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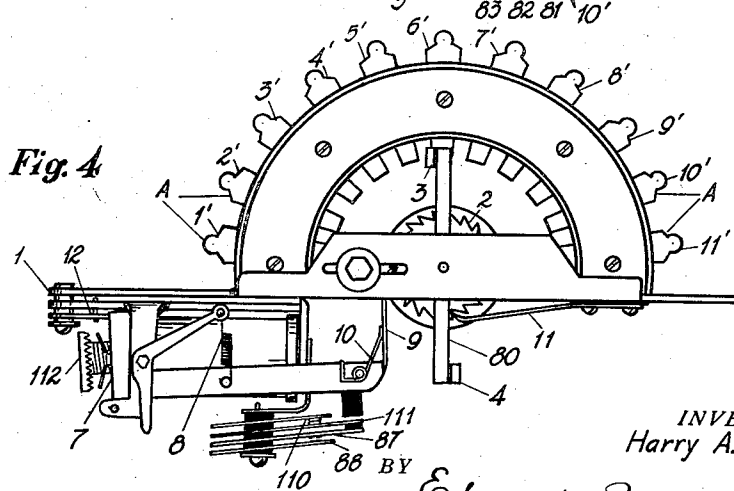
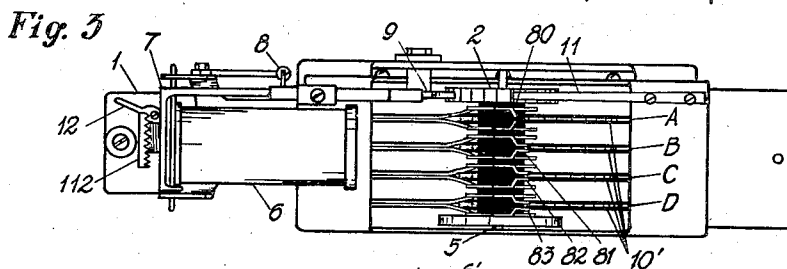
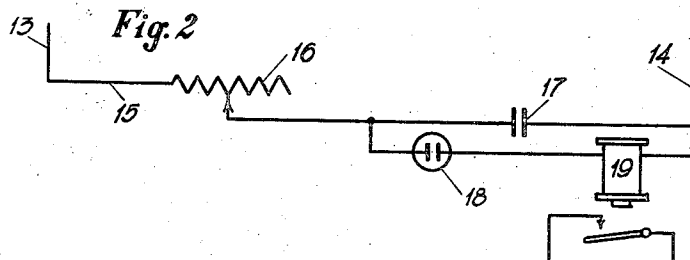
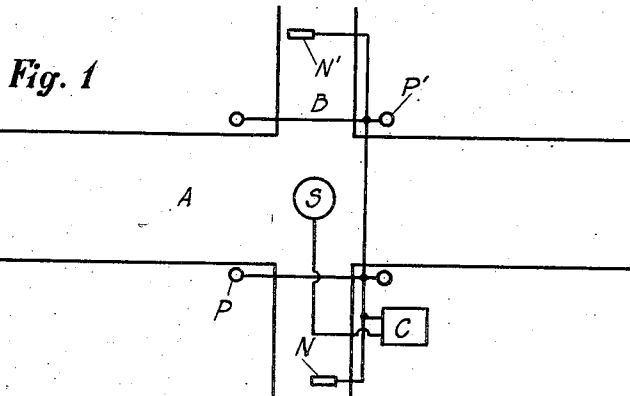
H. A. WILCOX

