United States Patent [19]

Martinez

[11] **3,739,332**

[45] **June 12, 1973**

[54] **ADVANCE CALL SYSTEM FOR VEHICULAR TRAFFIC CONTROL**

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[21] Appl. No.: **160,800**

[52] **U.S. Cl.** **340/37,** 340/35

[51] **Int. Cl.** **G08g 1/08**

[58] **Field of Search** ..... 340/31 R, 31 A, 35, 340/36, 37

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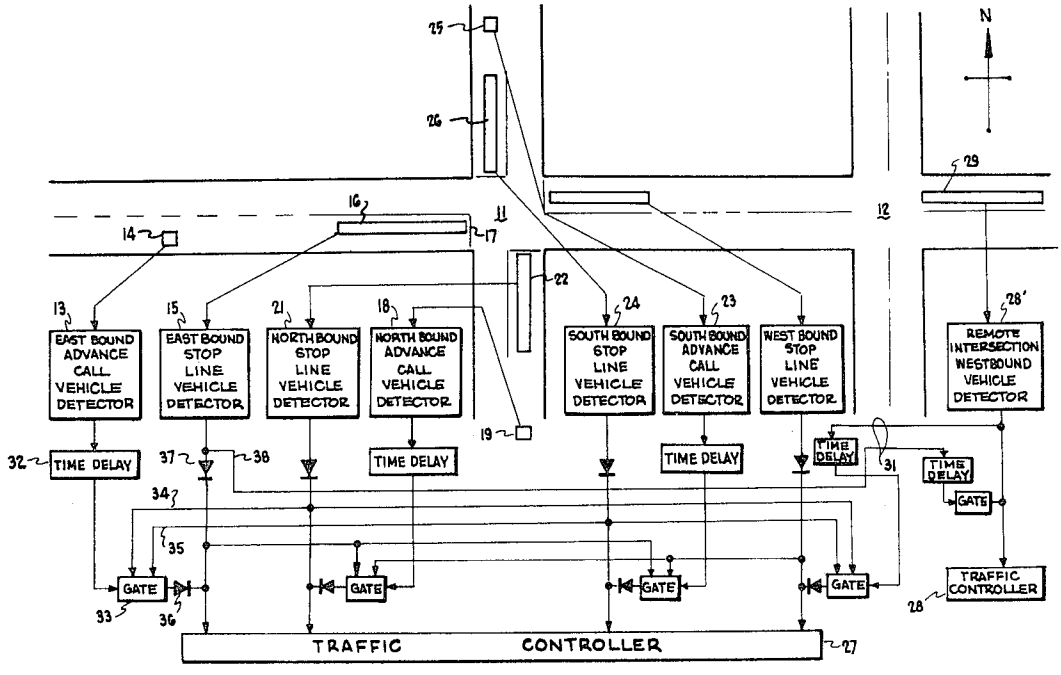
[57] **ABSTRACT**

A vehicle moving along a traffic lane towards a light controlled intersection is sensed by a first vehicle detector at a location remote from the intersection, and an "advance call" signal is generated by the first vehicle detector. The advance call signal is impressed immediately upon a traffic controller, and a capacitor or other storage means continues to hold the signal until the vehicle is sensed by a second or principal vehicle detector located close to the intersection. The traffic lights are thereby changed to green in advance of the vehicle approaching the intersection, so that the vehicle need not stop or slow down unduly. In the event that other traffic exists that might conflict with the vehicle, call signals from vehicle detectors of conflicting phases of the controller will inhibit the advance call signal causing the controller to operate in a normal mode without the advance call signal. Where a street or highway has two or more spaced apart intersections, a vehicle detector may serve in a dual capacity of providing a call signal for the controller of the first intersection and an advance call signal for the controller of the next intersection.

