June 23, 1936. F. G. KELLY, JR 2,044,907

TRAFFIC CONTROL SYSTEM AND APPARATUS

Filed April 23, 1930 2 Sheets-Sheet 1

Fig. 1.

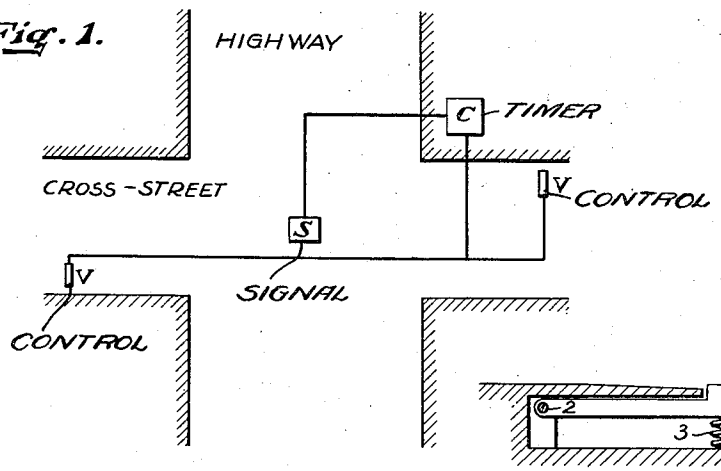


Fig. 2.

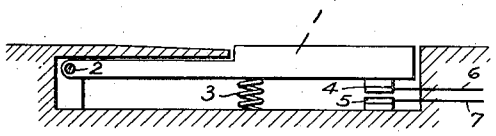
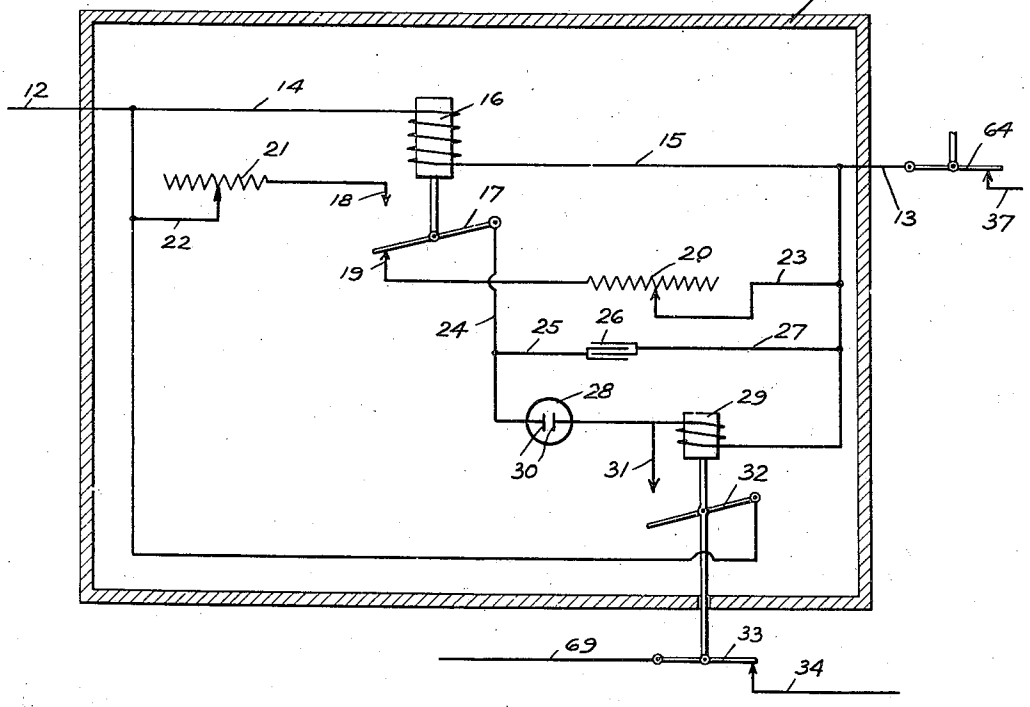


Fig. 4.



