

Aug. 11, 1936.

C. H. BISSELL

2,050,825

WORK CYCLE TIMER

Filed Jan. 18, 1932

4 Sheets-Sheet 1

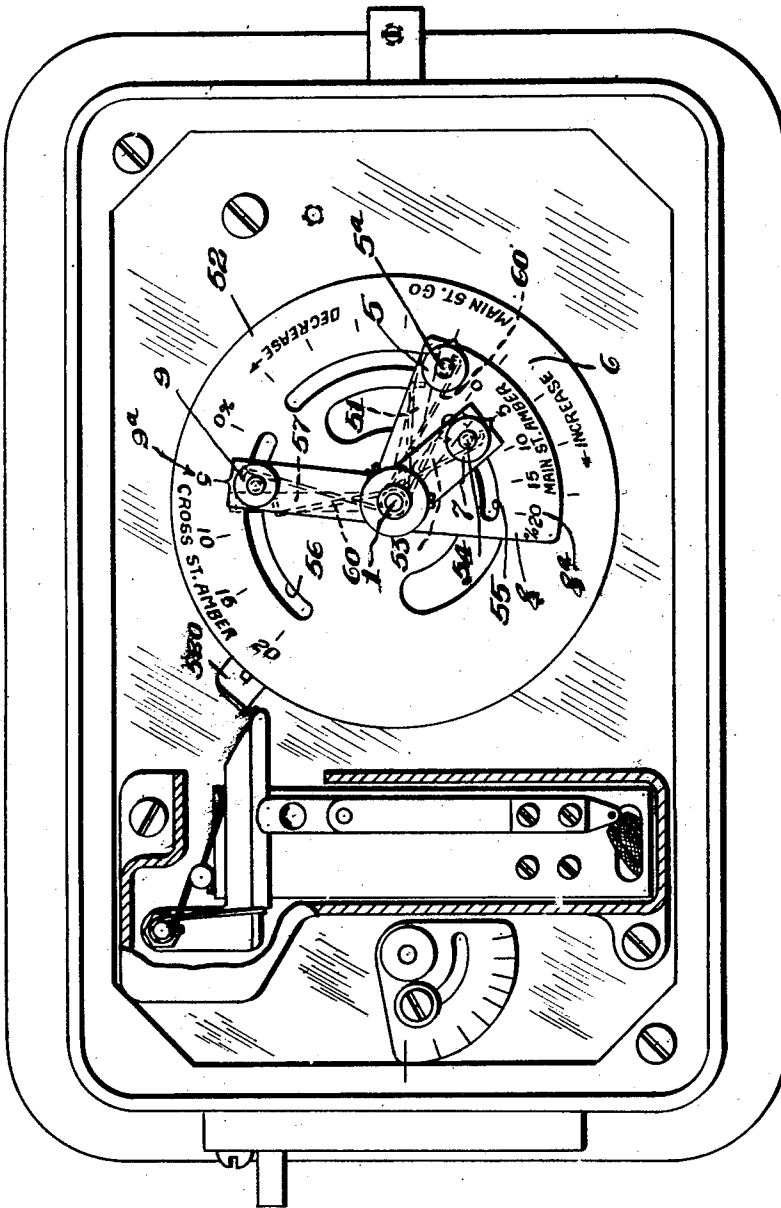


Fig. 1-

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4 Sheets-Sheet 2