5 Claims, 4 Drawing Figures



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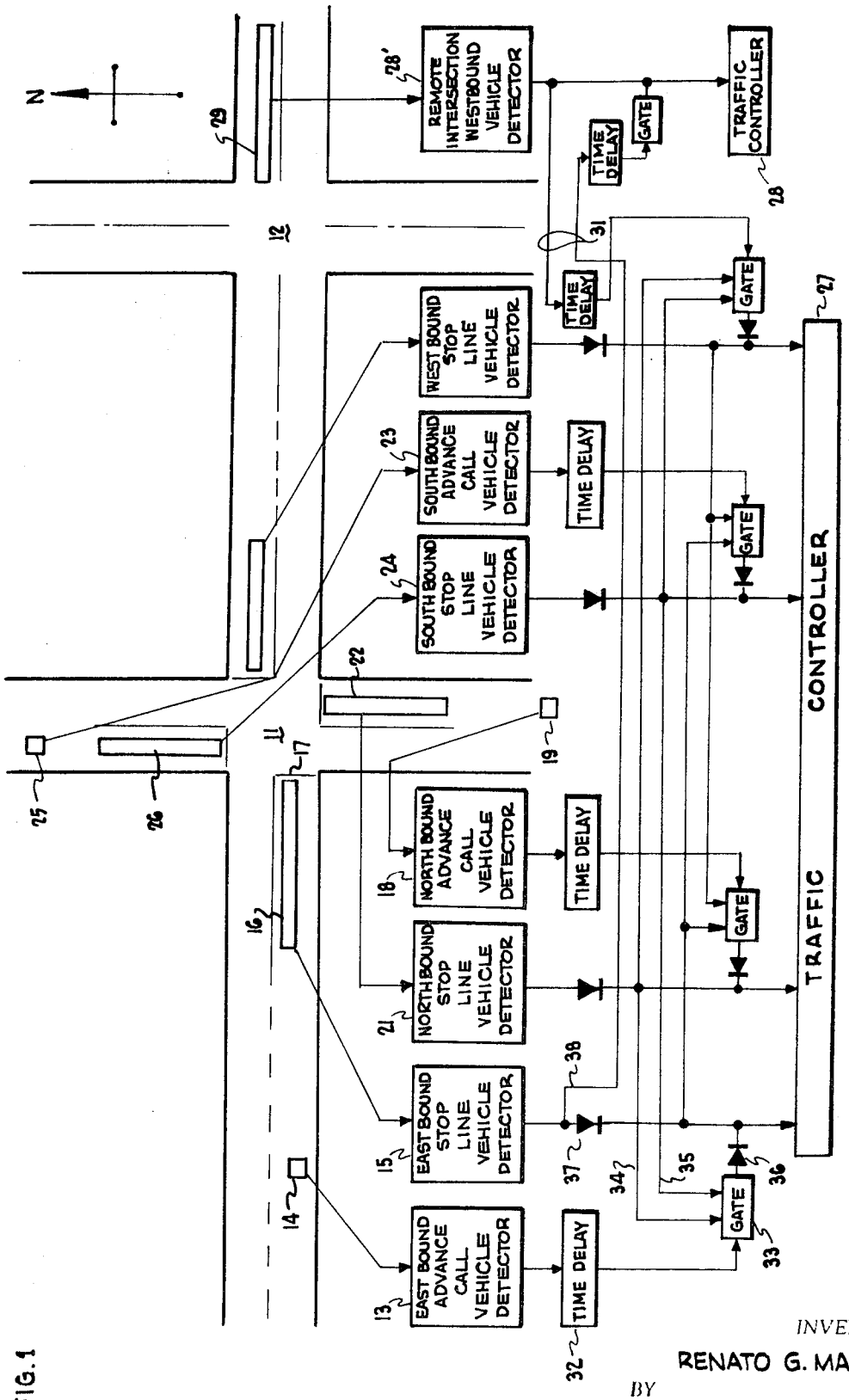