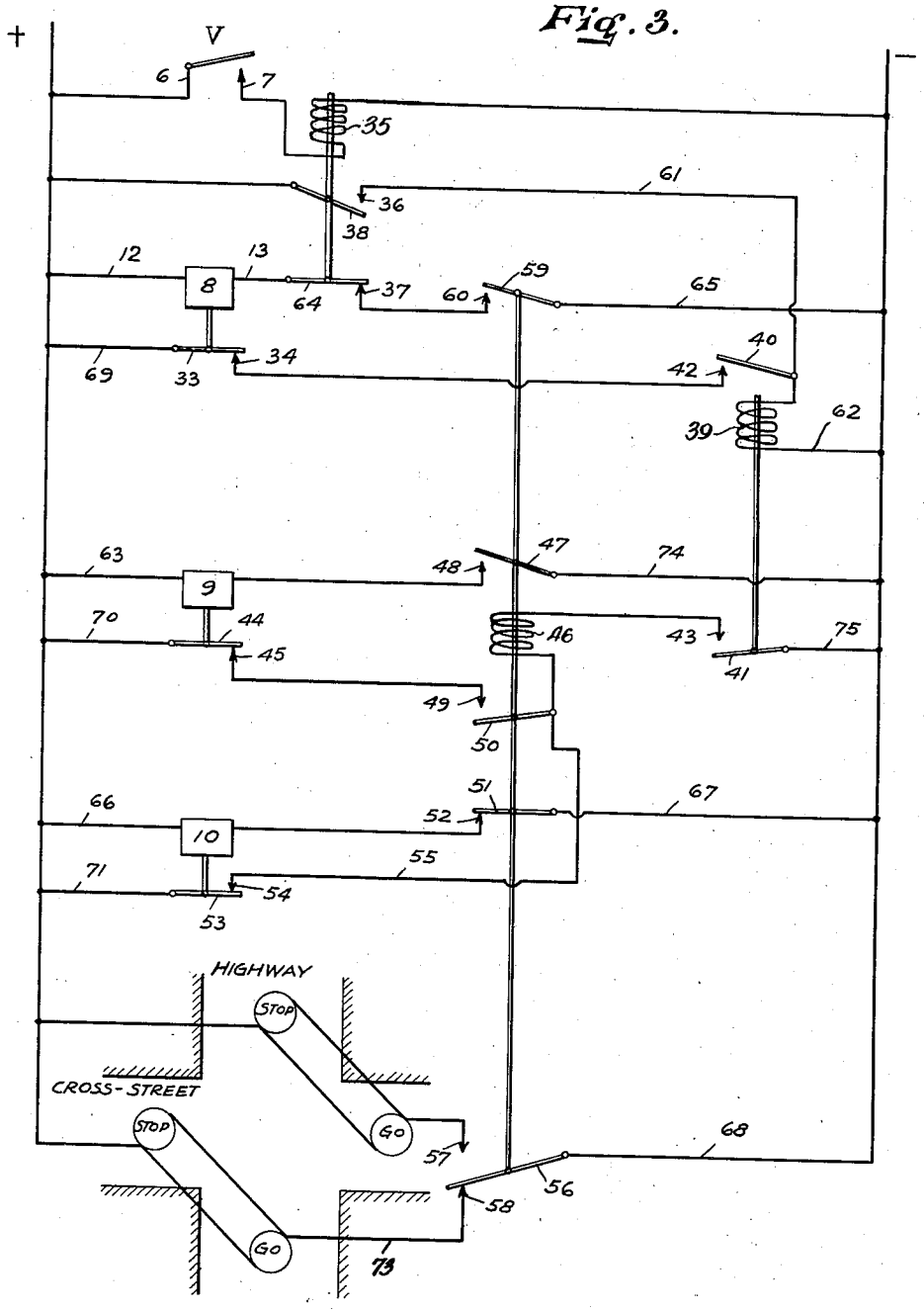
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TRAFFIC CONTROL SYSTEM AND APPARATUS

Filed April 23, 1930 2 Sheets-Sheet 2

Fig. 3.



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UNITED STATES PATENT OFFICE

2,044,907

TRAFFIC CONTROL SYSTEM AND APPARATUS

Frederick Griffen Kelly, Jr., New Haven, Conn., assignor to The Engineering and Research Corporation, New Haven, Conn., a corporation of Connecticut

Application April 23, 1930, Serial No. 446,479

27 Claims. (Cl. 177—337)

This invention relates—according to one aspect—to a functionally and structurally improved timer and—according to another aspect—to a timer of this character combined with a traffic control system.

It is an object of the invention to provide a device and system of this character, the parts of which will be relatively few in number and individually simple and rugged in construction, these parts being capable of adjustment to furnish a mechanism operating exactly in response to predetermined conditions and which mechanism will be free from mechanical and electrical difficulties over long periods of time and will require but a minimum amount of manual attention aside from the fact that its several components may be adjusted with facility to respond to conditions imposed thereon by changes in traffic conditions as they occur from time to time.

A further object of the invention is that of providing a timer which may be employed to advantage in numerous different associations with a view to controlling the functionings of various types of apparatus and which will be of primary value when associated with a traffic control system. Irrespective of such association, it will operate advantageously to automatically provide for a delayed action functioning and will take into account factors modifying such functioning. In association with a traffic control system, the timer will act to cause the same to operate in a more efficient manner, as a consequence of which traffic will be expeditiously handled.

A still further object is that of providing a construction of this nature in which the period of delayed functioning may be varied and in which, moreover, the factor of such functioning may also be varied within predetermined limits.

With these and further objects in mind, reference is had to the attached sheets of drawings illustrating one practical embodiment of the invention and in which:

Fig. 1 illustrates diagrammatically a highway intersected by a cross street and at which point of intersection the traffic is to be regulated;

Fig. 2 is an enlarged sectional side view of a portion of the cross street and showing diagrammatically one form of vehicle actuated control in association therewith;

Fig. 3 is a diagrammatic view of one form of traffic control system combined with a timer constructed in accordance with the teachings of the present invention; and

Fig. 4 illustrates schematically the mechanism of one of the timer units.

Certain features of the present application are disclosed and claimed in my prior Patent 1,909,471, issued May 16, 1933. No claims are made in the present application to such features, the claims herein being restricted to matter not disclosed in the patent.

Primarily considering a traffic control system, it is well understood by those conversant with the art that considerable difficulty has been experienced in connection with automatic signalling for the reason that a signal will be actuated to for example stop the flow of highway traffic and permit the passage of traffic across such highway and over an intersecting vehicle lane.