2,090,655

TRAFFIC CONTROL SYSTEM AND APPARATUS

Filed Oct. 19, 1934

2 Sheets-Sheet 1



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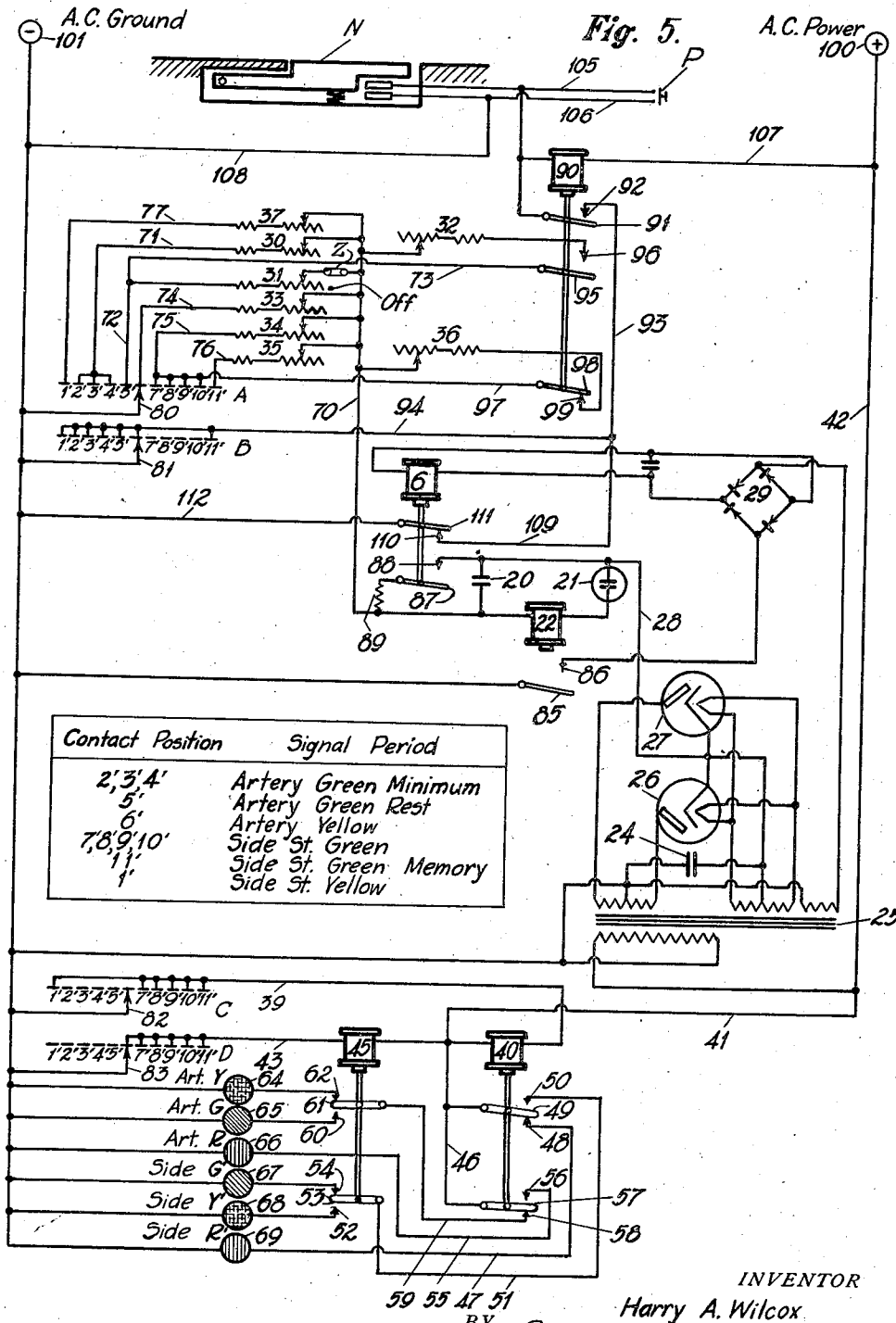
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TRAFFIC CONTROL SYSTEM AND APPARATUS

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,090,655

TRAFFIC CONTROL SYSTEM AND APPARATUS

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Application October 19, 1934, Serial No. 749,032

14 Claims. (Cl. 177—337)

This invention relates to traffic control systems and has for its general object to provide a system of this character and apparatus therefor capable of use in numerous different associations but primarily intended to be employed at the point of intersection of two or more traffic lanes.

One object of the invention is to provide an improved automatic traffic-actuated traffic control system, capable of performing various functions; and specifically, one so constructed as to utilize a single timing circuit.

Another object is to provide a traffic control apparatus in which the right of way period in one street is enlargeable from a minimum and up to a maximum period by traffic actuation on that street during that right of way period, and in which the timing of the minimum, extended, and maximum periods is accomplished by one timing element.

A further object is to provide an arrangement of apparatus so that it will furnish an automatic system to handle expeditiously the passage of vehicular and pedestrian traffic through the intersection, and in which in addition the system will embrace a factor of safety reducing to a minimum the danger of accidents between vehicles or with pedestrians.

Another object is to provide a traffic control apparatus of such design that by a minimum rearrangement or addition of parts different steps of the signal control cycle may readily be added or omitted in order to provide a larger or smaller number of different signal indications or for a large number of separate traffic movements.

A still further object is that of providing an apparatus for traffic control capable of installation in any number of instances, but of especial value at intersections of traffic lanes of unequal dignity. In other words this system is of especial utility where an arterial highway is intersected by a cross street, with the normal flow of traffic along the artery in excess of the flow across the artery.

Another object is to provide an apparatus employing a minimum number of individually simple and ruggedly constructed parts such that the units upon assembling will comprise a system that will be free from electrical and mechanical difficulties over long periods of time.

A further object is that the units of the apparatus shall be manually adjustable to function according to the particular conditions existing at the point of installation of the system.

A still further object is to provide an apparatus

for timing a series of steps in a sequence of operations or conditions with a minimum of moving and wearing parts in which adjustability of the time intervals is provided and rearrangement of the series can be made by simple changes of wiring.

Other objects will subsequently appear.

The invention will be described and explained in connection with the accompanying drawings which illustrate one practical embodiment of the invention, and in which:

Figure 1 illustrates schematically a street intersection with the new and improved system associated therewith;

Figure 2 shows one unit of the timing apparatus;

Figure 3 is a horizontal view of a type of rotary controller or stepping switch associated with the present apparatus;

Figure 4 is a vertical view of the stepping switch; and

Figure 5 is a wiring diagram of the control apparatus.

A self-regulating automatic traffic control system embodying this invention may comprise three parts: a vehicle detecting or responsive device placed in or at the side of the cross street vehicle lanes; a control mechanism including principally an electrical timer in combination with a rotary stepping switch; and a signal-indicating device for informing the traffic in each street when to go and when to stop. A push button or other device may also be provided to permit pedestrians to actuate the control mechanism in a manner similar to actuation by vehicles.