FIG. 1

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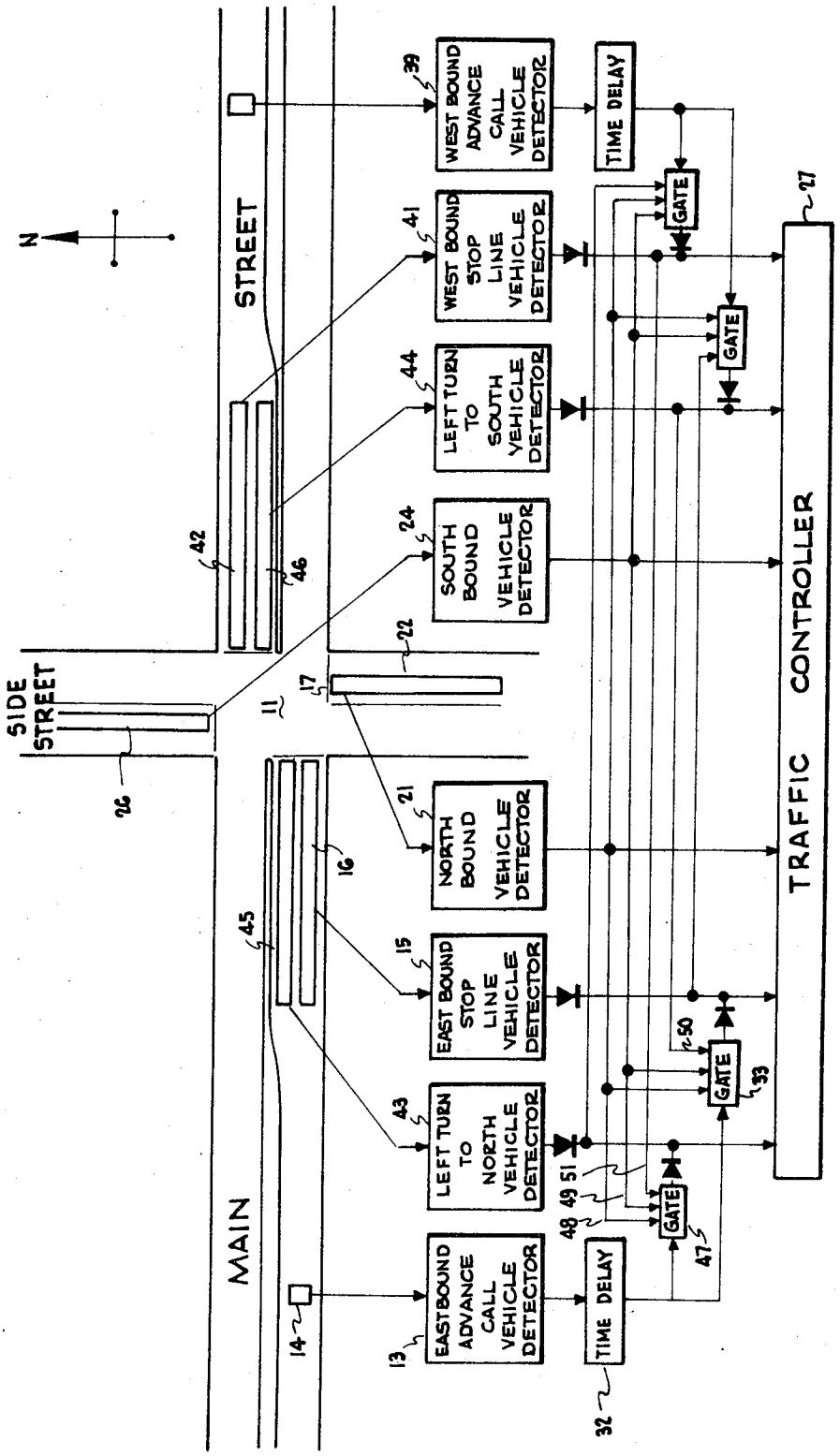