Obviously, timing provision has been made to permit a vehicle to cross and clear the path of vehicles in the highway lane before the signal has functioned to transfer right of way on the cross street to the highway. In the case of a vehicle standing in the cross street and awaiting right of way, it has been feasible to quite accurately provide for adequate timing after such right of way was granted and before the right of way was transferred back to the highway to allow the vehicle to pass. In the instance of succeeding vehicles, it has also been feasible to operate the timer to provide for additional delay in transfer of the right of way back to the highway. However, this delay period had to provide for an adequate margin of time to allow for the passage of a slow moving vehicle. Most of the vehicles traversing the cross street and obeserving that right of way was presently in their favor would be travelling at such speed that a full delay period would not be necessary for them to negotiate a crossing of the highway. Accordingly, in a large majority of instances, the delay period for which the timer was set provided for right of way on the cross street materially in excess of any reasonable margin necessary for vehicles to cross or turn into the highway and accordingly during this excess period, vehicles would be at a standstill in the highway awaiting transfer of right of way to the latter vehicle lane, and this delay would, aside from mere inconvenience, add materially to the congestion in the highway.

With this in mind, the present invention aims to provide a timer which will provide for a delay period inversely proportional to the speed with which vehicles in the cross lane are approaching the highway. Accordingly, in the case of a slow moving vehicle, the delay allowed for the latter clearing the highway traffic lane may be anywhere up to the maximum delay period, but in the

case of fast moving vehicles, the delay in transferring right of way back to the highway will only be such as is necessary—withwith adequate margin of safety—to allow the faster moving vehicles to either cross the highway or to merge into the traffic flow of the latter.

Figure 1 shows the arrangement of the parts as applied to the intersection of a heavily travelled highway and a cross street. S represents the right of way signal. This may be any one of several types of right of way signals that indicate "Go" to one street while indicating "Stop" to the other, and able to reverse such indications.

Vehicles approaching on the cross street indicate their presence by actuating vehicle actuated devices V placed in the cross street. C represents the controlling and timing mechanism which regulates the right of way signal S according to impulses received from the vehicle actuated devices V.

Fig. 2 shows one form of vehicle actuated device. Ramp 1 is attached at 2 and is forced to an elevated position by spring 3. When the wheel of a vehicle passes over the ramp, the ramp is depressed causing contacts 4 and 5 to touch which completes the circuit between wires 6 and 7. When the vehicle wheel leaves the ramp, spring 3 forces ramp 1 to an elevated position, causing contacts 4 and 5 to separate, which breaks circuit between wires 6 and 7. It will be noticed that the length of time circuit between wires 6 and 7 is closed depends on the length of time a vehicle wheel is on ramp 1, and this depends on the speed of a vehicle. The faster the vehicle is traveling, the shorter will the time of contact be. The two vehicle actuated devices are connected in parallel.

The wiring diagram of the controlling mechanism is shown in Fig. 3. There are shown instantaneous operation relays 35, 39, and 46, and timing mechanisms 8, 9, and 10. When the various relays and timing devices are in the position shown, switch arm 56 touches contact 58 and the highway "Go" signal and the cross street "Stop" signal will be energized through wire 68, armature 56, contact 58 and wire 73.

When a vehicle approaches on a cross street actuating one of the vehicle actuated devices located there, circuit between wires 6 and 7 will be closed and relay 35 will be energized causing it to operate. This causes arm 38 to touch contact 36 and thus closes the circuit through wires 61 to relay 39 and relay 39 operates in that it is coupled to the second power lead through wire 62. Relay 35 is energized only during the time the vehicle wheel is on the vehicle actuated device, and consequently, relay 39 would become de-energized as soon as switch arm 38 separates from contact 36 were it not for the locking circuit consisting of armature 40, contacts 42 and 34, armature 33, and wire 69. This circuit is completed when relay 39 operates. Relay 39 also operates through its armature, the switch 41, thus supplying power from the second power lead through wire 75, arm 41 and contact 43 to relay 46. Power from the first power lead is supplied to relay 46 through wire 71, arm 53, contact 54 and wire 55, and relay 46 operates, providing itself with a locking circuit through arm 50, contacts 49 and 45, arm 44, and wire 70. Relay 46 operates arm 56 through its armature. This extinguishes the highway "Go" signal and cross street "Stop" signal and, through wire 68, arm 56, contact 57 and wire 72, lights the cross street "Go" signal and the highway "Stop" signal. The "Go" signal being given to the cross street, the vehicle approaching there may cross the intersection.

When relay 46 operated it caused arm 59 to touch contact 60, and since contact between arm 64 and contact 37 was reestablished, as soon as relay 35 became deenergized power from the second power lead is supplied to timing mechanism 8 through wire 65, arm 59, contacts 60 and 37, arm 64, and wire 13. Power from the first power lead is always supplied to timing mechanism 8 through wire 12. Fig. 4 shows the detailed wiring diagram of a preferred form of timing mechanism 8, which is of the general type disclosed and claimed in my Patent No. 1,909,471 issued May 16, 1933, and the operation of which is briefly described below.

When current is applied to timing mechanism 8, the energized circuit of relay 16 is completed from the first power lead through wires 12, 14 and 15, and relay 16 operates, causing arm 17 to separate from contact 19 and to touch contact 18. This completes a circuit from the first power lead through wires 12 and 22, adjustable resistance 21, contact 18, arm 17, wires 24 and 25, condenser 26, wires 27 and 13 to the second power lead. Thus, the voltage of the power supply is applied to condenser 26 through resistance 21 and the voltage of the condenser begins to build up at a definite rate determined by the size of the condenser, the resistance 21, and the voltage of the supply. Shunting condenser 26 is a circuit including a glow tube 28 and a relay 29. The glow tube comprises a bulb containing a suitable gas into which electrodes 30 extend. This tube has such a characteristic that it is normally non-conducting, but when the voltage across its terminals reaches a certain critical or threshold value, the gas ionizes and becomes a good electrical conductor, and the tube 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 voltage of tube 28. When the voltage across the condenser has built up to the critical voltage of the tube, the tube suddenly becomes conducting, causing a current to flow momentarily from the condenser 26 through tube 28 and relay 29, causing relay 29 to operate. This would effect only a momentary closure of the relay were it not for the locking circuit consisting of contact 31, arm 32 and the wire extending therefrom, this circuit becoming operative when relay 29 operates. This places relay 29 directly across the supply, and relay 29 remains energized.

