

April 16, 1935.

LE ROY WOTTRING

1,998,038

TRAFFIC SIGNAL CONTROLLER

Filed Oct. 26, 1929

3 Sheets-Sheet 1

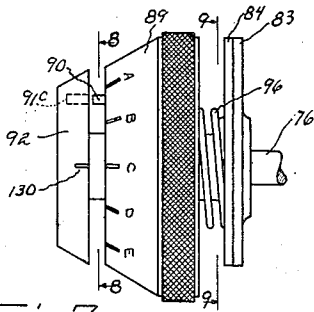


Fig. 7

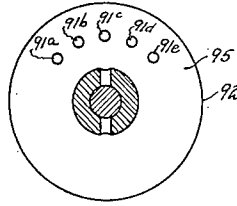


Fig. 8

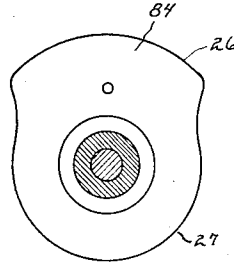


Fig. 9

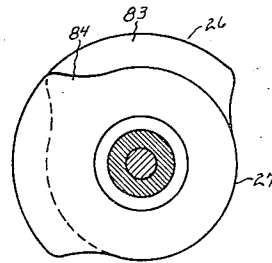
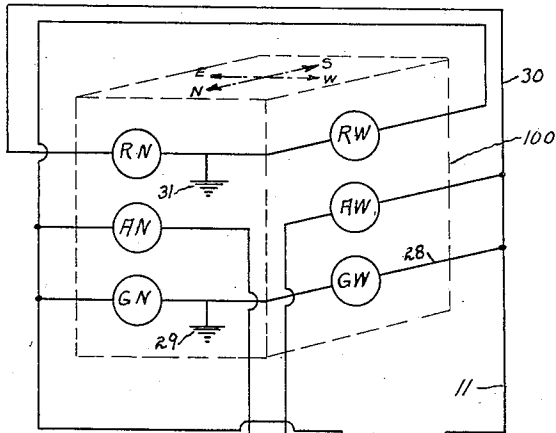