The vehicle-actuated means or detector may be any of several types. It may be of a mechanical nature, as a mechanical switch located in or at the side of the street. Obviously other devices, for instance those detecting by photoelectric sensitive means, or by electrical-magnetic sensitive means, might be used in lieu of the mechanical type. The vehicle and pedestrian actuated devices are referred to broadly in the claims as traffic actuatable controllers or means.

Referring to Figure 1, the function of the control mechanism C is to time the periods of the different signal indications and govern the change of indications of the signal S, its operation being initiated or modified by actuation of the vehicle or pedestrian responsive devices, so that the right of way is in effect under the joint

control of the traffic responsive devices and the time control mechanism.

Some features of the operation of the control system in handling traffic conditions may be described briefly as follows.

Assume, for example, there are no vehicles approaching on the cross street designated by B. Then right of way will be indicated to the highway designated by A. If a vehicle approaching on the side street B now operates the actuating means, the control mechanism, after causing a suitable warning signal to be displayed, causes the transfer of right of way to B street, and vehicles approaching on B street may cross the intersection. The duration of B street right of way is dependent upon the amount of cross traffic as traffic actuation during the B street right of way period may extend this period, yet the period never exceeds a pre-established maximum, nor falls below a pre-established minimum, these limits being provided by the control mechanism.

Vehicles actuating the detecting means in B street so near the end of the side street right of way period that they do not have sufficient time to cross the intersection affect the control so that right of way will eventually be returned to B street without requiring additional actuation of the B street actuating means.

Whenever the right of way is transferred to the highway it must remain on the highway for at least a certain minimum period before it can again be transferred to the cross street. This is accomplished by providing a timer mechanism which starts timing as soon as the right of way is accorded the highway, and before the end of this period actuation of the side street detector cannot cause interruption of artery right of way.

In some installations it is desired to provide periodic shifting of right of way to the side street within reasonable intervals even though there are no vehicles waiting which have actuated the detector residing in street B. For this purpose there is provided a timing mechanism which begins to time at the conclusion of the artery minimum period mentioned above, provided no actuation of the street B detecting means has occurred since the last side street green period. Upon the termination of this timed period, right of way is transferred to the side street, and the signal indications are shifted through their cycle as described above, with the right of way returning to the main highway.

While the general features of a self-regulating automatic traffic control system embodying this invention have been described above, and it has been shown that the invention may be comprised of three interconnected parts, the construction of one complete and specific system embodying the invention will now be described in detail.

In Figure 1 of the drawings there is shown the essentials of a complete self-regulating system applied to intersecting streets A and B. A represents the highway and B the cross street. Vehicle actuated means N and N' are located in the cross street only. They may be of the type shown in illustrative fashion or may be of some other suitable design. In the type illustrated, pressure operated switches in the pavement units are operated by the weight of vehicles traversing them, but any other form of device which will control an operating circuit upon the approach of a vehicle to the intersection may be employed.

The control mechanism C is located conveniently near the intersection. A signal device is indicated at S, which may comprise a housing in which colored lamps, lenses, and/or reflectors may be employed to display, for instance, green, red, or yellow, indicating respectively right of way (go), interruption of right of way (stop), and an impending change in right of way in the main and cross streets (caution). These signal lights are indicated in Figure 5 by units 64-69.

Referring to Figure 5, a circuit diagram of the controller, the type of timing mechanism shown includes a condenser 20, adjustable resistances 30-37, inclusive, glow discharge tube 21, and relay 22, and employs the familiar principles of timing by the charging of a condenser through a resistance to the ignition voltage of a glow discharge tube.

The fundamentals of the timing circuit are shown in Figure 2. Referring to this figure, it is seen that when a source of voltage supply is connected between wires 13 and 14 current flows through lead 15, adjustable resistance 16, condenser 17. Thus the voltage of the supply is applied to condenser 17, through the resistance 16, and the voltage of the condenser begins to build up at a definite time rate determined by the size of the condenser 17 and the value of the resistance 16. Shunting condenser 17 is a circuit including a glow tube 18, and a relay 19. The glow tube comprises a bulb containing a suitable gas into which the electrodes extend. This tube has such a characteristic that it is normally non-conducting, but when the voltage across its terminals rises to a certain critical or threshold value, the gas ionizes and becomes a good electrical conductor, and will not become non-conducting again until the voltage across its terminals has dropped considerably below the critical ionizing voltage. The voltage of the supply is greater than the critical value of tube 18. When condenser 17 has accumulated a voltage equal to the threshold value of discharge tube 18 the circuit through the tube and relay 19, paralleling the condenser, suddenly becomes conducting and relay 19 is energized. The interval elapsing between the application of supply voltage to leads 13 and 14, and the operating of relay 19, is the period timed by the mechanism. By suitable adjustment of the resistance 16 any desired interval may be obtained. The resistance 16, which is representative of elements 30-37, inclusive, in Figure 5, is manually adjustable and may be arranged to be varied between its minimum and maximum values either smoothly or in steps, as desired. The above description shows only the fundamentals of the timing mechanism and the details may be varied considerably as will be explained later.

When the present device is installed and connected to an alternating current supply of power, direct current for use in the timer circuit may be obtained, in the absence of a ready source, from the alternating current supply by any of the numerous well-known means, one of which is disclosed herein, for the sake of illustration.