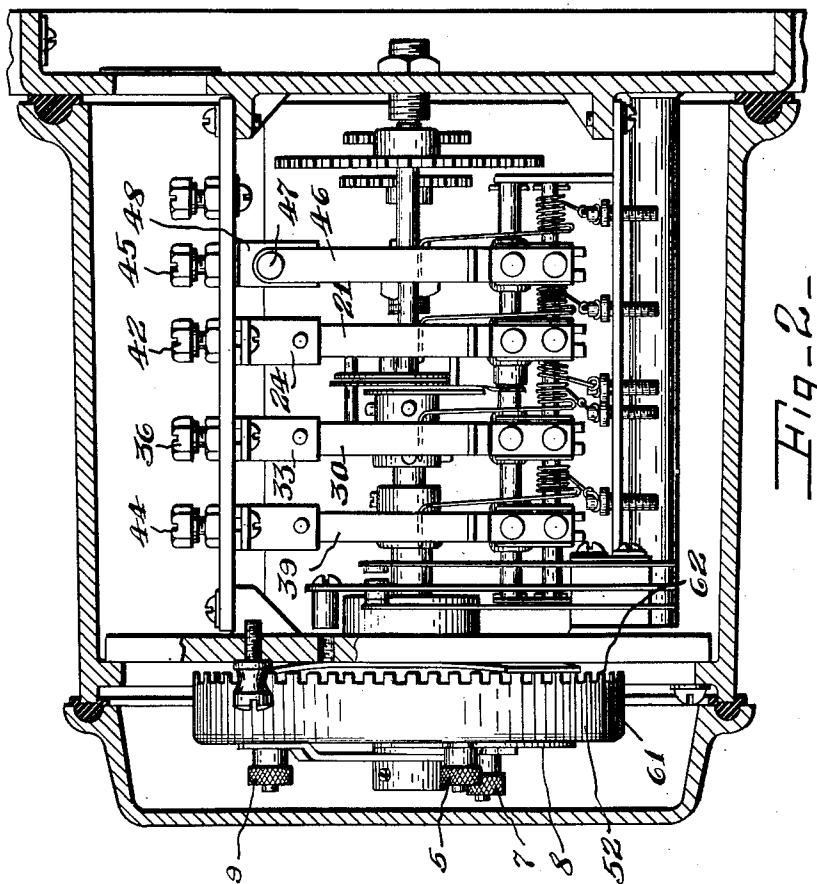


Fig. 2-

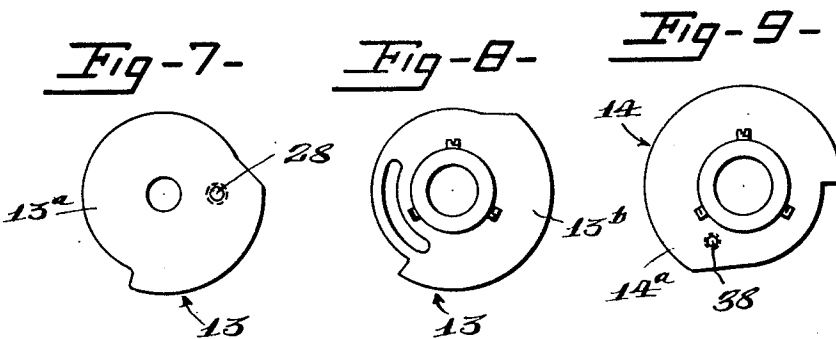
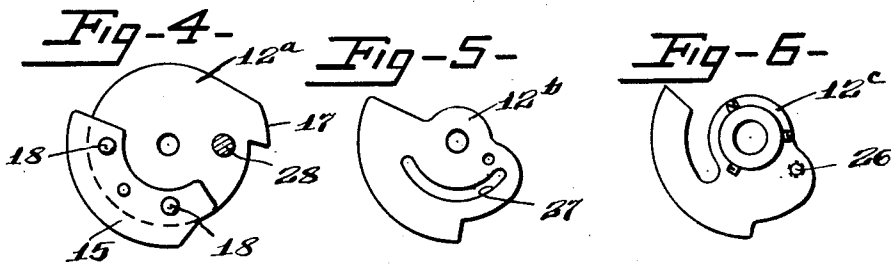
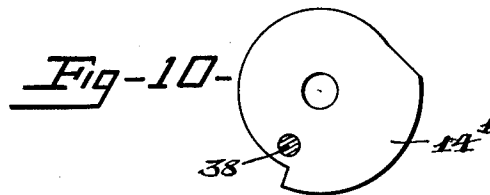
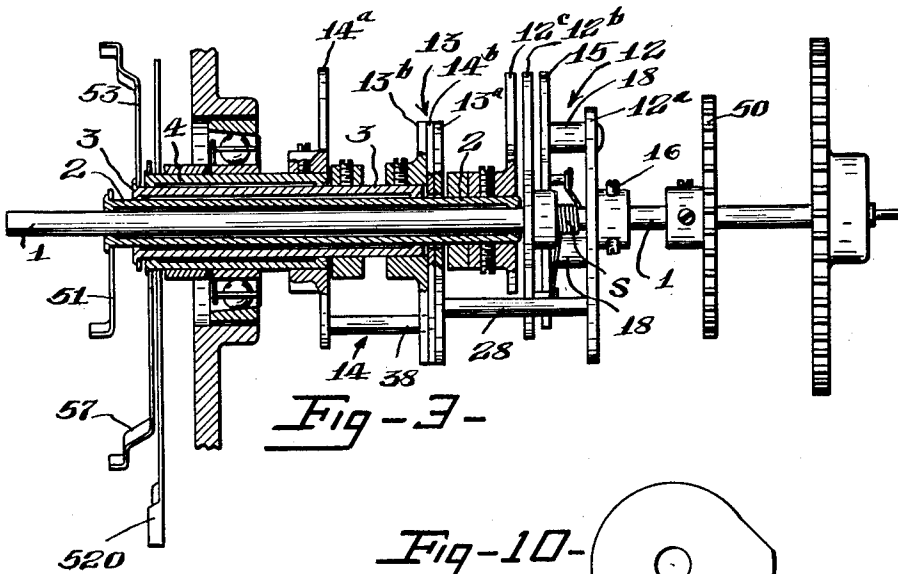