FIG. 2

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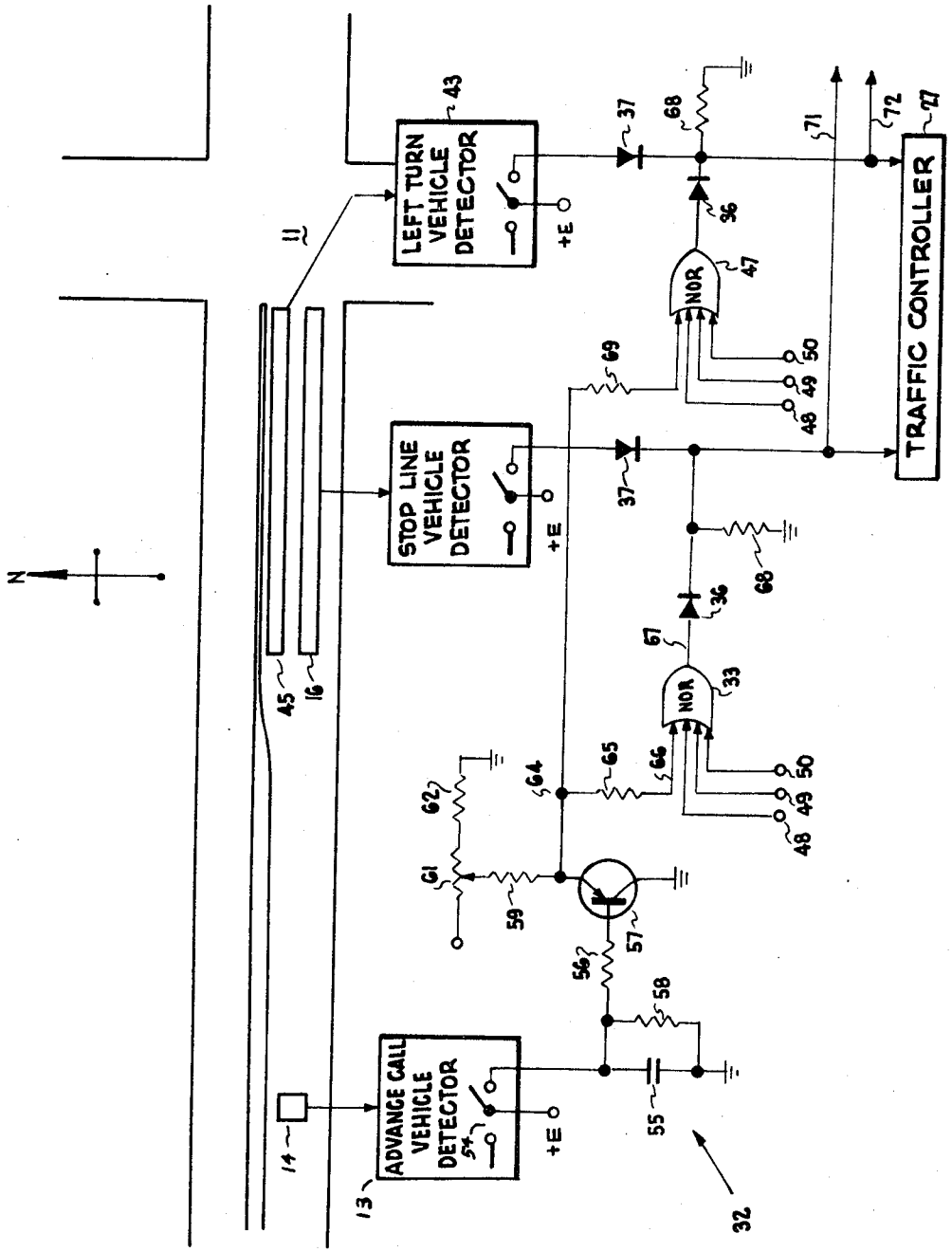

FIG. 3

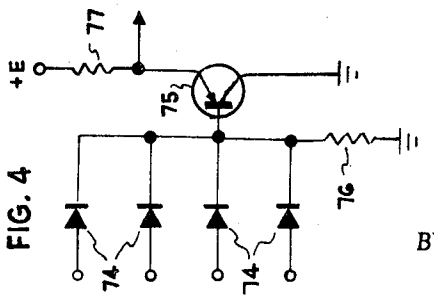

FIG. 4

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ADVANCE CALL SYSTEM FOR VEHICULAR TRAFFIC CONTROL

BACKGROUND OF THE INVENTION

This invention relates to systems for control of vehicular traffic through street and highway intersections; and more particularly, this invention relates to a system for passing call signals to a traffic signal controller for more efficient operation of traffic lights and for expediting the movement of vehicles through intersections.

Present day vehicular traffic flow through street and highway intersections is controlled by traffic lights which are switched from green to amber to red by traffic controllers that are usually housed in metal boxes or structures closely adjacent to the intersecting lanes of traffic. Originally the traffic lights were switched from phase to phase on a fixed time basis wherein the various traffic lanes received a "green light" in a fixed sequence with fixed time durations. This mode of operation was found to be inefficient and wasteful of the available time, since many motorists were caused to wait by a red light on one street while a cross street which was clear of all traffic was given an unnecessary green light. This situation was improved womewhat by "volume density" controllers and "traffic actuated" controllers. Volume density controllers are responsive to traffic counters associated with the various lanes approaching intersections such that the timing of the phases may be adjusted in accordance with the numbers of vehicles appearing in the various lanes and approach streets. Traffic actuated controllers are provided with treadles or other types of vehicle detectors in side streets, left turn lanes and the like. With a traffic actuated controller the lights remain green continuously on the main street until traffic appears from the side streets or until a vehicle moves into a left turn lane, whereupon the lights change to allow the side street or left turn traffic to move, and after that traffic moves, the green light will again return to the main street.