Fig. 10

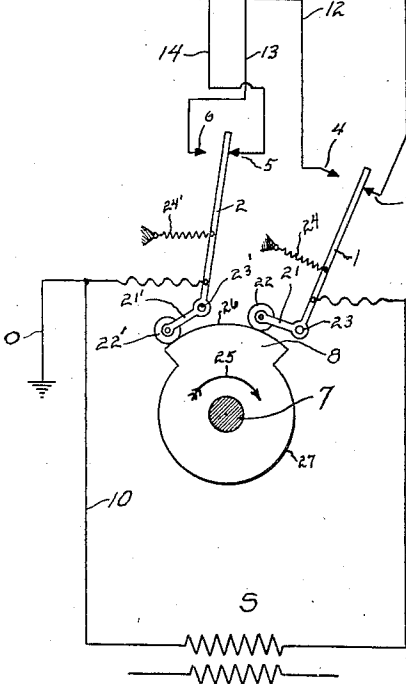


Fig. 1

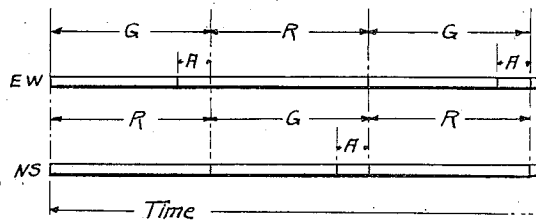


Fig. 2

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3 Sheets-Sheet 2

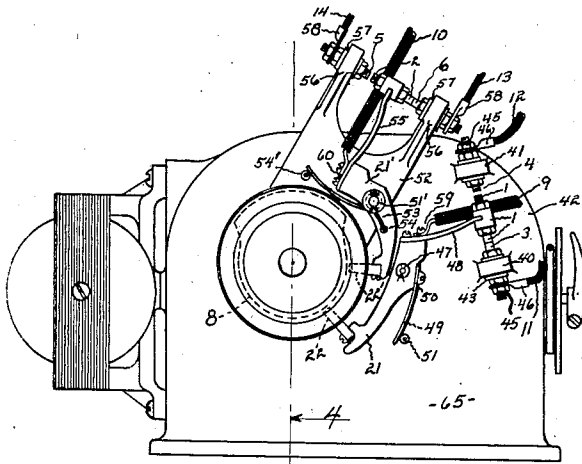


Fig. 3

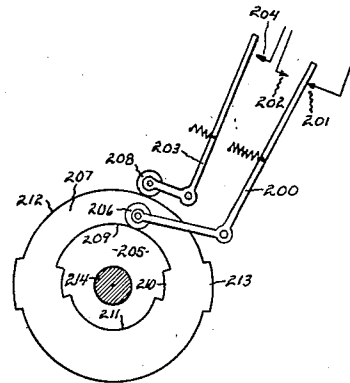
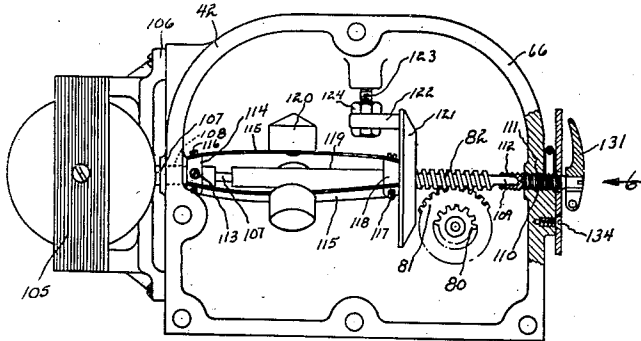


Fig. 11



UNITED STATES PATENT OFFICE

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TRAFFIC SIGNAL CONTROLLER

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Application October 26, 1929, Serial No. 402,585

4 Claims. (Cl. 177—337)

This invention relates to methods and apparatus for controlling traffic at street intersections by means of automatic signals and relates particularly to methods in which the traffic is controlled by signal lamps of different colors energized in predetermined cyclical sequence.

Traffic control systems have been proposed employing lamps of different colors having traffic directing significance such for example as green for "Go", red for "Stop" and another color such as amber for "Caution". In these systems, in general, the amber lamp is illuminated at the time of transition from the green to the red and in some cases also from red to green. Systems in which the amber lamp is illuminated on the change from green to red and also on the change from red to green are sometimes known as "four way independent amber" systems. In other systems which have been designated as "overlapping split amber" systems the amber lamp is illuminated only concurrently with the green lamp and in the latter part of the illumination period thereof.

It is one of the objects of my invention to provide a system for controlling traffic signal lamps according to the "split amber" method which will be very simple in principle and mode of operation.

Another object is to provide a controller or controlling apparatus for actuating the lamps of a "split amber" traffic control system which will be of simple construction, efficient in operation and in which illumination time periods may be adjustably varied.

Another object is to provide a control apparatus of the class specified having adjustment features whereby the length of the total cycle of illumination periods may conveniently be changed.

Another object is to provide a controller of the class specified in which the relative time periods of the green and red lamp illumination may be adjustably varied.

Another object is to provide a controller of the class specified in which the relative length of the time period of the amber lamp illumination may be adjusted.

Another object is to provide a controller of the class specified in which the three aforesaid adjustments may be made each independently of the others.

Another object is to provide a controller of the class specified which may be easily adapted to control either a "split amber" system or a "four way amber" system, as above specified.

Another object is to provide a controller and system of the "split amber" type for controlling

four sets of three lamps each, green, red and amber in a four way traffic lamp employing the minimum of make and break contacts.

Another object is to provide a controller of the class specified provided with improved timing means for timing the periodic illumination of signal lamps in a traffic controlling system.

Other objects will be apparent to those skilled in this art.

My invention is fully disclosed in the following description taken in connection with the accompanying drawings, in which:—

Fig. 1 is a diagrammatic view showing a traffic control system of the "split amber" type and a controller therefor embodying my invention.

Fig. 2 is a chart illustrating the illumination periods of green, red and amber lamps in a "split amber" system, such as shown in Fig. 1.

Fig. 3 is a side elevational view of a motor driven controller of the type diagrammatically illustrated in Fig. 1 and by which my invention may be practiced.

Fig. 4 is a view taken from the plane 4 of Fig. 3 and to a larger scale and with some of the parts back of the sectional plane being omitted for simplicity.

Fig. 5 is a view taken approximately from the plane 5 of Fig. 4 and to the same scale as Fig. 3.

Fig. 6 is a partial view taken in the direction of the arrow 6 of Fig. 5 showing an adjustment feature.

Fig. 7 is a fragmentary view similar to Fig. 4 shown in elevation and with some of the parts in different positions.

Fig. 8 is a view taken from the plane 8 of Fig. 7.