The interval elapsing between the application of the supply voltage to the timing mechanism and the operation of relay 29 is the period timed by the mechanism. By suitable adjustment of resistance 21, any desired period may be obtained. When relay 29 operates it causes arm 33 to separate from contact 34, and thus this contact is broken at the end of the timed period.

Relay 29 remains energized as long as supply voltage remains impressed on the timing mechanism. If the supply voltage is disconnected caused by either arm 59 separating from contact 60 or by arm 64 separating from contact 37, the energizing circuits of both relay 16 and relay 29 are interrupted, both relays become de-energized and drop to their de-energized positions. When relay 16 becomes de-energized, it causes arm 17 to touch contact 19. This shunts adjustable resistance 20 across the terminals of condenser 26 through wires 23 and 27, and through wires 25

and 24, arm 17, and contact 19. This discharges condenser 26, the energy stored in condenser 26 being dissipated in resistance 20. The rate of discharge is determined by the setting of resistance 28 and may be any desired value.

While the rate of discharge is determined by resistance 20, the actual amount of discharge, or reset, for a particular setting of resistance 20 depends upon the length of time the supply voltage is disconnected. If this time is long, all of the stored energy will be dissipated in resistance 20. When the supply voltage is re-connected, charging of condenser 26 will start with zero voltage of condenser 26, and the period timed by the mechanism will be the period necessary to change condenser 26 from zero voltage to the critical voltage of tube 28. If this time is short, condenser 26 will not be completely reset and thus, when the supply voltage is reconnected, charging of condenser 26 will start with a voltage of condenser 26 and the period timed by the mechanism will be the period necessary to change condenser 26 from that voltage to the critical voltage of tube 28. The timed period will be shorter by the amount of time that would have been required to change condenser 26 from zero voltage to the starting voltage. It is thus apparent that the amount of reset depends directly upon the length of time the supply voltage is disconnected. It is further apparent that this action takes place in the same manner whether the supply voltage is disconnected before or after the operation of relay 29.

Assume that resistance 21 of timing mechanism 8 is so adjusted that the mechanism will operate in 10 seconds. Timing mechanisms 9 and 10 are constructed with certain exceptions, hereinafter noted, similar to timing mechanism 8. Assume that they are adjusted to operate in 30 seconds. If energized for 30 seconds, timing mechanism 9 separates arm 44 from contact 45, thus opening the circuit. Timing mechanism 10, however, when energized, moves the switch arm 53 into engagement with contact 54, thus closing this circuit.

Referring again to Fig. 3, it will be seen that when relay 46 operates, it operates arm 51, de-energizes timing mechanism 10, which causes arm 53 to separate from contact 54. Relay 46 also operates the armature controlling switch arm 47 which provides a circuit from the power lead through wire 74, arm 47, and contact 48, to timing mechanism 9. Power being supplied to timing mechanism 9 through wire 63, the timing mechanism 9 begins to operate.

The vehicle on the cross street is given 10 seconds in which to cross the intersection. Assuming no further vehicles to approach on the cross street, timing mechanism 8 will, after 10 seconds, operate switch 33, separating it from contact 34 and thus breaking the locking circuit of relay 39. Relay 39 becomes de-energized, causing arm 41 to separate from contact 43. This breaks the energizing circuit of relay 46 and this relay becomes de-energized. In becoming de-energized, relay 46 breaks the energizing circuit of timing mechanism 8 by separating arm 59 from contact 60, and the energizing circuit of timing mechanism 9 by separating arm 47 from contact 48. Both timing mechanisms return to their initial positions, any energy stored in their condensers being dissipated in their respective resistances 20. At the same time, arm 56 comes to bear against contact 58, thus extinguishing the cross street "Go" signal and the highway "Stop" signal and lighting the highway "Go" signal and cross street signal as described above. In addition, arm 51 engages contact 52 and consequently through wire 67, arm 51, and contact 52, power from the second power lead is supplied to timing mechanism 10. The first power lead is always connected by wire 66, and timing mechanism 10 begins to operate.

The "Go" signal is now again given to the highway and traffic on the highway may proceed. The "Go" signal can not be again transferred to the cross street until timing mechanism 10 has operated, causing arm 53 to touch contact 54. This will not happen for 30 seconds. Should a vehicle approach on the cross street before the expiration of this period, relay 39 will lock in as described above, and through wire 75, arm 41 and contact 43, supplying power to relay 46. But when relay 46 became de-energized it interrupted its power-locking circuit separating arm 50 from contact 49, and the only other possible source of power is interrupted at contact 54. Thus relay 46 can not operate to transfer the right of way until after timing mechanism 10 has caused arm 53 to engage contact 54. When this happens, the right of way will be transferred to the cross street as described above. However, if no vehicle had approached on the cross street, the operating of timing mechanism 10 would have no other effect than to leave the mechanism so that right of way may be called by the cross street.