More recently, the development of improved vehicle detectors, has led to a further improved traffic controller known as a lane occupancy controller. Vehicle detectors may now be installed on or beneath the paved surface of traffic lanes for sensing the presence of vehicles in a controlled segment of a traffic lane which may have a length of 50 feet or more. With most lane occupancy controllers, vehicle detectors are used for sensing the presence of any vehicles in segments of the approach lanes extending about 50 feet from the "stop line" of each intersection. The "stop line" is usually painted across the traffic lane to indicate the point where vehicles must stop and wait for red lights, and in many intersections the stop line is also a boundary for a pedestrian cross walk. When a vehicle moves into the controlled segment of the traffic lane, its presence is sensed, and a "call signal" is generated by a vehicle detector. The call signal is impressed upon a traffic controller which will then give a green light to that phase or traffic lane at the next opportunity which may occur immediately if no other traffic is sensed in conflicting traffic lanes or phases. If there is conflicting traffic, the lane occupancy controller will wait for that traffic to clear and must then wait an additional 3 or 4 seconds while the conflicting phase is given an amber light before giving a green light to the waiting vehicle. As soon as that vehicle (and any subsequent vehicles) has cleared from the controlled segment of the traffic lane and moved into the intersection, the light changes to amber and then to red.

Ordinarily, there is no set time interval for each phase in a lane occupancy controller. A light will remain green only as long as it takes for traffic to clear from the control segments of the traffic lanes; and then the light will change to red such that other phases may get a green light. If there is no other traffic, all of the lights will remain red indefinitely. This "all red" condition will expedite traffic during times of light traffic, since a green light may be given immediately (without a 3 or 4 second wait for an opposing amber light) to any phase wherein a vehicle is sensed. Unfortunately, the driver of a vehicle approaching such an intersection in an "all red" condition will see the red light ahead and must slow his vehicle to prepare to stop. When the vehicle moves into the control 50 foot segment of the traffic lane, the lights will immediately change to green, but by this time the vehicle is slowed to nearly a stop. Moreover, the driver of the vehicle cannot make a prior assumption that he will get an immediate green light, because he cannot be certain that there is no conflicting traffic approaching from a cross street. To be safe, the driver must assume the possibility of cross traffic and must prepare to stop his vehicle at the intersection, thereby always slowing unduly at vacant intersections.

One solution to this dilemma would be to extend the length of the control segment of the traffic lane to 100 feet or more. This immediately leads to two disadvantages. Firstly, by extending the control segment, the present day vehicle detectors would be made to operate at a maximum capability with a substantial decrease in reliability. With the extended segments or loop areas the vehicle detectors would become less sensitive, whereupon small vehicles such as motorcycles would move into the segment without being detected. The motorcyclist might be required to wait an unduly long time for a green light until a subsequent vehicle arrives, to be sensed by the vehicle detector. Thus a longer segment of vehicle detection would lead to poor reliability.

A second reason for not extending the control segment for vehicle detection lies in the fact that during times of heavy traffic the advantages of the lane occupancy controller would be lost. From one viewpoint, the vehicle detector is said to sense the presence of vehicles. But from another viewpoint, it may be said that the vehicle detector senses gaps when no vehicles are present. It is helpful to assume this second viewpoint for the times of heavy vehicular traffic. When traffic is heavy, a vehicle detector will continue to generate a call signal with a continuous stream of vehicles passing through the control segment until a gap appears in the traffic stream. When a 50 foot gap appears between vehicles, the vehicle detector terminates (perhaps momentarily) the call signal, and the controller will immediately change the traffic lights to amber and then to red, and a different phase will receive a green light. It has been found that changing the phase when a natural gap appears in the traffic stream is the most expeditious manner to handle heavy traffic. Lane occupancy controllers usually provide maximum time intervals for changing phases in heavy traffic conditions in the event that no natural gaps of sufficient length appear in the traffic streams. However, by having the control segments of vehicle detectors not longer than 50 to 60 feet, the gaps in heavy traffic need only be of that

length for effective phase changes by the controller without relying upon the maximum time interval feature, and a much superior mode of operation will result. Therefore, the length of the controlled segment of a vehicle detector should not be unduly increased, since in times of heavy traffic, the gaps in the traffic streams would be lengthened and would not be as readily detected whereby performance of a lane occupancy controller would be impaired.