Fig. 9 is a view taken from the plane 9 of Figs. 4 to 7.

Fig. 10 is a view similar to Fig. 9 but with parts thereof in different positions.

Fig. 11 is a partial view similar to Fig. 1 showing a modification of my invention, and showing in front elevation a double cam which I may employ.

Fig. 12 is a side elevational view of the cam of Fig. 11.

Fig. 13 is a view similar to Fig. 1 showing another modification.

Referring to Fig. 1, I have indicated at 100 a four way traffic lamp casing, which in the simplified form illustrated is generally of box form having sides facing the north, east, south and west directions of traffic, as indicated by the letters N, E, S and W.

On the west and north sides of the lamp are signal lamps RW, RN etc. The letters R, A and

G thereof indicate the colors red, amber and green and these colors, as is sometimes customary, have the traffic controlling significance "Stop", "Caution" and "Go" respectively, and the letters W and N indicate the directions west and north. On the east and south sides of the lamp 100 may be provided respectively lamps identical with those on the west and north sides respectively, but these in the diagram have been omitted for simplicity.

In the operation of the lamp, the signal lamps are illuminated and extinguished according to a predetermined sequence, as follows: Assuming the traffic to be flowing in the east-west direction, the green lamp GW will be presented to that traffic and indicate "Go", and the red lamp RN will be presented to the north-south traffic and indicate "Stop", in accordance with which the traffic will not be moving at the intersection. After a suitable interval of time, the amber lamp AW will be illuminated concurrently with the green lamp GW, and this will indicate to the east-west traffic that the traffic moving directions are about to change. After a predetermined interval of amber and green illumination, the amber and green lamps AW and GW will be extinguished and the red lamp RW will be illuminated stopping the traffic in the east-west direction and at the same time the green lamp GN will be illuminated indicating "Go" to the north-south traffic. Similarly, after a suitable interval the amber lamp AN will burn concurrently with the green lamp GN and indicating a cautionary period to the north-south traffic, at the end of which both the amber and green lamps AN and GN will go out, and the red lamp RN will come on against the north-south traffic and the red lamp RW will go out and the green lamp GW will come on for east-west traffic. This completes the cycle and is the cycle known as the "split amber" cycle.

This sequence of illumination periods is illustrated in the chart of Fig. 2. The upper bar EW indicates the time periods for the lamps of the east-west direction and the lower bar NS indicates the periods of time for the lamps in the north-south direction, time being measured as indicated in the horizontal direction. In the chart, it will be noted that when the green lamp is burning for one direction, the red lamp is burning for the other direction and that in each case, in the latter part of the green period, the amber lamp burns concurrently with the green. In the chart, the successive green and red periods in any one direction are equal, but, as will be understood, they may be made with one longer than the other in accordance with the greater or lesser amount of traffic in the respective directions.

The above described sequence of signals is effected by the system of connections and controller diagrammatically illustrated in Fig. 1. Stationary switch contacts 3 and 4 have cooperating therewith a movable contact 1, shown in the form of an arm pivoted at 23; the arm has an angularly directed extension 21 on the end of which is a cam follower 22 adapted to roll on a cam 8 which is rotated continuously in the direction of the arrow 25. The roller is kept in contact with the cam by a tension spring 24. Similar stationary switch contacts 5 and 6 have a cooperating movable contact arm 2 pivoted at 23' and having a branch arm 21' and a cam follower 22' also spring pressed against the cam 8 by a spring 24'. When the cam 8 rotates, a large diameter portion 26 and a small diameter portion

27 successively cause the contact arms 1 and 2 to move into engagement with the contacts 3-4 and 5-6 in a sequence to be described.

In the operation of the system, starting with the controller parts in the position shown, current is supplied by a transformer S and flows by way of wire 9, contact arm 1, contact 3, wire 11, and thence by wire 28 to a ground connection 29, energizing lamp GW and by wire 30 current flows to ground 31, energizing lamp RN. Through ground connections the current returns by wire O and wire 10 to the transformer S.

The cam 8 rotates on its shaft 7 and when the cam follower 22' descends to the cam portion 27, current flows by wire 11 energizing lamp AW and through wire 13, contact 6, contact arm 2 and wire 10 the current flows back to the transformer. On continued rotation of the cam 8, the cam follower 22 falls and shifts the arm 1 to contact 4 and this will extinguish lamps GW and AW and RN and by way of wire 12 will illuminate lamps GN and RW. Subsequently, the cam will raise the follower 22' and move the arm 2 into engagement with contact 5 and current by way of wire 12 will illuminate lamp AN, concurrently with the lamp GN. After a suitable interval of time the cam will raise the follower 22 and move the contact arm from contact 4 to contact 3 and this will extinguish lamps AN and GN and by way of wire 11 will restore the lamps to their original condition completing the cycle.