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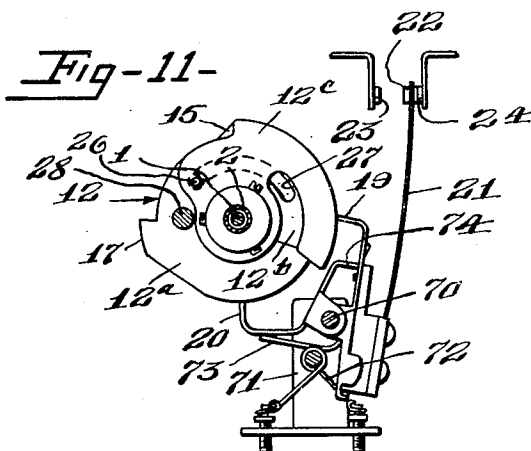
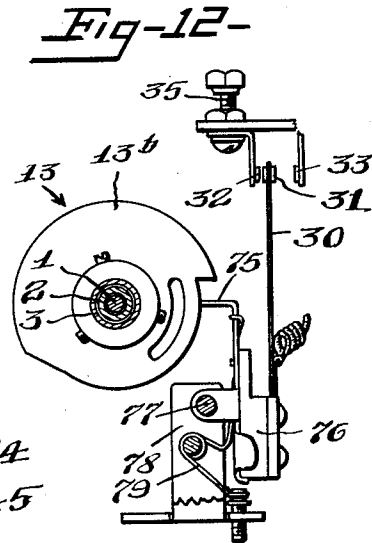
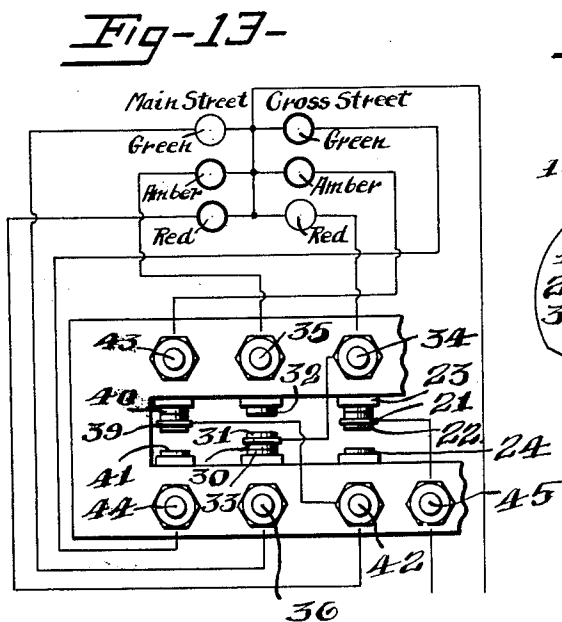
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,050,825