From suitable taps and coils on the secondary side of transformer 25, rectifier tubes 26, 27, are operated to furnish the proper voltages of direct current. A filter condenser 24 maintains a near-constant voltage value. Where direct current is available, however, the transformer 25 and rectifier units 26, 27, and 29 can be elim-

inated, and lights, relays, and timing circuit may be arranged to operate from suitable D. C. supply voltages.

Before describing the details and operation of the time control mechanism, one portion of it, the rotary stepping switch, a satisfactory embodiment of which is shown in Figures 3 and 4 will be reviewed. This rotary switch is of the general type familiarly known and frequently used in telephone practice. Referring to Figure 3, on the frame 1 is rotatively mounted a spindle 5 to which is secured a ratchet wheel 2, (see Figure 4) and four pairs of wiper arms, 80—83 inclusive. Each pair of wipers, 80, 81, 82, 83 is arranged to pass over one of the corresponding banks of contacts, A, B, C, and D respectively, each of which is comprised of eleven contact points 1'—11'. The several contacts in each bank are arranged in a semi-circle in the same plane, and the several banks and their corresponding wipers lie in parallel planes. The location of the eleven contacts in each bank is such that when the end of one wiper 3 is rotated off the eleventh and last contact, the other contacting arm 4 of each pair comes into engagement with the #1' contact. Wiper arms 81, 82, and 83, on banks B, C, and D, are of the bridging type; that is they are so designed that when stepping from one contact to the next they will momentarily engage the latter before they are out of engagement with the one from which they are passing, and thus their circuits are held closed during the movement. Additional banks and wiper arms may be added if desired, and a larger or smaller number of contacts in the banks could be employed.

When the magnet 6 is energized, armature 7 is attracted, forcing the free end of the armature downward against tension in spring 8, advancing pawl 9, which under pressure of spring 10 engages another tooth on ratchet wheel 2. The adjustable screw 112 serves to limit the amplitude of movement of armature 7. Ratchet wheel 2 is prevented from retrogressing by detent 11. When magnet 6 is de-energized, the free end of armature 7 is forced upward by spring 8 until the armature comes into contact with a backstop 12. This movement of the free end of the armature 7 causes pawl 9 to rotate the ratchet wheel 2 into engagement with the next contact. Energizing and de-energizing the magnet 6 causes the operation to be repeated each time.

In Figure 5 the wiper arms of the electrical switching device are represented by arrows, which for convenience are shown in the 6th contact position. Each of the eleven contacts located in each bank of contacts corresponds to a position in the cycle of the control mechanism as it causes the display of suitable indications by the signaling means for the control of traffic movement. Obviously the invention is not limited to the signals or indications illustrated; there can be many other arrangements of the indications displayed while the wiper arms are in any particular position on the contact banks, in lieu of the arrangement herein, without departing from the spirit of the invention. A table of wiper contact positions and corresponding signal periods is given in connection with Figure 5.

Operation of the apparatus through its cycle follows. Assume, for instance, that wiper arms are engaging contact #2' on each bank. In this position no connection is made on either bank C (Fig. 5) or bank D of the rotary line switch, leaving the circuits through lead 39, relay 40, lead 41, lead 42, to A. C. power source 100, and

through lead 43, relay 45, lead 41, lead 42, to terminal 100 disconnected from A. C. ground 101 at their corresponding wiper contacts 82 and 83. Both relays 40 and 45 will thus be de-energized, armature 49 will engage contact 43 and current will flow from lead 41, through lead 46, armature 49, contact 48, lead 47, and side street red light 69 to A. C. ground 101; also from lead 46, through armature 57, contact 58, lead 59, armature 61, contact 60, artery highway green light 65, to A. C. ground 101. The traffic signal will accordingly display green on the artery and red on the cross street.

From the rectifier unit 26, 27, and lead 23, meanwhile, a current charges condenser 20, through lead 70, "artery green minimum" resistance 30, lead 71, contact #2' on timing bank A, wiper arm 80, to ground 101 which is connected to the other side of rectifier 26, 27. The voltage of the condenser 20 begins to build up at a rate determined by the size of resistance 30, and, as described above, when this voltage equals the critical value of tube 21, the circuit through the tube and relay 22 which parallels the condenser, suddenly becomes conducting and relay 22 is momentarily energized by the discharge of the condenser through it. The operation of relay 22 closes armature 85 against contact 86 and permits current from a secondary coil of the transformer 25 momentarily to flow through a rectifier 29 or other embodiment of controlled source of power, to operate momentarily the rotary switch motor magnet 6. Upon being energized and de-energized, magnet 6 notches over the wipers 80—83 inclusive to engagement with their corresponding contacts #3' on their respective contact banks. Operation of magnet 6 also closes armature 87 against contact 88 shunting a small resistance 89 across the terminals of the condenser 20, discharging the latter. Thus the condenser upon recommencing to be charged will have borne over no residual charge from the period previously timed, and the mechanism will accurately measure time from the instant the charging circuit is closed.