By virtue of the above arrangement, traffic travelling toward an intersection facing a red or "Stop" signal lamp is charged with the duty to stop and the drivers will not be tempted to continue in motion into the intersection because of the lighting of any intermediate signal denoting the approach of the green or "Go" signal. There is nothing to indicate to them how long it may be displayed and, therefore, there is nothing to tempt them to drive into the intersection before the display of the green "Go" signal.

On the other hand, the cautionary signal, such as the amber lamp, comes on toward the end of the green or "Go" signal, so that traffic facing a green signal and approaching the intersection may either be warned of the imminence of the red signal, so that they may brake their vehicles and bring them to a stop at the intersection, or, if the amber lamp is not burning, may proceed at full speed through the intersection without hesitation or slowing down and thus aid materially in the free flow and movement of traffic.

It will be observed from Fig. 1 that the "split amber" cycle of lamp illumination, above described, may be accomplished according to my invention with four make and break contacts only, such as 3, 4, 5 and 6 and with only four control wires to the lamps, namely wires 11, 12, 13 and 14. It will also be observed that a single cam 8 and two cam followers 22 and 22' are all that are needed to actuate the contacts.

In Figs. 3 to 10 inclusive, is illustrated a preferred form of controller mechanism having the circuit make and break functions of the diagrammatic controller of Fig. 1. In Fig. 3, the stationary contacts 3, 4, 5 and 6 are reproduced as of the butt contact type. The contacts 3 and 4 are mounted in posts 40 and 41 rising from the outside surface of a controller housing 42. The contacts are insulated from the posts by insulating washers 43 and bushings, not shown, of well known construction, and the contacts 3 and 4 are provided

with terminal nuts 45 between which are secured conductor terminals 46 to which are connected the conducting wires 11 and 12, respectively. Rotatably mounted on a pivot post 47 on the controller housing 42 is a generally vertically arranged switch arm 21 carrying on its upper end a generally horizontal resilient extension 48 on the extremity of which is mounted a double butt contact 1—1 adapted to reciprocate into engagement with the stationary contacts 3 and 4 and by means of the flexible extension 48 to have spring pressed wiping contact therewith, when the arm 21 is oscillated in a manner to be described.

The switch arm 21 is resiliently held in a clockwise direction by a flat spring 49 secured to the arm as at 50 and riding upon an insulated post 51 on the casing.

Rotatably mounted upon a pivot post 51' rising from a contact support 52, to be more fully described, is a switch arm 21' normally held in a clockwise direction by a wire spring 53 one end of which engages the arm 21' at 54', the spring being wound about the post 51' and its other end riding upon an insulated post 54 on the contact support 52. The arm 21' has a vertical resilient extension 55 having on its extreme end a butt contact 2—2 similar to the contact 1—1, adapted to engage the contacts 5—6 with a spring pressed wiping contact. The contacts 5 and 6 may be constructed similarly to the contacts 3 and 4 and insulated from supporting branches 56—56 on the contact support 52 by insulating parts 57 in a well known manner; and the contacts 5 and 6 may have terminals 58—58 connected thereto and communicating with conducting wires 14 and 13, respectively.

A conducting wire 9 is connected to the extension 48 and contact 1—1 by a terminal connection as at 59 and a wire 10 is connected with arm 55 and contact 2—2 by a terminal connection 60. Upon the lower ends of the arms 21 and 21', respectively, are mounted fibre blocks or cam followers 22 and 22', respectively, adapted to ride upon the surface of a cam, to be described, and thereby adapted to be moved counter-clockwise and clockwise about their pivots 47 and 51' and it will now be understood that when the arms 21 and 21' are so moved, the contacts 1—1 and contacts 2—2 will be moved to make and break connection with the stationary contacts 3, 4, 5 and 6 respectively, to establish connections through the wires 9, 11 and 12 and wires 10, 13 and 14, as has been described in connection with Fig. 1.