It was assumed above that only a single vehicle approached on the cross street. Should a further vehicle approach closely behind the first, some provision must be made to extend the time during which the "Go" signal is given to the cross street. When the second vehicle actuates one of the vehicle actuated devices, it closes circuit between wires 6 and 7 and causes relay 35 to operate. Relay 35 causes armature 64 to separate from contact 37, breaking the energizing circuit of timing mechanism 8, and timing mechanism 8 begins to reset in the manner described above. It will be noticed that the energizing circuit of timing mechanism 8 is broken for a time, which depends directly upon the speed of the vehicle and, consequently, the amount of reset depends upon the speed of the vehicle. By proper setting of resistance 20, which would be determined by conditions at the intersection, this setting may be made just sufficient to give the second vehicle time to cross the intersection instead of giving it a full, and in this case unnecessary 10 seconds. The faster the vehicle travels, the less the reset, but the less is the time the vehicle requires. The action for additional vehicles is similar. But the system, while giving each vehicle a protection period, does not give a fixed protection period, but gives one commensurate with the speed of the vehicle requiring such a protection period. When traffic ceases on the cross street, timing mechanism 8 will operate and return the "Go" signal to the highway as described previously. It will be understood that there are two actuations for each vehicle, one being caused by the front wheels and the second by the rear wheels. The reset resistance would naturally be adjusted with this in mind.

Of course if traffic approaches continuously on the cross street, the "Go" signal will not remain there indefinitely because, after 30 seconds, timing mechanism 9 operates, breaking the locking circuit of relay 46 by causing arm 44 to separate from contact 45. Relay 46 becomes de-energized and the "Go" signal returns to the

highway. However, relay 39 remains energized, and after the "Go" signal has been given to the highway for 30 seconds the operating of timing mechanism 10 will again energize relay 46 and thus, without requiring any additional actuation of vehicle actuated devices, the "Go" signal returns to the cross street to allow the vehicle or vehicles sufficient time to cross the intersection.

Considering the values given to the several portions of the apparatus, it will be found that the unit 8 will operate in a satisfactory manner if, for example 317 volts are imposed upon the power leads. For a timing of 10 seconds, the resistance 21 should have a value of 1,000,000 ohms; the condenser 26 may have a value of 10 mf.; the resistance 20 may have a value of 10,000 ohms, and the tube 28 may become ionized at a voltage of 200. In the case of units 9 and 10, the resistance 21 will have a value of 3,000,000 ohms which will provide for a 30 second interval before the relays 29 of these units are energized, and in connection with these units, it will be understood that a short circuit for their condensers 26 might be provided by simply eliminating completely resistance 20. However, this is not desirable incident to the burning of the contacts which would occur. For this reason, it is preferred to substitute for the variable resistance 20, a resistance of for example 100 ohms.

Again considering the unit 8, it will be understood that if the vehicle actuated control has a width of for example 10 inches, a vehicle requiring approximately $1/20$ of a second to traverse the plate 1 (in other words a slow moving vehicle) would cause a complete discharge of the condenser 26. Shunting of this condenser through the resistance 20 for lesser periods of time would result in a proportionate reduction of energy dissipation on the part of the latter.

Thus, it will be appreciated that a timer is provided which may be utilized advantageously in numerous different associations but which, according to the preferred embodiment of the invention is combined with a traffic control system. The term timer is employed herein to designate a device for controlling the operation of one or more work circuits or the display of one or more signal indications operated by such circuits between certain determinable time limits. Where combined with a traffic control system—and considering that a system such as illustrated in Fig. 3 is employed—right of way is normally in favor of the highway. In the case of a vehicle approaching on the cross street, this right of way is transferred and is maintained for a period not alone adequate to permit the cross street vehicle to traverse the intersecting vehicle lanes provided by the highway, but in the case of following vehicles will provide for a reset of the timer to furnish a delay period inversely proportional to the speed of movement of such succeeding vehicles. After the last vehicle on the cross street has moved over the highway, the right of way will be transferred to the latter. Of course, if the right of way on the cross street is maintained for a period of time equal to that for which the unit 9 is set to operate, the right of way will be transferred to the highway regardless of the number of vehicles on the cross street, and the system will work automatically to alternately transfer right of way from one vehicle lane to the other and according to the illustrated embodiment the maintenance of this right of way on each vehicle lane will be for a like period. It will, of course, be understood that if the right of way is transferred back to the highway due to a sufficient interval of time having elapsed for the last vehicle on the cross street to have moved across the highway, and if immediately after such transfer, a succeeding vehicle operates one of the vehicle actuated controls, this will result in an energization of the relay 39 to attract the armature 40 thereof to a position at which as soon as the arm 53 engages the contact 54, the relay 46 would operate.

The terms "traffic responsive means" and "traffic actuated means" employed in some of the claims will be understood to represent any device which detects the passage or presence of vehicles or similar elements of traffic in a traffic lane, or roadway, and thereupon transmits an energy impulse or agects a circuit to a control mechanism for signalling or other appropriate purpose.

From the foregoing, it will be understood that among others, the several objects of the invention as specifically aforementioned are achieved. It will, moreover, be understood that numerous changes in construction and rearrangements of the parts might be resorted to without departing from the spirit of the invenion as defined by the claims.

Having described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A traffic control system including, signalling means regulating the flow of vehicles over two intersecting traffic lanes, a vehicle actuated control, a timer connected to said control and to said signalling means, said timer operating in response to actuation of said control to transfer right of way from one to the other lane, and means forming a part of said timer and functioning in response to actuation of said control and during said right of way period to compel said right of way to endure in favor of the lane in which said control is situated, for an amount of time inversely proportional to the speed of a vehicle causing said last mentioned actuation.