Vehicle-actuated devices, or detectors N, N', are placed in the paths or lanes of vehicles approaching the intersection on the side street as indicated in Figure 1. Push buttons, P, or in lieu thereof other suitable means by which pedestrians who wish to cross the street may register their presence, and the vehicle detectors are all preferably connected in parallel, and for simplicity of illustration only one such circuit closer of each kind has been shown in Figure 5. Closure of any one of the devices closes a circuit between wires 105, 106 energizing relay 90 by a circuit from A. C. source 100, lead 42, lead 107, relay 90, wires 105, 106, lead 108, and terminal 101. Relay 90, by virtue of a circuit through contact 92 and armature 91, locks-in through lead 93, lead 94, contact #3' of lock-in bank B, wiper arm 81, to ground 101. Since bank B has bridging type wipers the circuit through it is held closed during the movement of its wiper between contacts connected to lead 94, the lock-in circuit will remain closed until the wipers are advanced to the first side-street green position #7'. In this manner the presence of side street vehicular or pedestrian traffic approaching the intersection is "remembered" by the control mechanism, until right of way is accorded to it.

Considering once more the rotation of the wiper arms, the line switch motor magnet 6 upon the momentary closure of circuit through the tube

21 and relay 22 has advanced the wipers from position #2' to position #3'. Positions #3' and #4' are also timed by current through the same resistance as period #2', resistance 30, and connections on the contact banks of the line switch are also the same as in position #2', so that the conditions and operations of the device described above are repeated. If desired, these three positions #2', #3', and #4' could be replaced by a single period timed by a resistance three times the value of resistance 30. By using three periods, the total timing for any period, and consequently the size of the resistance needed, is appreciably reduced. It will be seen that the total of periods 2', 3', 4' constitutes a minimum artery green period, the purpose of this period being to prevent too frequent interruption of artery right of way and also to permit any vehicles which have been stopped on the artery during the preceding side street green period to accelerate and clear the crossing.

Upon the conclusion of each of these periods, when circuit through the glow discharge tube 21 is completed momentarily the energizing and de-energizing of the motor magnet 6 notches forward the wipers to the next position in the manner aforescribed.

Position #5' may conveniently be termed the "artery green rest" position, since the control mechanism in this position rests in the absence of actuation of the traffic actuatable controllers unless the periodic call feature is set to operate as described below. In this period light relays 40 and 45 remain de-energized, continuing the display of side street red and artery green. If the periodic call feature is set to operate and if no vehicle or pedestrian has arrived and actuated a detector within a pre-determined, usually reasonably long interval, the period is terminated without detector actuation. Under these conditions if no side street actuation has caused relay 90 to lock-in, current for the charging of the timing condenser in this period will flow from wiper 80, contact #5' on timing bank A, lead 72, "periodic call" high resistance 31, lead 70, and condenser 20. Thus, after a reasonably long period of time determined by the setting of adjustable resistance 31 the condenser will charge up and the line switch will advance its wipers in the manner previously described. If relay 90 has been locked-in by actuation of a detector, however, a circuit shunting high resistance 31, is closed by engagement of contact 96 by armature 95, and the condenser is charged through lead 73, armature 95, contact 96, and small resistance 32. Thus condenser 20 rapidly is charged to the critical value of tube 21, and the wipers are advanced by the notching of the line switch motor magnet described above.

Periodic call may be eliminated by placing switch Z, of the circuit through the adjusting arm of resistance 31, in the "off" position shown in Figure 5 as a point designated "off" beyond the end of the resistance, in which case there will be no connection between wire 70 and wire 72 in this position via resistance 31, and the only remaining circuit to charge the condenser in this position #5' is via armature 95 of relay 90 so that the green on the artery highway will remain indefinitely until a side street detector actuation is received. Under this condition the condenser 20 remains open circuited until relay 90 is energized by actuation, and the timer circuit through the resistance 32 is completed by armature 95 and contact 96.

In position #6' connection is made on bank D

through wiper 83, lead 43, relay 45, lead 41, energizing the relay 45. Relay 40 meanwhile continues de-energized. Current flows through the leads 42, 41, 46, armature 57, contact 58, lead 59, and armature 61, contact 62, artery yellow unit 64, while artery green unit 65 is extinguished by the separation of armature 61 and contact 60. Side street red unit 69 remains energized as in the preceding position. The timing in period #6' is determined by the charging of the condenser through resistance 33. When the condenser is charged to the critical value of the tube 21, motor magnet 6 is energized and de-energized advancing the wipers one step as described above.

Positions #7' through 11' and their corresponding periods provide a green indication on the side street; the total duration depends upon the amount of traffic on the cross street but never exceeds a pre-established maximum nor falls below a pre-established minimum. By a connection made on bank C in periods 7' through 11' relay 40 is energized through leads, 42, 41, relay 40, lead 39 bank C, wiper 82, ground 101. Relay 45, operated in the preceding period, continues energized. Current now flows through armature 49, contact 50, lead 51, armature 53, contact 54, to illuminate the side street green unit 67, which replaces the side street red unit 69. Through armature 57, contact 56, lead 55, artery red unit 66, is illuminated.

The total length of these five periods may preferably be approximately the time required for a single vehicle waiting on the side street to cross the intersection. Under this condition the timing condenser 20 is charged in each period 7'-10' inclusive through wiper 80, lead 97, armature 98, contact 99, and a small resistance 36 in parallel with high resistance 34, and in period #11' by a similar resistance 35. When the voltage of the condenser reaches the discharge voltage of the tube 21, the wipers are advanced to the next position as shown above. The timing of the periods 7' to 11' in this manner constitutes the side street minimum green period.