WORK CYCLE TIMER

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Application January 18, 1932, Serial No. 587,386
In Great Britain June 12, 1931

1 Claim. (Cl. 200—30)

This invention relates to work cycle timers, particularly a timer for controlling the display of stop or red and go or green signals at street intersections, and has for its object, a particu-
5 larly simple and efficient mechanism by which the cams of the timer can be adjusted to split the traffic cycle into stop and go periods of different durations to suit conditions and to adjust the timing and the extent of the intermediate or
10 amber signals.

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
15 to the accompanying drawings in which like characters designate corresponding parts in all the views.

Figure 1 is a front elevation of the cabinets for the timer, the door being removed showing the
20 manuals on the face of the adjusting mechanism.

Figure 2 is an end view, partly in section, looking to the left in Figure 1, the casing being
shown in section.

Figure 3 is a fragmentary detail sectional view
25 of the timer shaft and cams thereon.

Figures 4, 5, 6, 7, 8, 9, and 10, are detail views of the timer cam sections.

Figure 11 is a fragmentary elevation of one
30 of the timer cams and its follower.

Figure 12 is a view similar to Figure 11, of another timer cam and its follower.

Figure 13 is a diagrammatic view illustrating
one type of signals used in this system illustrating the wiring thereof.

This timer comprises generally, a center drive shaft, a plurality of nested shafts mounted concentric with the drive shaft, cams including sections mounted respectively on the nested shafts, one of the cams having a section mounted on the
40 drive shaft, members as rock arms on the nested shafts respectively by which any one of the nested shafts can be turned relatively to the other nested shafts and the drive shaft, a coupling member mounted on the center shaft and common to all of the rock arms, the rock arms
45 lying adjacent said coupling member, and means for disconnecting the rock arms from and connecting the same to, the coupling member for the purpose of adjusting any one or more nested
50 shafts relatively to the other nested shafts and the center shaft, the rock arms and the coupling member being mounted on the face plate of the housing of the timer where it is readily accessible.

1 designates the center drive shaft, 2, 3, and 4,
55 the nested shafts mounted concentrically around

the drive shaft 1 and normally rotating as a unit therewith and shiftable about their common axes relative to each other and to the center shaft 1 to vary the timing of the cams. The shafts 2, 3,
4, are shifted by manual means to be described. 5

The cams are sectional in order to be adjusted to conform to different conditions, or for accomplishing the following results:

(a) Splitting up the traffic cycle into subdivisions of different lengths, as for instance, fifty
10 seconds go on each street; or 60 seconds go on the main, or 40 seconds go on the cross street with 40 seconds stop on the main street, and 60 seconds stop on the cross street etc. The cams are adjustable to split up the traffic cycle into
15 any desired proportion.

(b) To shift the time that the amber lights will occur in accordance with the adjustments of the cams to split up the traffic cycle, or in other words, to locate the amber lights so that
20 they will occur in proper relation to the change of signals from green to red, and red to green on both streets.

(c) To vary the extent of time of the amber signals on each street from zero to a maximum
25 of say 20 seconds, or cut out the amber signal on both streets, or on either one street and not on the other.

The traffic cycle splitting adjustment (a) is effected by shifting the handle 5 (Figure 1) over the dial 6 and the adjusting (b) of the amber
30 light by the handle 7. The handle 7 is normally clamped to a segment 8 to which the handle 5 is attached, so that when the handle 5 is operated to split the traffic cycle, the handle 7 moves
35 therewith and thus shifts the amber cam so that the amber light will occur with proper relation to the red and green signals.

To effect adjustment (c) that is vary the extent of time of the amber light on the main street
40 from zero to maximum, as from zero to 20 seconds, the handle 7 is shifted relatively to the segment 8 over the scale 8^a on the segment 8. The corresponding change of time on the cross street, that is, changing the time the amber is
45 displayed from zero to maximum, say to 20 seconds, is effected by the handle 9 which is movable over scale 9^a.