2. A traffic control system including, signalling means regulating the flow of vehicles over two intersecting traffic lanes, a vehicle actuated control extending adjacent to one of said lanes, a timer connected to said control and to said signalling means, said timer operating in response to actuation of said control to transfer right of way from one to the other lane, and means forming a part of said timer and functioning in response to actuation of said control and during said right of way period to compel said right of way to endure, in favor of the lane in which said control is situated, for an amount of time proportional to the amount of time a vehicle causing said last mentioned actuation consumes in operating said vehicle actuated control.

3. A traffic control system for interfering traffic lanes, including, in combination, a signalling device, a timer for operating said signalling device so as to accord and interrupt right of way over said lanes, a vehicle actuated controller, said timer including means responsive to actuation of said controller during right of way in the lane of said controller to compel an extension of right of way, and means forming a part of said timer and functioning to cause said extension to be dependent, in inverse relation, upon the speed of vehicles at the time of actuating the traffic actuated controller.

4. A traffic control system including, in combination, signalling means to accord and interrupt right of way over two intersecting traffic

lanes, a traffic-actuated controller disposed in one of said lanes, a timer connected thereto and to said signalling means to operate the latter to transfer right of way from one lane to the other in response to a functioning of said traffic actuated controller and means operable to extend the period of said transfer of right of way, and including means forming a part of said timer and functioning in response to further actuations of said controller and during said right of way period, to compel said right of way to endure for an amount of time proportional to the time of said last mentioned controller actuation.

5. A traffic control system including, in combination, signalling means to accord and interrupt right of way over two intersecting traffic lanes, a traffic actuated controller disposed in one of said lanes, a timer connected thereto and to said signalling means to operate the latter to transfer and retransfer in response to a single controller actuation the right of way in favor of and away from the lane in which said controller is situated, and means operable to extend the period of transferred right of way, and including further means forming a part of said timer and functioning in response to actuation of said controller and during said transferred right of way period, to compel said right of way to endure in favor of the lane in which said controller is situated for an amount of time proportional to the time of said last mentioned controller actuation.

6. A traffic control system for interfering traffic lanes and including, in combination, a signalling device, a traffic actuated controller disposed in one lane, a timer connected to said controller and to said signalling device, and operating in response to a functioning of the former to transfer right of way from one lane to the other lane, said timer including a plurality of units, one of said units retaining right of way indication in favor of one lane for a period of time, another of said units preventing retention of right of way in favor of the other lane and in excess of a certain period and a third of said units establishing the minimum period of time during which right of way is accorded to said latter lane by said signalling device, said latter unit functioning in response to actuation of said controller and during the right of way period of said latter lane to permit right of way to continue in favor of the lane in which said controller is situated, for an amount of time proportional to the time of said last mentioned controller actuation.

7. A system for controlling traffic, including a signalling means to be visible to traffic approaching over either of two intersecting lanes, said signalling means normally indicating right of way in favor of one lane, said lane having no traffic controlled means, a traffic controlled means solely for use in connection with the other lane and to be operated by traffic approaching the intersection over such latter lane, a governing mechanism connected to and functioning in response to an operation of said control means and in turn connected to said signalling means to cause the latter to transfer right of way from one lane to the other and thereupon to automatically retransfer such right of way, and means forming a part of said governing mechanism and functioning in response to a second actuation of said control means during the period of transferred right of way to prevent automatic retransfer of such right of way for a period of time commensurate to the length of time of such second control actuation.

8. In a traffic control apparatus having means for indicating a signal to traffic proceeding along a traffic lane and a timer for determining the time of display of said signal, means forming a part of said timer and comprising a condenser, means functioning upon the voltage of the condenser reaching a predetermined value to terminate the time period of display of said signal, means for varying the voltage on said condenser over an interval of time and means associated with said timer and responsive to the passage of traffic in said lane and connected to said voltage varying means so as to control the voltage varying effect upon the said condenser.

9. In a traffic control apparatus having means for indicating a signal to traffic proceeding along a traffic lane and a timer for determining the time of display of said signal, means forming a part of said timer and comprising a condenser, means functioning upon the voltage of the condenser reaching a predetermined value to terminate the time period of display of said signal, means for varying the voltage on said condenser from an initial value toward said predetermined value, normally inoperative means for varying the voltage on said condenser toward said initial value and means associated with said timer and responsive to the passage of traffic in said lane and connected to said last named voltage varying means to make the same operative on said condenser upon the passage of traffic.

10. A traffic control system for interfering traffic lanes including in combination right of way indicating means for said lanes, time controlled means connected to said right of way indicating means and including a condenser, means functioning upon the voltage of the condenser reaching a predetermined value to cause the operation of said right of way indicating means to shift right of way, means for changing the voltage on said condenser over an interval of time, traffic actuatable means in one of said lanes and connected to said voltage changing means so as to control its voltage changing effect upon the said condenser.

11. A traffic control system for interfering traffic lanes including in combination right of way indicating means adapted to accord right of way to and change right of way between said lanes, time controlled means connected to said right of way indicating means to control the period between changes of right of way indication and including a condenser, means including a relay operable to cause change of right of way by the right of way indicating means, means for charging said condenser and means functioning in response to said condenser reaching a predetermined charge to operate said relay, means for discharging said condenser, means controlling the effect on the condenser of the charging and discharging means, and traffic actuatable means in one lane and connected to said controlling means to govern effectiveness of said controlling means for charging and discharging said condenser to vary the charge on said condenser.