It will be noted that in periods 7' to 10' there is no connection between the lock-in bank B and the lock-in circuit in wire 94, so that when N or P is actuated, relay 90 is locked-in only through lead 93, lead 109, contact 110, armature 111, lead 112, ground 101. Each time the wipers are advanced by the notching of the stepping magnet, relay 90 is allowed to become de-energized by breaking this circuit at armature 111. Thus the first vehicle actuating the detector during each period from 7' to 10' inclusive causes relay 90 to become locked-in by means of the circuit through the line switch contact 110, and armature 111, until the end of the period in which actuation occurs. Energizing relay 90 breaks the charging circuit through the small resistance 36 between armature 98 and contact 99, and the condenser 20 is then charged through a lead 75, and larger resistance 34, so that the side street green period is prolonged to provide further time for the actuating vehicle or pedestrian to clear the intersection. Thus the additional resistance 34 can be inserted in the charging circuit in each side street extendable green period, 7' to 10' inclusive, if side street traffic actuates a detector in these periods. It thus appears for instance that the first side street vehicle receives a certain length of time to cross and other vehicles approaching the intersection cause an extension of this side street green time which varies with the number of vehicles causing it, 75

until period #11' is reached. If crossing traffic is heavy so that actuation occurs in every one of the periods 7' to 10' or is practically continuous during these intervals each period 7' to 10' will have the maximum extension and the total of periods 7' to 11' inclusive will under these conditions constitute the maximum side street green period.

Obviously if the traffic on the cross street is approaching continuously, or if some vehicle arrives at the end of period 10', some vehicle will lose the right of way before it has had sufficient time to cross the intersection. The specific function of the machine during the last side street green period, #11', is to retain the effect of actuations of such vehicles so that the system remains in such a condition that without further actuation right of way will revert to street B at the end of the highway minimum period. The effect of detector actuation during this period will be retained since relay 93, when energized, will be locked-in by a circuit through armature 91, contact 92, lead 93, lead 94, contact #11' of lock-in bank B, wiper 81, to ground 101. Since connection is made on bank B during all positions from #11' until the first period of side street green, and the wiper arm on bank B is of the bridging type, relay 93, once energized, will remain locked-in until the waiting car is allowed to cross.

In position #11' the timing condenser is charged through a circuit from wiper 80, contact #11' of timing bank A, lead 76, resistance 35, and lead 70. In the manner described above, the line switch wiper arms are advanced to engage contact #1' on each bank when the condenser has charged to the threshold value of tube 21.

In position #1', connection on bank D is open and connection on bank C is made so that relay 45 is de-energized and relay 40 remains energized. Thus side street green is extinguished and yellow is illuminated for the reason that armature 53 breaks circuit with contact 54, and makes contact with contact 52, completing a circuit through side street yellow unit 68. Artery red unit 66 remains illuminated by the circuit through armature 57, contact 53 and lead 59. The charging circuit is closed in this period through lead 77, resistance 37, lead 70. Condenser 20 will charge up to the critical voltage of tube 21 when the condenser will discharge, and the notching operation will proceed again as described previously, shifting the wiper arms from position #1' to position #2'. The condition described at the beginning of the cycle having been reached, the condenser once again begins to be charged through resistance 30. While the signal circuits are illustrated and described above as being under the control of relays operated by the contacts of one of the banks on the rotary switch it is obvious that an additional bank or banks of contacts may be provided and the signal circuits connected directly to the banks.

Each of the resistances 30 to 37 inclusive which determine the charging rate of the condenser 20 can be adjusted manually by turning a rheostat dial, one of which is associated with each of the resistances. If the supply voltage remains constant and a discharge tube of proper value is employed for tube 21, the time required for the condenser to become charged to critical voltage will be approximately directly proportional to the size of the charging resistances. Therefore the dials may be marked in units of time, as

seconds required for charging the condenser for a particular setting of the rheostat.

It will be seen from the above that once started the timing condenser 20 always is charged without interruption to the flash voltage of the glow discharge tube 21, even in the rest position, #5', when the interruption occurs before the start of the timing. Thus voltage across the condenser never at any time exceeds the value of the flash voltage of glow discharge tube 21, even when the impressed charging voltage of the line is much greater.

From the foregoing it will be seen that by means of the present invention a traffic control system, comprised of vehicle and pedestrian actuated control means, signal display means, and controlling means, consisting principally of a single timing device and a type of rotary step by step controller, is provided which will in an efficient manner care for the different traffic conditions described; and that a control mechanism is provided that can be readily assembled from a few rugged and well known parts.

It will further be seen that with minor wiring changes a number of different sequences of signal indications can be obtained, and that this design of control mechanism lends itself readily to change of or addition to the sequence of signal indications to meet the needs of different types of traffic lane intersections.

It will be understood that the above description and the drawings are illustrative of one embodiment of the invention, that the invention is capable of use in a wide variety of conditions, and that considerable departure may be made from the details of construction shown without departing from the spirit of the claims.