The said cam and the mechanism for rotating it will now be described. Referring to Figs. 3 and 4, the controller housing 42 consists generally of a front portion 65 and a rear portion 66 which may be secured together with a sealed joint, as at 67 in a known or suitable manner. Into the front portion 65 is screwed a shaft bearing 68 having a flange 69. The inner end 70 of the bearing 68 may, if desired, be slightly peened over to retain it against accidentally unscrewing. Between the flange 69 and the face 71 on the wall of the housing portion 65 is clamped a bearing head 72 formed on the contact support 52 which has above been described. The head 72 is bored out as at 73 to fit a smooth bearing portion of the bearing 68 and the bearing support 52 may thus be adjustably rotated about the axis of the bearing 68. To hold the head and bearing support in any adjusted position, a friction washer 74 is interposed between the head 72 and the face 71 above referred to and the washer 74 is preferably made of resilient material and dished

out of planular form and riveted in one or more places as by rivets 75 to the head 72. Thus, when the bearing 68 is screwed in, the washer 74 exerts axially a resilient thrust causing friction on the flange 69 and on the face 71. The washer 74 may, if desired, be provided on its periphery with gear teeth and by means of gears, not shown, the washer thus may serve also to rotate the head 72 to which it is riveted and thus adjustably rotate the contact support 52. When adjusted, the contact support 52 will take up different clockwise or counter-clockwise positions, as viewed in Fig. 3 to change the angular displacement or relative circumferential interval between the cam follower blocks 22 and 22', for a purpose to be described.

Within the bearing 68 is rotatably mounted a cam shaft 76 projecting into the housing 42 and having secured thereto a toothed gear 77 by which the shaft may be rotated. By a train of meshed reduction gears including the gear 77 and spur gears 78, 79, and 80, a worm gear 81, and finally a worm 82 meshed with the worm gear, the shaft 76 may be slowly rotated, power being supplied to the worm 82 by a motor and connected elements shown particularly in Fig. 5 and to be described. The cam 8 mounted to rotate with the shaft 76 comprises two leaves 83 and 84, arranged in a plane transversely to the shaft 76. The leaf 83 is pinned to the shaft 76 as at 85 and is rotatably driven thereby. The leaf 84 is provided with a hub 86 rotatably mounted on the shaft 76 to adjust its angular position thereon, but in any adjusted position is driven by the shaft 76 by a key 87 in the hub, a longitudinal key way 88 in an adjusting indexed head 89, and a pin 90 secured in the head and entering one of several recesses 91 in a flange 92 pinned as at 93 to the shaft 76. The head 89 has an internal hub 94 rotatably and longitudinally slidably mounted on the hub 86 of the cam leaf 84 and is retained in its outward axial position in engagement with the flange 92 along an inner face 95 of the flange and with the pin 90 of the head in a hole 91c in the flange by a spring 96 abutting between the head and the cam leaf 84. The leaf 84 may thus be angularly adjusted around the axis of the shaft 76 relative to the leaf 83 by manually sliding the head 89 inwardly on the hub 86, to free the pin 90 from the flange 92 and then by rotating the head 89 and cam hub 86 on the shaft 76 to bring the pin 90 into registration with another hole in the head 92 and releasing the head 89, whereupon the spring 96 will cause the pin 90 to enter the said hole and lock the head 89 and the cam leaf 84 in the new adjusted position relative to the shaft 76 and therefore relative to the cam leaf 83. The flange 92 thus referred to is shown separately in Fig. 8 where five adjustment holes 91a to 91d are shown.

In Fig. 7, the head is shown in its inner spring pressed position at which it may so be turned, the pin 90 being shown withdrawn from its hole in the flange 92. The cam leaves 84 and 83 are preferably of the same profile, shown in Fig. 9, and in that figure the cam leaf 83 is directly behind the cam leaf 84. In Fig. 10, the cam leaf 84 is shown adjusted counter-clockwise relative to the cam leaf 83 and this figure illustrates one of the adjusted positions of the cam. It will thus be seen that the large diameter portion 26, referred to also in the diagrammatic figure of Fig. 1, may have a minimum length as in Fig. 9 and the small diameter portion 27 a maximum length and that the portion 26 may be adjustably increased and the portion 27 may be adjustably de-

creased when the cam leaf 84 is adjustably rotated and as illustrated in Fig. 10. The two leaves of the cam cooperate as a single cam 8, when the shaft 76 is rotated for the purpose described in connection with Fig. 1, the cam followers 22 and 22', shown in Fig. 3 being made axially long enough to cover both cam leaves 83 and 84, as indicated in broken lines at 22 in Fig. 4. The cam 8, is shown in dotted lines in Fig. 3 with the cam followers 22 and 22' in engagement therewith.