12. A traffic control system for interfering traffic lanes including, in combination, a signalling device, a timer for operating said device so as to accord and interrupt right of way over said lanes, said timer including a condenser, a relay and tube in series with each other and with said condenser, means including a switch connected to and operated by said relay and connected to said signalling device to operate the same to cause transfer of right of way from one lane to the other upon

said condenser accumulating a predetermined charge and causing a functioning of said tube and relay, leads coupled to a source of electrical current supply, and a switch for connecting said leads to said condenser to charge the same, a traffic actuated device and means connected to said latter device and operating responsive to actuation of said device to shift said latter switch to disconnect said condenser from said current supply leads and to accordingly delay said condenser in receiving its predetermined charge.

13. A traffic control system for interfering traffic lanes including, in combination, a signalling device, a timer for operating said device so as to accord and interrupt right of way over said lanes, said timer including a condenser, a relay and tube in series with each other and with said condenser, means including a switch connected to and operated by said relay and connected to said signalling device to operate the same to cause transfer of right of way from one lane to the other upon said said condenser accumulating a predetermined charge and causing a functioning of said tube and relay, leads coupled to a source of electrical current supply, a switch for connecting said leads to said condenser to charge the same, a traffic-actuated device, means including a lead engageable with said switch to shunt said condenser and thereby dissipate the charge accumulated therein and means connected to and functioning in response to actuation of said traffic actuated device to shift said switch to disconnect said condenser from said source of current supply and to connect the same in circuit with said shunting means.

14. A traffic control system for interfering traffic lanes including in combination a signalling device, a timer connected to said signalling device for operating said device to accord and interrupt right of way in said lanes, said timer including a condenser, a relay, means operated upon operation of said relay to change right of way between said lanes, an electron discharge tube connected to said condenser and to said relay, said tube passing current to operate said relay upon said condenser reaching a predetermined charge, a source of current supply, a switch operated for connecting and disconnecting said condenser to and from said source, traffic actuatable means in one of said lanes connected to said timer for operating said switch in response to actuation of said traffic actuatable means.

15. A traffic control system for interfering traffic lanes including in combination right of way indicating means adapted to accord right of way to and change right of way between said lanes, time controlled means connected to said right of way indicating means to control the period between changes of right of way indication and including a condenser, means including a relay operable to cause change of right of way by the right of way indicating means, means for charging said condenser and means functioning in response to said condenser reaching a predetermined charge to operate said relay, and traffic actuatable means in one of said lanes for controlling the charge of said condenser by said charging means.

16. A traffic control system for interfering traffic lanes including in combination right of way indicating means adapted to accord right of way to and change right of way between said lanes, time controlled means connected to said right of way indicating means to control the period between changes of right of way indication and including a condenser, means including a relay operable to cause change of right of way by the right of way indicating means, means for charging said condenser and means functioning in response to said condenser reaching a predetermined charge to operate said relay, condenser discharging means, and traffic actuatable means in one of said lanes functioning when operated to connect said discharging means, to said condenser.

17. A traffic control system for interfering traffic lanes including in combination right of way indicating means adapted to accord right of way to and change right of way between said lanes, time controlled means connected to said right of way indicating means to control the period between changes of right of way indication and including a condenser, means including a relay operable to cause change of right of way by the right of way indicating means, means for charging said condenser and means functioning in response to said condenser reaching a predetermined charge to operate said relay, condenser discharging means, and traffic actuatable means in one of said lanes functioning when operated to disconnect said charging means from said condenser and connect said discharging means thereto.

18. A traffic control system including in combination signalling means arranged at the intersection of traffic lanes and adapted to display indications for the control of traffic in said lanes, traffic actuated means in one of said lanes, time controlled means connected to said signalling means and to said traffic actuated means for causing said signal to indicate right of way to the lane of said traffic actuated means in response to actuation of said traffic actuated means, said time controlled means including a condenser, a condenser charging means, a condenser discharging means, means connected to said condenser and acting responsive to a predetermined charge on said condenser to operate said signal to interrupt said right of way, and means functioning upon operation of said traffic actuated means while said right of way is accorded to its lane to operate said condenser discharging means so as to extend the period of right of way.

19. A traffic control system for two interfering traffic lanes including in combination signalling means adapted to accord and interrupt right of way to said lanes, a timer connected to said signalling means to control the same, said timer including switching means having one operative position for causing said signalling means to accord right of way to the first of said lanes and another position for causing said signalling means to accord right of way to the second of said lanes, and including two timing means each comprising a condenser, means operable when said timing means is energized for varying the charge on said condenser from an initial to a predetermined value, control means including a relay operable upon the charge on said condenser reaching said predetermined value, one of said timing means being connected to be energized by said switching means in its first position in which right of way is accorded to the first lane, means associated with said switching means and actuatable by traffic only in the second lane, means forming a part of said switching means and connected with the control means of the timing means for said first position and operable upon operation of the latter together with operation of the traffic actuatable means to cause said switching means to shift from its first position to its second, the second timing means being connected to said switch-

ing means so as to be energized in the second position of the latter in which right of way is accorded to the second lane and means forming a part of said second timing means and operable upon said second timing means being de-energized to vary the charge on its condenser toward its initial value from any value between its predetermined value and its initial value and means associated with said traffic actuatable means and cooperative with said switching means in the second position of the latter to de-energize said second timing means upon actuation of said traffic actuatable means.