12 designates generally the cam which controls the display of the red and green signals on both
50 streets, and also the amber signals.

13 designates the cam for controlling the amber on the main street, and 14 the cam for controlling the amber on the cross street. The cam 12 is composed of three sections 12^a, 12^b, 55

and 12^c, and the section 12^a also has an additional lobe 15. The section 12^a is fixed on the cam shaft 1 by set screws 16 and is thus fixed or anchored to the cam shaft. This cam section 12^a has a high part 17 and the lobe 15, which is offset therefrom by posts 18, is another high part diametrically opposite the high part 17. The cam section 12^a with its lobe 15 coacts with a pair of followers 19 and 20, Figure 11, which actuate the spring arm 21 having a double contact 22 at its end which coacts alternately with contacts 23 and 24. When the contact 22 is engaged with the contact 23, red will be displayed on the cross street and when the contact 22 is engaged with the contact 24, red will be displayed on the main street. The lobe 15 and the cam sections 12^b and 12^c which coact therewith, as will be presently described, act on the follower 19 so that the contact arm 21 is pressed to the right (Figure 11) to engage the contact 24 and when the cam section 12^a rotates so that the follower drops off the lobe 15, or any extension thereof effected by the sections 12^b and 12^c, the operation of the contact arm 21 is controlled by the follower 20 riding up the high part 17 which actuates the contact arm 21 to the left (Figure 11) carrying the contact 22 into engagement with the contact 23 displaying red on the cross street until the follower 20 drops off the high point 17.

In order to extend the red period on the cross street and hence, as will be hereinafter described, extend the go period on the main street and correspondingly shorten the green on the cross street and red on the main street, the cam sections 12^b and 12^c are utilized or shifted, these being arranged side by side along side of the lobe 15.

The section 12^c is mounted on the sleeve or hollow shaft 2 nested around the timer shaft 1 and it has a pin 26 (Figure 6) extending laterally therefrom through a slot 27 (Figure 5) in the cam section 12^b. The sleeve 2 is turned by means, as will be hereinafter described, and when turned first turns the cam 12^c so that its lobe forms an extension of the lobe 15. During such turning, the pin travels along the slot 27 until it reaches the end thereof where further turning will turn the section 12^b. The section 12^b fills up the gap that forms between the rear end of the high portion of the cam section 12^c and the lobe 15 when the section 12^c is turned far enough to separate from the lobe 15. When this point of separation is reached, the pin 26 reaches the end of the slot 27. Hence, the control of the contact arm 21 remains in the control of the lobe 15 and the extensions thereof effected by the cams 12^c and 12^b. The movement of the section 12^c in one direction is effected as stated by the pin 26 pressing against one end of the slot 27 and in the return direction when the hollow shaft 2 is actuated in a reverse direction by a spring S. The spring S is a coiled spring for convenience encircling the shaft 1, and is anchored at its opposite ends to the cam sections 12^c and 12^b respectively. The purpose of the spring S is to hold the section 12^c, which is loosely mounted, from rattling or loose shifting movement relatively to the section 12^b in any adjustment of these sections.

The cam 13 (Figures 7 and 8) which for convenience is called the main street amber cam (although it will be understood that all the cams contribute to the control of all the signal colors) consists of two sections 13^a and 13^b. The section

13^a is mounted loosely on the shaft 2 but is connected to the cam section 12^a on shaft 1 by a yoke 28, and as the section 12^a is anchored to the timer shaft 1, the section 13^a is also fixed relatively to the timer shaft 1. The section 13^b is adjustable to extend the high portion of the section 13^a and is mounted onto a hollow shaft 3 nested around the hollow shaft 2, and this hollow shaft 3 is adjustable about its axis to shift the section 13^b relatively to the section 13^a to extend the latter. These two sections of the cam 13 coact with a suitable follower which controls the operation of a contact arm 30 (see Figure 12) having a double contact 31 thereon for coacting alternately with two contacts 32 and 33.