For rotating the cam shaft 76 through the chain of gears above described, the mechanism illustrated in Fig. 5 is preferably employed. The electric motor 105 which may be of any suitable or known type, and suitably mounted on the housing 42, as at 106, has a motor shaft 107 extending into the housing 42 on which is formed or mounted or to which is connected or secured the worm 82 above mentioned. The shaft 107 may have a bearing support at or adjacent its driven end in the frame of the motor or in the controller housing as at 108 and to support the outer end of the shaft, an adjustable end thrust bearing 110 screw threaded into the wall of the housing, as at 111, is provided, having an axial recess 112 into which a trunnion 109 of the motor shaft is inserted and in which it has rotative and end thrust bearing.

This construction permits additionally of the use of a simple speed controlling mechanism whereby the speed of the motor shaft, and therefore of the cam shaft above referred to, may be adjusted and maintained at adjusted speeds, and this mechanism will now be described. Secured to the motor shaft as by a set screw 113 is a collar 114 to which one end each of a plurality of flat thin metal resilient governor springs 115 are secured as by screws 116. The other end of the springs are secured as by springs 117 to a similar collar 118 secured to a longitudinally slidable sleeve 119 on the shaft. Governor weights 120 are secured to the springs 115. Mounted to rotate with and move with the collar 118 is a friction wheel 121 adapted to have suitable friction contact with a shoe 122, preferably of felt, leather or the like supported by the roof of the housing 42 by a stud 123 threaded in the housing and having clamp nuts 124—124 on each side of the shoe 122. The stud 123 passes outwardly through the housing, as shown at 125 in Fig. 4. By this construction, the radial position of the shoe 122 on the friction wheel 121 may be adjustably varied and fixed.

Upon rotation of the motor shaft, the springs 115, weights 120 and friction wheel 121 rotate with it; the centrifugal movement of the weights 120 will draw the friction wheel 121 into contact with the shoe 122, the sleeve 119 sliding on the motor shaft for this purpose, and the shoe 122 and wheel 121 will function as a brake load on the motor, limiting speed to a definite amount.

To adjustably vary the speed, the normal position of the wheel 121 may be shifted by longitudinally shifting the shaft 107 and this in turn is effected by adjustably screwing the bearing 110 inwardly or outwardly of the housing 42. In this connection, the motor shaft may be given thrust away from the motor by means of the reaction between the worm 82 and the worm wheel 81 and also by means of armature reactions to keep out lost motion in the end thrust bearing 109—110, and to thus contribute to accurate sensitive speed regulation.

It will now be understood that by means of the motor 105, power is transmitted to rotate

the cam shaft 76 and the cam 8 at a uniform rate of speed to operate the switch contacts in the sequence heretofore described in connection with Fig. 1. The functions of the adjustment features referred to above will now be described. As described above, one complete cycle of operations is effected upon one complete revolution of the cam 8, the cycle including (for each direction, say east and west traffic) a "Go" interval, concurrently at its end with a cautionary interval, and a "Stop" interval, the "Go" interval occurring when the cam follower 22 is on the cam portion 26, the "Stop" interval when the cam follower 22 is on the cam portion 27 and the cautionary interval when the cam follower 22 is on the portion 27 and the cam follower 21' is on the portion 26. By referring to Fig. 1, it will be clear that to vary the cautionary period, the cam followers 22 and 22' may be moved closer together or farther apart and in my improved controller, this is very easily and conveniently effected by manually rocking the contact support 52 clockwise or counter-clockwise, as desired, which movement moves the cam follower 22'.

It will also be apparent from Fig. 1 that the relative lengths of the "Go" and "Stop" periods will be in proportion to the relative lengths of the cam portions 26 and 27 and this relative length may be adjustably varied in my improved controller and the adjustment fixed as above described.

I find that a suitable range for this adjustment will be given with two cam leaves having cam portions 26 equal to approximately a fourth of the revolution of the cam and providing adjusted positions in which they may be registered with each other, as in Fig. 9 or relatively moved to an extreme position, as in Fig. 10, wherein the cam portion 26 of one leaf begins where that of the other leaves off.

