fig. 6 the details of these circuit connections are more clearly indicated.

Whereas we have described our invention by giving a concrete illustration it will be understood that we do not wish to be limited in its application to the specific disclosure inasmuch as variations may be made without departing from the spirit of the invention or from the scope of the claims herein.

What we claim as new and desire to secure by Letters Patent of the United States is:—

1. In a traffic signal a main circuit connection, a main switch in said connection, a plurality of branch connections from the main connection, a branch switch in each branch

connection, a switch controller common to said switches provided with means for opening the main switch before the branch switches are operated and for thereafter operating the branch switches in sequence, said means for operating the branch switches comprising a cam for each switch and a common driving element for all of the cams, each cam being adjustably secured to said common driving element, each switch being normally in engagement with its cam.

2. In a traffic signal a main circuit connection, a main switch in said connection, a plurality of branch connections from the main connection, a branch switch in each branch connection, a switch controller common to said switches provided with means for opening the main switch before the branch switches are operated and for thereafter operating the branch switches in sequence, said means for operating the branch switches comprising a cam for each switch and a common driving element for all of the cams, each cam being adjustably secured to said common driving element, each switch being normally in engagement with its cam, each cam having a number of high points and low points whereby the corresponding switch may be operated a number of times during one cycle of operation of the cam.

3. In an electric system a main circuit connection, a main switch in said connection, a plurality of branch connections from the main connection, a branch switch in each branch connection, a switch controller common to said switches comprising a shaft for opening the main switch before the branch switches are operated and a cam for each switch for thereafter operating the branch switches in sequence, each switch comprising an element movable under the influence of gravity and being mounted to oscillate about a horizontal axis, said shaft being mounted to rotate about a vertical axis and serving as a common operable means for all of said cams, and a latch associated with said shaft whereby the shaft and cams may be locked in any one of a number of positions.

4. An electric circuit controller comprising a shaft mounted to rotate about its longitudinal axis, a cam element, said shaft passing through said cam element, said shaft being mounted to move longitudinally through said element, said element being mounted to rotate with said shaft, said element having a flange surface extending along the length of the shaft and having a cam formed on the rim of the flange, and an electric circuit-making and circuit-breaking switch mounted in proximity of said cam and in operative engagement with said cam whereby the switch may be opened and closed by said cam when the shaft is rotated, and a second circuit-making and circuit-breaking switch mounted in proximity of said shaft and in operative engagement with the shaft whereby the latter switch may be opened and closed by the longitudinal movement of the shaft.

5. An electric circuit controller comprising a shaft mounted to rotate about its longitudinal axis, a plurality of cam elements, said shaft passing through all of said cam elements, said elements being mounted to rotate with the shaft, each of said elements having a flange surface extending along the length of the shaft, a cam surface formed on the rim of each flange whereby the cam may be operated in a plane parallel to the axis of the shaft, and an electric circuit-making and circuit-breaking switch associated with each cam, each switch mounted in proximity of its corresponding cam and adapted to be operated thereby whereby all of the switches may be operated by rotating the shaft, a lever for operating said shaft, and latching means associated with the lever for holding the shaft and cams in any one of a number of positions.

6. An electric circuit controller comprising a shaft mounted to rotate about its longitudinal axis, a plurality of cam elements, said shaft passing through all of said cam elements, said elements being mounted to rotate with the shaft, each of said elements having a flange surface extending along the length of the shaft, a cam surface formed on the rim of each flange whereby the cam may be operated in a plane parallel to the axis of the shaft, and an electric circuit-making and circuit-breaking switch associated with each cam, each switch mounted in proximity of its corresponding cam and adapted to be operated thereby whereby all of the switches may be operated by rotating the shaft, a lever for holding the shaft and cams in any one of a number of positions said shaft being mounted to move longitudinally, said lever being mounted in proximity of the shaft and in operative engagement with the shaft whereby the shaft may be moved longitudinally by moving said lever about said pivot, and an auxiliary electric circuit-making and circuit-breaking switch mounted in proximity of said shaft and in operative engagement with the shaft whereby the auxiliary switch may be opened and closed by moving the shaft longitudinally.

7. In an electric controller a main circuit connection, a main switch in said connection, a plurality of branch circuit connections extending from said main circuit connection, a branch switch in each branch circuit connection, a switch controller common to all of said switches, said controller being provided with means for opening the main switch before the branch switches are operated and for thereafter operating the branch switches in sequence, an electric lamp in each branch circuit connected in series with the auxiliary

switch thereof, all of said lamps being under the common control of the main switch and each lamp being under the individual control of its corresponding auxiliary switch, said switches being so related to the controller and said controller being so mounted that when the controller is moved in one direction the main switch is operated and when moved in a different direction the auxiliary switches are operated.

In witness whereof, we have hereunto set our hands this 22nd day of November, 1924.

CROMWELL A. B. HALVORSON, JR.
HARRY W. VICKERY.