As seen in Figure 13, the contact arm 30 is in circuit with a binding post 34 which is connected in circuit with the contact 23 and the contact 32 is connected to a binding terminal 35 which is connected in circuit with the amber lights on the main street. The contact 33 is connected to a binding terminal 36 which is connected with the green lights on the street. Thus, when the cam 12 actuates the contact 22 to engage the contact 23 so that red is displayed on the cross street, the cam 13 first actuates the contact 31 to engage the contact 33 so that green is displayed on the main street and thereafter actuates the contact arm 30 to engage the contact 31 with the contact 32 so that amber is displayed on the main street, as long as the contact 22 is engaged with the contact 23 by the cam 12.

14 designates the cam for controlling the cross street amber light.

In the wiring of the timer contacts just described the amber signals follow the green giving warning to the moving traffic that the stop signal is about to be displayed but no amber follows the red or precedes the change to green from red.

The cam 14 comprises two sections 14^a and 14^b, Figures 9 and 10, the section 14^a being mounted upon a hollow shaft 4 nested around the hollow shaft 3. The section 14^b is located between the sections 13^a and 13^b of the cam 13 and coacts with the follower which controls the contact arm 30. The two sections 14^a and 14^b are connected by a yoke 38. The section 14^a coacts with the follower which controls the double contact arm 39 which coacts alternately with contacts 40 and 41. The contact 40 controls the cross street amber, and the contact 41 controls the cross street green. The contact arm 39 is connected by a wire to the binding post 42 which is connected to the contact 24 which controls the red on the main street and coacts with the contact 22 controlled by the main cam 12. The contact 40 is connected to a binding post 43 which is connected to the cross street amber lights, and the contact 41 is connected by a wire to a binding post 44 which is connected to the green light of the cross street.

The contact arm 21 is connected by a wire to a binding post 45 which is connected in the feed circuit. This binding post 45 is also connected to a contact arm 46 having a contact 47 thereon which coacts with a contact 48. The contact 48 is connected to a binding post connected in all the amber light circuits. The contact arm 47 is controlled by a cam 50 on the cam shaft which coacts with a follower which vibrates the contact arm 46. The cam 50 is provided throughout its circumference with points arranged close together so that the contact arm 46 is vibrated to produce flashing amber. The flashing amber is used only when the red and green lights are not

used, and the flashing amber feature forms no part of this invention, nor does this means for holding the contact arm 46 normally spaced apart from the contacts 48 or out of operation, or for vibrating into contact therewith, and for holding all the contact arms 22, 30 and 39 from coacting with their contacts, while the flashing amber is in operation.

In the operation of the signals at an intersection, the cams may be adjusted to split the traffic cycle into divisions of any desired length as to display the green and red signals an equal time on both streets, or to display them in unequal periods as for instance, green sixty seconds on the main street, and forty seconds on the cross street with a corresponding display of red forty seconds on the main street, and sixty seconds on the cross street. Or the traffic cycle may be split up in some instances to give the cross street a greater go period and less stop period than the main street.

Owing to the mounting of the cams on the various nested shafts 2, 3, 4, the cams are readily adjustable to split the traffic cycle into any desired subdivisions and to locate the amber lights so that they will occur at the proper intervals relatively to the red and green signals and to adjust the time of the amber from zero to maximum.

The splitting of the traffic cycle is effected by turning the hollow shaft 2 which adjusts the sections 12^b and 12^c of the cam 12 as before pointed out, and thus extends or shortens the time the contact 21 is engaged with the contact 23. Adjusting of the cam sections 12^b and 12^c to lengthen the red on the cross street would correspondingly lengthen the green on the main street as contact 23 which controls cross street red is connected to contact 31 which controls main street green. This hollow shaft 2 has a radially extending arm or quill 51 at its front end on the front side of the face plate of the frame of the timer in position to be engaged by the stem 5^a of the handle 5 which is movable with the dial 6. This handle 5 is a knob or nut which screws onto the stem 5^a extending through the coupling member, or disk 52, on which the dial 6 is provided, into position to engage the arm 51 on one side, as seen in Figure 1, the stem or pin extending through the segment 8 which is loosely mounted on the front end of the timer shaft 1. This pin 5^a, as well as the pin 54, and the pin on which the nut 9 threads, is a bolt extending through the slot in the disk 52, and having a head on the inner side of the disk 52 which is clamped by the tightening up of the handle 5^a against the inner side of the disk 52, while the nut is tightened against the segment A. The head of the bolt has a shoulder or pin extension which coacts with the quill 15. The disk 52 on which the dial 6 is provided, is mounted on the timer shaft 1 to rotate therewith. When the handle 5 is loosened or unscrewed so that it is not clamped to the disk 52, movement of the handle in one direction as counterclockwise (Figure 1) will press the stem thereof against the quill or arm 51, and hence shift the hollow shaft 2 about its axis and shift the cam section 12^c. Movement of the handle 5 and hence, the cam section 12^c in one direction lengthens or extends the high point of the cam 102 and hence, correspondingly shortens the valleys of the cam so that the contact 22 remains in engagement with the contact 23 a shorter period so that the green on the main street is displayed longer and hence, the red on the cross street displayed the