By means of a reference calibration mark 130, Fig. 7, and suitable calibration indicia, A, B, C, D and E on the head 89, corresponding to the several holes 91 in the flange 92, the controller may be calibrated for definite "Stop" and "Go" periods. The total number of seconds required for a complete cycle, or complete rotation of the cam, may be adjusted by screwing inwardly or outwardly the bearing 110, Fig. 5, and by means of a hand 131, Fig. 5, secured to the bearing 110 to rotate therewith and by means of a calibrated dial 132 secured to the housing against rotation as by a screw 134, the speed of the motor, and, therefore, the length of a cycle may be indicated. The dial 132 is preferably calibrated in seconds by calibration marks 133.

Thus, the length of the entire cycle can be adjusted at any time simply by turning the hand 131 to the suitable calibration mark on the dial 132. Division of this cycle into "Go" and "Stop" intervals may be determined simply by rotatably adjusting the head 89 in accordance with its calibration marks. Finally, the relative length of the cautionary interval may be adjusted by simply rocking the contact support 52.

While I have described my improved controller mechanism in connection with the preferred or "overlapping split amber" method of traffic control, my controller has a further advantage in being simply and easily adapted to control traffic systems operating on the "four way independent amber" method. To adapt my controller to this use, it is only necessary to pro-

vide it with cam leaves 83 and 84 of suitable profile and to provide cam followers cooperating independently with each other, each with a respective leaf of the cam.

5 This adaptation of my invention is illustrated in Figs. 11 and 12. In Fig. 11 the movable switch contact 200 cooperates with the stationary contacts 201 and 202 to respectively energize the "Go" and "Stop" signals and the movable contact 203 cooperates with the stationary contact 204 to energize the amber signals. The cam leaf 205 actuates the movable contact 200 through the cam follower 206 and the cam leaf 207 similarly actuates the movable contact 203 through the cam follower 208. It is not deemed necessary in view of the complete foregoing description of the "split amber" operation to describe or show the circuit connections in full in connection with Fig. 11. It is believed sufficient to say that in connection with the cam leaf 205, when the cam follower 206 is on the cam portion 209, the contact at 201 will be closed; when the cam follower is on the cam portion 210 the contact 200 will be in an intermediate or open contact position; when the cam follower is on the cam portion 211, the contact 202 will be closed. In connection with the cam leaf 207, when the cam follower 208 is on the cam portion 212, the contact at 204 will be open and when the cam follower 208 is on the cam portion 213, said contact will be closed.

The cam leaves 207 and 205 are positioned on their shaft 214 so that the cam follower 206 comes on the cam portion 210 at the same time the cam follower 208 comes on the cam portion 212. Thus, it will be seen that the contact 204 will be closed to energize the amber lamps each time that the contact 202 is in the intermediate position between the "Go" and "Stop" positions, i. e., when both the "Stop" and "Go" lamps are extinguished.

In Fig. 12 the two cam leaves 207 and 205 are illustrated and their respective cam followers 206 and 208 are indicated.

45 Another adaptation of my controller and control system by which the "four-way independent amber" method of control may be effected therewith is illustrated in Fig. 13. In this modification, the controller is unchanged from its form as employed for the "overlapping split amber" method and as described hereinbefore, it being necessary with this modification only to change some of the electric circuit connections of the system.

55 Referring to Fig. 13, the wire 11 from the contact 3 may energize a lamp GW and a lamp RN and the wire 12 connected to the contact 4 may energize a lamp GN or a lamp RW. A wire 250 connected directly to the switch arm 2 may energize lamps AW and AN. The contact 5 is connected to the contact 4 by wire 251 and the contact 6 is connected to the contact 3 by a wire 252. Energy is supplied from the transformer secondary S by the wire 9.

65 In the operation of the four-way independent amber method according to the system of connections in Fig. 13, when the cam 8 is in the position shown, current may flow from wire 9 to wire 11 to energize the GW and RN lamps. 70 When the cam is rotated until the switch arm 2 operates to engage contact 6, current flows additionally through wire 252, contact 6 and wire 250 to energize lamps AW and AN concurrently with the energization of the lamps just described. 75 Further movement of the cam 8 will move the

arm 1 to engage the contact 4 and thereupon all the energized lamps will be deenergized and current will flow from wire 9 through wire 12 and energize the lamps RW and GN only.

Upon continued rotation of the cam 8, the switch arm 2 will again be actuated in the other direction to engage contact 5 and then current will flow from contact 4 by wires 251 and 250 to energize lamps AW and AN concurrently with the other lamps.

Upon a further movement of the cam 8, the arm 1 will be returned to the contact 3 deenergizing the lamps just described and energize those which were energized in the first instance, thus completing the cycle.