Having described my invention what I claim as new and desire to secure by Letters Patent of the United States is:

1. A traffic control system for interfering traffic lanes including signalling means to accord and interrupt right of way in the said lanes, a traffic actuatable controller in one lane, and a right of way transferring mechanism connected to said signalling means and said controller, said mechanism including a timed electrical switching device, the latter having a series of contact positions and corresponding timed intervals during which right of way is displayed to the lane of the controller, a time controlled circuit connected in each of such contact positions to provide a unit time interval having a minimum value therefor in the absence of controller actuation during such unit interval, including means operated by actuation of said controller within the interval to enlarge said interval.

2. A traffic control system for interfering traffic lanes including signalling means to accord and interrupt right of way in the said lanes, a traffic actuatable controller in one lane, and a right of way transferring mechanism connected to said signalling means and said controller, said mechanism including a timed electrical switching device, the latter having a series of contact positions and corresponding timed intervals during which right of way is displayed to the lane of the controller, and means to control the time interval in each of such positions to provide a minimum interval in the absence of controller actuation during such interval, said last named means including means operable by actuation of the controller at any time within such minimum interval to produce an enlargement of the interval

proportional to that part of the minimum interval remaining at the time of actuation.

3. A traffic control system for interfering traffic lanes including right of way indicating means for signalling right of way to one lane at a time, a traffic actuatable controller in one lane, a timer and an electrical switching device having a series of contact positions and corresponding timed intervals, connected to said indicating means and traffic actuatable controller means, for indicating right of way to the lane of the controller for the duration of a series of the timed intervals, means connected to said timer and operable by actuation of the controller within any of the intervals to produce a single extension of the remainder of that interval irrespective of the number of actuations which may occur within that interval and consequently to produce a limited extension of the total right of way period.

4. A traffic signalling system for interfering traffic lanes having in combination an indicating device for according and interrupting right of way in said lanes, a traffic actuatable controller, and a right of way transferring mechanism connected to said indicating device and to said traffic actuatable controller, and said transferring mechanism comprised of a timer and electric switching device having a series of timed intervals during which right-of-way to one lane is displayed, means operable in each of said intervals by actuation of the controller within the interval to produce an extension of the remainder of same interval and consequently of the total right of way period and means to prevent more than one such extension in any one interval.

5. A traffic control system for interfering traffic lanes including signalling means to accord and interrupt right of way in the said lanes, a traffic actuatable controller in one lane, and a right of way transferring mechanism connected to said signalling means and said controller, said mechanism comprised of an electric timer, and an electrical switching device, the timer having a condenser and means including resistance to charge the condenser to a certain potential to time a desired period, and said electrical switching device having a series of arcuately spaced contact points, a contacting arm to successively engage said contacts, driving means including a magnet for advancing said arm one position upon the completion of each timing operation, said mechanism being cooperable with said signalling means and said controller to indicate right of way to the lane of the controller for a series of timed periods, the length of each period depending upon the value of resistance in the charging means, and means operable by actuation of said controller during each contact position to increase said resistance.

6. A traffic control system for interfering traffic lanes having, in combination, a signalling means to accord and interrupt right of way in said lanes, a right of way transferring mechanism and a traffic actuatable controller in one lane, said right of way transferring mechanism connected to said indicating means and controller means, and comprising a timer and an electric rotary switch having a series of contact positions, said timer and switch mutually cooperable to time an interval for each of the contact positions of said series, while right of way is accorded to the lane of the controller, and means operable in each interval to store the effect of the first controller actuation within said interval to enlarge

only the remainder of said interval following such actuation.

7. A traffic control system for interfering traffic lanes including signalling means to accord and interrupt right of way in the said lanes, a traffic actuatable controller in one lane, and a right of way transferring mechanism connected to said signalling means and said controller, said mechanism including a timed electrical switching device, the latter having a series of contact positions and corresponding timed intervals during which right of way is displayed to the lane of the controller, and means to control the time interval in each of such contact positions to provide a minimum interval in the absence of controller actuation during such interval, and including means operable by actuation of the controller within such minimum interval to enlarge the interval up to a predetermined maximum, and means for preventing more than one of such enlargements in each of said intervals, thus providing a maximum limit to duration of right of way in said lane.

8. A traffic control system for interfering traffic lanes including signalling means to accord and interrupt right of way in the said lanes, a traffic actuatable controller in one lane, and a right of way transferring mechanism connected to said signalling means and said controller, said mechanism comprised of an electric timer, and an electrical switching device, the timer having a condenser and means including a resistance to charge the condenser to a certain potential to time a desired period, and said electrical switching device having a plurality of contacts and corresponding contact positions through which it is adapted to operate cyclically, means responsive to said certain potential on said condenser to so operate said device from one position to another in its cycle, said mechanism being cooperable with said signalling means and said controller to indicate right of way to the lane of said controller for a series of timed periods corresponding to a series of the contact positions of said switching device, the length of each period depending on the value of resistance in the charging means, and means operable in each contact position of said series by actuation of said controller in any one such position to increase said resistance in such one position, whereby the length of the right of way period may be varied by small degrees in accordance with actuations occurring in different positions of said series.