same length of time as the green on the main street, because the contact 22 is connected to the binding post 45 and controls red on the cross street. Movement of the handle 5 in the other direction lengthens the cam to lengthen the red on the cross street and hence correspondingly shortens the go on the main street.

The changing of the main street amber is controlled by the cam 13 and adjusted by turning the sleeve 3 having an arm 53 at its outer end which coacts with a stem 54 of the handle 7 which is similar to the handle 5, the stem extending through the slot 55 in the segment 8, and by reason of the handle 7 which is a clamping nut threading on the stem 54 is normally clamped to the segment 8 and moves with the segment 8 when it is shifted by the handle 5 so that the occurrence of the amber following the green signal is automatically adjusted when the adjustment of the traffic cycle into subdivisions is being effected by shifting the handle 5.

To adjust the time extent of the amber signals from zero to maximum, the handle 7 is shifted along the slot 55 relatively to the segment 8 which thus actuates the arm 53 and the hollow shaft 3 and the adjustable cam section 13^b. The extent of time of the amber signal on the cross street from zero to maximum is determined by shifting the handle 9 with its stem along the slot 56 and thus shifting the arm 57 mounted on the hollow shaft 4 which shifts the cam section 14^a. The stems of each of the handles 5, 7, and 9 thrust against like sides of the various arms 51, 53, and 57, and when either of these handles are moved in a counterclockwise direction, the corresponding arm is moved in a counterclockwise direction. However, the stems or pins are pressed against the arms by springs as 60 which permit the pins to separate from the arms 51, 53, and 57 when the corresponding handle is moved in a clockwise direction. When any of the handles are set in a clockwise direction, the pins become spaced apart from the corresponding arm, and the corresponding arm remains stationary until it is picked up by the stem or pin in the normal operation of the timer.

The disk 52, as before stated, is connected to the timer shaft 1 to rotate therewith. It has an annular flange 61 formed with notches at its edge 62 and scales along the notches. The notches coact with a so-called offset arm 520 adjustable along the notches to adjust the timer at one intersection relative to that at another so that the green signal will be offset or occur say ten seconds after the green signal at the preceding intersection. This feature forms no part of this invention, but is the subject matter of the system application 460,771. The shaft 1 is connected to a motor through suitable gearing, as in said application 460,771.

As seen in Figure 11, the follower 19, which coacts with the cam 12 which operates the contact arm 21, is pivoted at 70 to a suitable support 71 and is acted upon by a spring 72 which tends to hold the follower 19 against the cam, and the follower 20 is pivoted on the same pivot 70 and is pushed against the cam by a spring 73, the spring 73 being stronger than the spring 72. The follower 20 also has an arm 74 thrusting against the follower 19. The construction is such that when the follower 20 is being acted upon by a high point of the cam 12, the follower 19 is free to enter a valley of the cam 12 being pressed by the spring 72 and carry the contact

22 into engagement with the contact 23, but when the follower 20 enters a valley of the cam 12, the spring 73 being stronger than the spring 72 will force the follower 19 outwardly away from the cam, and cause the contact 22 to engage the contact 24.