20. In a traffic control apparatus for interfering traffic lanes the combination of a signal adapted to alternately accord right of way to such lanes for the control of traffic therein, switching mechanism having one condition of operation for causing the signal to accord right of way to one lane and another condition to cause accord of right of way to another lane, an electrostatic timer for timing one of said conditions comprising means including a relay operable to cause shift of said switching mechanism from one condition to the other, a condenser, means operated by said mechanism in said one condition to vary over a period of time the charge on said condenser from an initial value toward a different predetermined value, and means operable upon the charge on said condenser reaching said predetermined value to operate said relay to cause shift of said mechanism to the other condition said means partially restoring the charge on said condenser toward said initial value, and means operable by said mechanism upon such shift of right of way to cause the charge on said condenser to be restored substantially wholly to said initial value.

21. A traffic control system for interfering traffic lanes including in combination right of way indicating means adapted to accord right of way to and change right of way between said lanes, time controlled means connected to said right of way indicating means to control the period between changes of right of way indication and including a condenser, means including a relay operable to cause change of right of way by the right of way indicating means, means for charging said condenser and means functioning in response to said condenser reaching a predetermined charge to operate said relay, condenser discharging means, traffic actuatable means in one lane, means forming a part of said discharging means and functioning responsive to actuation of traffic actuatable means to cause discharge of said condenser to a degree dependent on the time length of said actuation.

22. A traffic control system for interfering traffic lanes including in combination right of way indicating means adapted to accord right of way to and change right of way between said lanes, time controlled means connected to said right of way indicating means to control the period between changes of right of way indication and including a condenser, means including a relay operable to cause change of right of way by the right of way indicating means, means for charging said condenser and means functioning in response to said condenser reaching a predetermined charge to operate said relay, condenser discharging means, traffic actuatable means in one lane, means forming a part of said discharging means and functioning responsive to actuation of traffic actuatable means to cause discharge of said condenser to a degree dependent on the speed of traffic actuating said traffic actuatable means.

23. A traffic control system for interfering traffic lanes including in combination right of way indicating means for said lanes, time controlled means connected to said right of way indicating means and including a condenser, means functioning upon the voltage of the condenser reaching a predetermined value to cause the operation of said right of way indicating means to shift right of way, means for changing the voltage on said condenser toward the said value, further means changing the voltage of said condenser away from said value, a traffic actuatable means in one lane and means responsive to actuation of said traffic actuatable means to operate said further means to change the voltage on said condenser to a degree dependent on the time length of said actuation.

24. In combination a timer including a charge accumulating means, a source of electrical current supply, leads connectible to said source to charge said means at a certain rate, means for connecting said leads to said source, a consuming circuit connectible to discharge said accumulating means, means for controlling the rate of discharge through said consuming circuit when the latter is connected, and means operating in response to passage of a vehicle to connect said consuming circuit to said accumulating means and cooperable with said discharge rate control means to cause the amount of discharge to be dependent in inverse relation on the speed of the passing vehicle.

25. A traffic control system for interfering traffic lanes including, in combination, a signalling device, a timer connected thereto for operating said device to accord and interrupt right of way over said lanes, said timer including a charge accumulating means, means also forming a part of said timer and connected to said accumulating means and acting to shift right of way when the latter is charged up to a predetermined amount, a circuit connected to said accumulating means to charge the same at a certain rate, a consuming circuit connectible to discharge said means at a certain rate, means for controlling the rate of discharge through said consuming circuit when the latter is connected, and means operating in response to passage of a vehicle to connect said consuming circuit to said accumulating means and cooperable with said discharge rate control means to cause the amount of discharge to be dependent in inverse relation on the speed of the passing vehicle.

26. A traffic control system for interfering traffic lanes including, in combination, a signalling device, a timer for operating said signalling device so as to accord and interrupt right of way over said lanes, said timer including a charge accumulating means, means also forming a part of said timer and connected to said accumulating means to shift right of way when the latter is charged up to a predetermined amount, a circuit connectible to charge said accumulating means at a certain rate, a vehicle actuated device and additional means forming a part of said timer and connected to said vehicle actuated device to be operated by actuation of said device to delay to a degree dependent in inverse relation upon the speed of the vehicle actuating said device said charge accumulating means in reaching said predetermined amount of charge.

27. In a traffic control apparatus having means for indicating a signal to traffic proceeding along

a traffic lane and a timer for determining the time of display of said signal, means forming a part of said timer and comprising a condenser, means functioning upon the voltage of the condenser reaching a predetermined value to terminate the time period of display of said signal, means for varying the voltage on said condenser from an initial value toward said predetermined value, means for varying the voltage on said condenser toward said initial value from any value between said initial value and said predetermined value and means associated with said timer and responsive to the passage of a unit of traffic in said lane and connected to said last named voltage varying means in response to such passage of traffic to cause the latter means to vary the voltage on said condenser toward said initial value to a degree inversely dependent on the speed of said unit of traffic whereby the period of display of said signal is prolonged to a degree correspondingly inversely dependent on the speed of said unit of traffic.

FREDERICK GRIFFEN KELLY, JR.

CERTIFICATE OF CORRECTION.

Patent No. 2,044,907. June 23, 1936.

FREDERICK GRIFFEN KELLY, JR.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, first column, line 3, for "withwith" read with; page 4, second column, line 17, for "agects" read affects; page 6, first column, line 66, claim 15, for "charge" read charging; and second column, line 8, claim 16, after "means" strike out the comma; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 22nd day of September, A. D. 1936.

(Seal)

Henry Van Arsdale
Acting Commissioner of Patents.