It is an object of this invention to provide an improved vehicle detection system for generating and passing call signals to a traffic controller; and more particularly it is an object to provide a vehicle detection system which will provide the advantages of a greatly extended segment of vehicle detection during times of light traffic conditions and will further provide the advantages of a shorter segment of vehicle detection during times of heavy traffic conditions.

It is a further object of this invention to provide an improved vehicle detection system wherein an advance call is generated by a vehicle in a traffic lane approaching but remote from an intersection for changing the traffic lights to green far ahead of the vehicle providing that there is no conflicting traffic also approaching the intersection.

Present day vehicle detectors employ inductive loops of electrical cable which are on or beneath the surface of the street or road. Generally the positioning of each loop defines the control segment of the traffic lane within which the presence of vehicles will be sensed. A vehicle detector loop may be narrow enough to sense vehicles in one lane of traffic or the loop may be widened to encompass two or more parallel traffic lanes. There are several competing manufacturers providing various commercially available vehicle detectors. One such vehicle detector is shown and described in a U.S. Pat. No. 3,375,493 granted to Irving M. Gottlieb on Mar. 26, 1968. It will be appreciated that a complete vehicle detector may include an an inductive loop in the traffic lane(s) of a street or roadway and a manufactured unit in a roadside box or housing next to a traffic controller unit. Prior to the development of the inductive loop vehicle detectors, treadles or pressure plates were installed in roadways to sense the weight of vehicles passing thereover. Undoubtedly, other types of vehicle detectors will be developed, and it is not intended that this patent be limited to use with any specific type of vehicle detector. For this reason this patent designates an area of vehicle detection as a "control segment" or "controlled segment" of a traffic lane without specific reference to inductive loops or treadles which may define the controlled segment. A vehicle may be said to move into or pass through the controlled segment of a traffic lane, rather than moving or passing over a loop or treadle.

SUMMARY OF THE INVENTION

According to this invention, a first vehicle detector provides an advance call signal when a vehicle moves into a traffic lane approaching an intersection, but as yet is remote from the intersection, a second vehicle detector provides a principal call signal when the vehicle moves into a control segment near the stop line of the intersection. A storage means such as a capacitor-resistor circuit retains and impresses the advance call signal upon a traffic controller for an interval of several seconds until the vehicle moves into the control segment of the second vehicle detector. The advance call signal is passed to the controller through a gate or other signal inhibiting means which receives call signals from conflicting phases of the controller, such that the advance call signal will be inhibited in the event that conflicting traffic exists. The advance call signal may be generated by a vehicle detector situated at another intersection, or the like wherein the signal generated by the vehicle detector may be used also by another controller.

DESCRIPTION OF THE DRAWINGS

The various features and advantages of this invention will become apparent upon consideration of the following description taken in connection with the accompanying drawings, which show an exemplory embodiment of the advance call vehicle detector system of this invention. The views of the drawing are as follows:

FIG. **1** is a plan view of a hypothetical street with two cross intersections combined with a circuit diagram of the advance call apparatus of this invention;

FIG. **2** is a plan view of another hypothetical street intersection combined with a circuit diagram of another embodiment of this invention;

FIG. **3** is a partial plan view of the hypothetical intersection of FIG. **2** combined with a more detailed circuit diagram of a single phase of the advance call apparatus of this invention; and

FIG. **4** is a schematic diagram of a NOR circuit or gate which appear as blocks in FIG. **3.**

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. **1** and **2** illustrate two conventional street or highway intersection arrangements with controlled segments of traffic lanes wherein vehicle detectors will sense the presence or absence of vehicles. For purposes of illustration, the streets are presumed to be laid out along the cardinal points of the compass such that vehicular traffic may be defined as "Northbound," "Eastbound," "Southbound" and "Westbound." It will be appreciated that these designations are only for providing an understanding of this invention and that actually street intersections need have no specific compass orientations. FIG. **1** shows a street extending east-west through to simple cross street intersections **11** and **12,** but this patent will be concerned principally with apparatus in connection with the westerly or left hand intersection **11** as shown in FIG. **1.** The eastbound approach lane to the intersection **11** is provided with a first vehicle detector **13** for sensing vehicles passing over a treadle or short loop **14.** A second vehicle detector **15** is adapted to sense vehicles over a longer loop or control segment **16** which is adjacent to the intersection **11** and extends rearwardly (southerly) from a stop line **17.** Similarly, the northbound approach lane of the intersection **11** is provided with an advance vehicle detector **18** for sensing vehicles in an advance location **19,** and is further provided with a principal or "stop line" vehicle detector **21** for sensing vehicles in a principal or stop line segment **22.** The southbound approach lanes are provided with an advance vehicle detector **23** and a principal vehicle detector **24** for respectively sensing vehicles in the segments **25** and **26.**