My invention is not limited to the exact details of construction shown and described, since my invention may be embodied in other and various structures without departing from the spirit of my invention or sacrificing its advantages.

I claim:

1. In an electric system for traffic control, a stop, caution and go signal for the traffic in a first direction, a stop, caution and go signal for the traffic in a second direction, a source of current supply and circuits and contacts for energizing the signals comprising a first contact and a first and second contact associated therewith, a second contact and a first and second contact associated therewith, circuit connections for energizing the go signal in the first direction and the stop signal in the second direction including the first contact and its first associated contact; circuit connections for energizing the go signal in the second direction and the stop signal in the first direction including the first contact and the second of its associated contacts; circuit connections for energizing the caution signal in the first direction including the first contact, the first of its associated contacts, the second contact and the first of its pair of associated contacts; and circuit connections for energizing the caution signal in the second direction including the first contact, the second of its associated contacts, the second of the associated contacts of the second contact, and the said second contact, and means effecting cyclic operation of the contacts whereby the go signal in the first direction and the stop signal in the second direction will be concurrently energized for a predetermined time interval, and the cautionary signal in the first direction will be subsequently concurrently energized for a shorter predetermined time interval, then concurrently all of the aforesaid energized signals will be de-energized and the go signal in the second direction and the stop signal in the first direction will be energized for a predetermined time interval, and subsequently concurrently the caution signal in the second direction will be energized for a predetermined time interval, and then concurrently all of the said energized signals will be de-energized, and the cycle thus determined will be continuously repeated, and means for varying the relative time intervals allotted to each of the signals.

2. In an electric system for traffic control, a stop, caution, and go signal for the traffic in a first direction, a stop, caution, and go signal for the traffic in a second direction, a source of current supply and circuits and contacts for energizing the signals comprising a first contact and a first and second contact associated therewith, a second contact and a first and second contact associated therewith, circuit connections for ener-

gizing the go signal in the first direction and the stop signal in the second direction including the first contact and its first associated contact; circuit connections for energizing the go signal in the second direction and the stop signal in the first direction including the first contact and the second of its associated contacts; circuit connections for energizing the caution signal in the first direction including the first contact, the first of its associated contacts, the second contact and the first of its pair of associated contacts; and circuit connections for energizing the caution signal in the second direction including the first contact, the second of its associated contacts, the second of the associated contacts of the second contact, and the said second contact, and means effecting cyclic operation of the contacts whereby the go signal in the first direction and the stop signal in the second direction will be concurrently energized for a predetermined time interval only, and the cautionary signal in the first direction will be energized for a predetermined time interval only beginning after the initial energization of the said go and stop signals, and then after the termination of the go and stop signal time interval and substantially at the termination of the cautionary signal time interval, the go signal in the second direction and stop signal in the first direction will be energized for a predetermined time interval only, and the cautionary signal in the second direction will be energized for a predetermined time interval only beginning after initial energization of the last-mentioned go and stop signals, and then after the termination of the last-named go and stop signal time interval and substantially at the termination of the last-named cautionary signal time interval, the above-described cycle will be repeated.

3. An electric system as described in claim 2 and in which means is provided for varying the relative time intervals allotted to each of the signals.

4. In an electric system for traffic control, a stop, caution and go signal for the traffic in a first direction, a stop, caution and go signal for the traffic in a second direction, a source of current supply and circuits and contacts for energizing the signals comprising a first contact and a first and second contact associated therewith, a second contact and a first and second contact associated therewith, circuit connections for energizing the go signal in the first direction and the stop signal in the second direction including the first contact and its first associated contact; circuit connections for energizing the go signal in the second direction and the stop signal in the first direction including the first contact and the second of its associated contacts; circuit connections for energizing the caution signal in the first direction including the first contact, the first of its associated contacts, the second contact and the first of its pair of associated contacts; and circuit connections for energizing the caution signal in the second direction including the first contact, the second of its associated contacts, the second of the associated contacts of the second contact, and the said second contact, and means effecting cyclic operation of the contacts whereby the go signal in the first direction and the stop signal in the second direction will be concurrently energized for a predetermined time interval, and the cautionary signal in the first direction will be subsequently concurrently energized for a predetermined time interval, then concurrently all of the aforesaid energized signals will be de-energized and the go signal in the second direction and the stop signal in the first direction will be energized for a predetermined time interval, and subsequently concurrently the caution signal in the second direction will be energized for a predetermined time interval, and then concurrently all of the said energized signals will be de-energized and the cycle thus determined will be continuously repeated.

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