9. In a traffic control system for interfering traffic lanes having signalling means for according and interrupting right of way in said lanes, a traffic actuated controller in one of said lanes, and a timed electric switching device having a series of contact positions through which it is adapted to be stepped intermittently and cyclically, said device including a condenser, means operable upon said condenser being charged to a certain potential to cause said device to step one position in its cycle and momentarily to discharge said condenser, means including contacts on said switching device operating in all except one position of said cycle to charge said condenser over a relatively long time interval in each position whereby said switching device will be automatically stepped intermittently at time periods through all except said one position, said switching device including means for operating said signalling means in such cycle to transfer right of way to said one lane from another lane for a time period and then retransfer right of way to

said other lane for a minimum time period, and means connected for operation by said controller and including a contact operated by said switching device in said one position for charging said condenser over a very short time period in said one position only by actuation of said traffic actuated controller, whereby such cycle of said device for transferring and retransferring right of way will be initiated in said one position only by traffic actuation.

10. A traffic control system for interfering traffic lanes having in combination, a signalling means to accord and interrupt right of way in said lanes, a traffic actuatable controller in one lane, and right of way transferring mechanism for operating said signalling means in accordance with actuation of said controller, said mechanism comprising an electric rotary switching device having a plurality of contacts and corresponding contact positions, a timer having means for controlling its time interval, said timer rotating said switching device normally at minimum time intervals through a series of said contact positions while right of way is accorded to the lane of said controller to determine the total time period of right of way in said lane, means including contacts operating in each of said series of positions and connected to said controller to lengthen said time interval in any position of said series by traffic actuation in any such position and to maintain such interval so lengthened after such actuation, said last named means including a contact operated at each rotation of said switching device from one position to the next by said timer to interrupt said last named means, whereby the time interval in said next position will be a minimum until another actuation.

11. A traffic control system for interfering traffic lanes having in combination, signalling means to accord and interrupt right of way in said lanes, a traffic actuatable controller in one lane, and right of way transferring mechanism for operating said signalling means in accordance with actuation of said controller, said mechanism comprising an electric rotary switching device having a plurality of contacts and corresponding contact positions, a timer having an operating circuit including a resistance for controlling the time interval of the timer, said timer rotating said switching device normally at minimum time intervals through a series of said contact positions while right of way is accorded to the lane of said controller to determine the total time period of right of way in said lane, means including contacts operating in each of said series of positions and connected to said controller to change and maintain so changed the resistance in said operating circuit by traffic actuation in any position of said series to lengthen the time interval in such position, and said last named means including a contact operated as said device is rotated from one position to the next by said timer to interrupt said last named means whereby the time interval in said next position will be a minimum until another actuation of said controller occurs in said next position and the total time period of right of way on said one lane will be varied by relatively small degrees between a minimum and maximum in accordance with the number of actuations occurring throughout said series of positions.

12. A traffic control system for interfering traffic lanes having in combination, signalling means to accord and interrupt right of way in said lanes, means including a relay actuatable by traffic in

one lane, right of way transferring mechanism for operating said signalling means in accordance with actuations of said relay by traffic, said mechanism including an electric rotary switching device having a plurality of contacts and corresponding contact positions through which it is adapted to be rotated cyclically, a timer for rotating said switching device through the several positions in its cycle, said device and timer co-operable to time an interval for each of a series of said contact positions while right of way is accorded to said one lane to determine the time period of right of way, means including contacts on said device operated in each one of said series of positions to vary the time interval of any one position of said series by actuation of said relay in such one position, means including contacts having one condition of operation while said device is in any position of said series to maintain said relay so actuated after any momentary actuation by traffic occurring in said position, and said contacts having another condition to which they are operated as said device is rotated from one position to the next by said timer to interrupt such maintaining of said relay actuated at the end of the time interval in said one position.

13. A traffic control system for interfering traffic lanes having in combination, signalling means to accord and interrupt right of way in said lanes, means including a relay actuatable by traffic in one lane, right of way transferring mechanism for operating said signalling means in accordance with actuation of said relay by traffic, said mechanism including an electric rotary switching device having a plurality of contacts and corresponding contact positions through which it is adapted to be rotated cyclically, a timer for operating said switching device from one position to the next, and said device and timer cooperating to time an interval for each of a series of said contact positions while right of way is accorded to said one lane to determine the time period of right of way, means including a contact on said relay and a contact on said switching device operated in each of said series of positions for increasing the time interval in any position by any actuation of said relay in such position, and a stick circuit for said relay for maintaining the same operated after any momentary actuation and including a contact opened only momentarily as said device is operated from one position to the other by said timer.

14. A traffic control apparatus for interfering traffic lanes having in combination signalling means to accord and interrupt right of way in said lanes, means including a relay actuatable by traffic in one lane, and right of way transferring mechanism for operating said signalling means in accordance with actuations of said relay by traffic, said mechanism including an electric rotary switching device having a plurality of contacts and corresponding contact positions through which it is adapted to be rotated cyclically, an electric condenser, means for varying the charge on said condenser from an initial value to a predetermined value, means responsive to a charge on said condenser of said predetermined value to operate said switching device from one position to the next and restore the charge on said condenser substantially to said initial value, said switching device having a series of said contact positions in which right of way is accorded to said one lane for a time period determined by the total of the time intervals in the several positions of said series, means including a con-

tact on said relay and contact on said switching
device operated in each of said series of positions
for increasing by actuation of said relay in any
position of said series the time rate at which said
5 condenser charge is varied by said charge vary-
ing means in such position, and a stick circuit

for said relay for maintaining the same actuated
after any momentary actuation said circuit in-
cluding a contact opened only momentarily by
said charge responsive means in operating said
device from one position to the next.

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