The vehicle detectors will sense vehicles appearing in their respective control segments of the traffic lanes and will generate respective "call signals" which are

passed to a traffic controller 27 which controls the operation of traffic lights (not shown) at the intersection 11. A similar traffic controller 28 will receive call signals from its vehicle detectors and will control the operation of traffic lights at the intersection 12. A vehicle detector 28' senses vehicles appearing in a principal or stop line segment 29 of the westbound approach lane to the intersection 12 to provide call signals for the controller 28. However, the stop line segment 29 of the westbound traffic lane may also provide an advance call for the westbound approach to the second intersection 11. Therefore, the vehicle detector 28' can provide a dual function of furnishing a principal or stop line call signal to the controller 28 and also furnish an advance call signal to the controller 27. Similarly, the eastbound stop line detector 15 may provide call signals which constitute the principal eastbound call signals for the controller 27 and the advance call signals for eastbound traffic of the controller 28. As shown in FIG. 1 an electrical cable 31 connects between the two controller locations for passing advance call signals from one controller to another at a remote intersection.

Ordinarily, an advance call location may be a treadle or short loop 14, and the vehicle detector 13 associated therewith will generate a momentary voltage pulse as a vehicle passes thereover. A time delay circuit 32 is coupled to receive and store the momentary signal of the vehicle detector 13 such that a call signal with a duration of several seconds will be provided to hold the call on the traffic controller 27 until the vehicle enters the control segment 16 of the principal vehicle detector 15. An obvious alternative for the short control segment 14 and the time delay circuit 32 would be to provide an extended control segment for the advance call vehicle detector 13 such that a vehicle will continue in the extended advance control segment of the traffic lane until the principal or stop line control segment 16 has been entered. In that case the vehicle detector would furnish an extended advance call signal that would last until the stop line vehicle detector 15 would provide a call signal for the controller 27.

A gate 33 constitutes a signal inhibiting means for receiving call signals representative of conflicting traffic and for blocking or inhibiting the advance call signal when such conflicting call signals are received. In FIG. 1, the gate 33 is coupled to receive call signals from northbound vehicle detectors 18 and 21 via a lead 34; and is further coupled to receive call signals from the southbound vehicle detectors 23 and 24 via a lead 35. In the event that vehicles appear in the northbound or southbound approach lanes to the intersection 11, this would constitute conflicting traffic for the eastbound traffic, and the gate 33 will inhibit the advance call signal from the vehicle detector 13 such that the advance call signal will not be impressed upon the traffic controller 27. Each of the other advance call vehicle detectors 18, 24 and 28' are provided with time delay circuits and signal inhibiting gate which function similarly to the time delay circuit 32 and the gate 33.

A pair of diodes 36 and 37 provide a coupling to the controller 27 for the call signals of the vehicle detectors 13 and 15. These diodes prevent "back circuits" wherein a signal from one vehicle detector would otherwise pass to the circuit of the other vehicle detector. The diode 37 performs an additional function of isolating the call signal of the stop line vehicle detector 15 from the advance call signal of the vehicle detector 13, such that a lead 38 may pass a call signal from the vehicle detector 15 to the controller 28 of the remote intersection 12, and the advance call signal from the circuit of the vehicle detector 13 will be blocked and will not be passed to the remote intersection.

In some respects the apparatus illustrated in FIG. 2 is similar to that of FIG. 1, and therefore the similar elements are given the same reference numerals. In this case, only the single intersection 11 is shown, but it will be assumed that the east-west street will be a main street or principal thoroughfare, and that the north-south street is a smaller and lesser traveled side street. Advance call vehicle detectors 13 and 39 are provided to expedite the principal east-west traffic, but no advance call apparatus is deemed to be necessary on the north-south side street. On the other hand, provision is made for vehicles turning left from the east-west main street onto the north-south side street. In addition to stop line vehicle detectors 15 and 41 for sensing straight through traffic in control segments 16 and 42 of the eastbound and westbound traffic lanes, left turn vehicle detectors 43 and 44 are provided for sensing traffic in special control segments 45 and 46 of left turn traffic lanes.