The followers for the other cams are illustrated in Figure 12 in connection with the section 13^b of the cam 13. 75 designates the follower carried by a block 76 pivoted at 77 to a suitable support 78 and being pressed by a spring 79 against the cam. The block 76 carries the contact arm 30 which has a double contact 31 coacting with the contacts 32 and 33. The spring 79, when it is free to do so, compresses the follower 75 into the valley and causes the arm 30 to engage the contacts 31 and 32. When the follower 75 is pressed outwardly by the high point or lobe of the cam, the arm 30 is actuated to engage the contacts 31 and 32. The construction of the follower coacting with the cam 14^a is similar to that shown in Figure 11.

During the rotation of the timer shaft 1, the current passes from the terminal or binding post 45 which is connected to one side of the feed circuit, through the wire, to the double contact 22. Assuming that the contact arm 21 has been actuated by the cam 12 to engage the contact 23, then the current passes through the contact 23, binding post 34 and thence to the red lights on the cross street, and also through a conductor to the double contact 31 which has been actuated by the cam 13 to engage contact 33 so that the current passes to the binding post 36, thence to the green lights on the main street. After the green lights have been displayed a predetermined period and while contact 22 is still held by cam 12 engaged with contact 23, the cam 13 actuates the contact arm 30 to carry the contact 31 into engagement with the contact 32 so that the current flows to the amber signals on the main street following the green signal. Thus, while red is displayed on the cross street, green is displayed on the main street, and the intermediate amber signal is displayed on the main street, before the red on the cross street changes to green. As the cam shaft continues to rotate the cam 12 shifts the contact arm 21 to carry the contact 22 into engagement with the contact 24 so that red is displayed on the main street through the binding post 42, this binding post being connected to the contact 39 controlled by the cam 14 engaging the contact 39 controlled by the cam 14 engaging the contact 39 with the contact 41, thus through the binding post 44 displaying green on the cross street while red is displayed on the main street. Thereafter, the cam 14 actuates the contact 39 into engagement with the contact 40 and

through the binding post 43 displaying amber on the cross street before the change from green to red on the cross street. This cycle is repeated as long as the timer is in operation.

The cam section 12^a is thus one section mounted on and rotatable with the drive shaft 1. 12^c is a second cam section rotatable with the sleeve shaft 2 and located alongside the section 12^a or the lobe 15 thereof to form a single adjustable cam therewith.

13^a is a third section connected to the first section 12^a as by a yoke 28. 13^b is a fourth section mounted on the sleeve shaft 3 adjacent the third section 13^a and together therewith and with a sixth section forming another cam.

14^a is a fifth cam section mounted on the sleeve shaft 4 and connected to the sixth section 14^b as by a yoke 38, and located adjacent the third section 13^a and fourth section 13^b.

The first and second sections 12^a, 12^c, constitute one cam; the third and fourth sections 13^a, 13^b, and sixth section 14^b, constitute another cam, and the fifth section 14^a a third cam.

12^b is a seventh section which is rotatable relatively to all the shafts 1, 2, 3, and 4, and merely forms a filler or extension between the lobe 15 of section 12^a and the lobe or high portion of section 12^c when these lobes are widely separated or the section 12^b fills the valley between the lobe 15 and the lobes of the cam section 12^c when they are separated by the turning of the shaft 2 relatively to the drive shaft.

What I claim is:

In an electric traffic signal cycle timer, a center drive shaft, and a plurality of nested shafts mounted concentric around the center shaft, three cams mounted on the shaft including a stop cam, and a pair of go and amber cams, each cam including a section mounted on the center shaft, and a section mounted on one of the nested shafts, and the nested shafts being adjustable in a rotary direction relatively to each other and to the center shaft, and means for normally holding them in their adjusted position, whereby the center and nested shafts rotate as a unit, contact arms for controlling the stop, go, and caution circuits having followers coacting with the cams, contacts with which said arms are movable into and out of engagement, and terminals connected to said contacts, one for each, said terminals being connected respectively in the go, stop, and caution circuits, a feed circuit terminal connected to the contact arm actuated by the stop cam, and conductors between the terminals for the contacts with which the stop arm coacts and the contact arms coacting with the go and caution cams.

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