As shown in FIG. 2, an advance call signal is generated by a vehicle detector 13 when an eastbound vehicle passes over a remote location 14 approaching the intersection 11. The signal is stored for an interval by a time delay circuit 32, and is then passed to two different phase inputs of the controller 27 by two gate or signal inhibiting circuits 33 and 47. The gate 33 passes the advance call signal to the eastbound straight through traffic phase, and the gate 47 passes the advance call signal to the "left turn to north" phase of the controller. Therefore, in the absence of conflicting traffic, the controller 27 will give an advance green light to eastbound straight through traffic and will give an advance green arrow to the left turn lane. The gate 47 is coupled via leads 48, 49 and 51 to call signals from the vehicle detectors 21, 24 and 41, and any northbound, southbound or westbound traffic sensed in the segments 22, 26 or 42 will inhibit the advance call signal of the left turn to north phase. Similarly the gate 33 will inhibit the advance call from the vehicle detector 13 in the event that any northbound, southbound or left turn to south traffic is sensed by the respective vehicle detectors 21, 24 or 44. Therefore it will be appreciated that the gate 47 will inhibit the advance call signal to the left turn phase, and the gate 33 will inhibit the advance call to the straight through phase in the event that conflicting traffic exists for either case respectively.

In practice it may not be appropriate to give an advance call to the left turn phase since any vehicles intending to turn left must necessarily slow down such that an advance green arrow would be of questionable value in expediting this traffic. On the other hand, an intersection may exist such as a gentle fork in a highway where a vehicle swinging off to the left need not slow down unduly except for conflicting traffic. The arrangement shown in FIG. 2 illustrates that the advance call signal may be used simultaneously by two or more separate controller phases or other circuits, and that separate gates may inhibit the call signal to the different phases using different criteria to inhibit the signal in each case.

FIG. 3 illustrates in greater detail the circuit of a single phase of FIG. 2. Since the various phases have

nearly identical apparatus and are practically the same in mode of operation, it is not necessary to show and describe all phases in detail. An understanding of the interconnections between phases may be gained from FIG. 2 and the internal working of each phase can be gained from FIG. 3.

The advance call vehicle detector 13 is shown with a switch 54 for coupling a supply voltage +E to the time delay circuit 32. This switch is ordinarily a part of an output relay provided in commercially available vehicle detectors. When a vehicle is sensed in the control segment or loop 14, the switch closes to impress the supply voltage +E across a capacitor 55 which is immediately charged thereby. The impressed voltage +E constitutes the advance call signal which is stored by the capacitor 55 and which is immediately passed via a resistor 56 to bias a transistor 57 into conduction. After the vehicle has passed beyond the control segment 14, the capacitor will continue to bias the transistor 57 for a time interval while the charge dissipates or leaks through a resistor 58. A portion of the charge will leak through the transistor 57, but this will not be detrimental to the operation of the time delay circuit 32.

The transistor 57 constitutes a threshold detector and a signal invertor. As the charge leaks from the capacitor 32, the bias voltage gradually diminishes until a threshold value is reached, whereupon the transistor 57 will abruptly cut off and become non-conductive. The emitter electrode of the transistor 57 is coupled to an adjustable bias source by a load resistor 59. The adjustable bias source comprises a potential dividing network including a potentiometer 61 and a fixed resistor 62 connected in series between the supply voltage +E and the ground reference potential. The potentiometer 61 may be adjusted in value to set the bias level of the transistor 57. Since the cut off point of the transistor 57 is determined by the relative biasing between the emitter and the base electrodes, a variation of the potentiometer adjustment will vary the threshold value and will thereby vary the time interval of the time delay circuit 32.

As indicated above, the transistor 57 is a signal invertor. When a vehicle appears in the control segment 14 and for a time interval thereafter, a positive voltage is impressed on the base electrode of the transistor to bias the transistor into conduction. When the transistor 57 conducts a point 64 is effectively coupled to ground through the transistor. On the other hand, when no biasing voltage or when insufficient biasing voltage is impressed upon the base electrode of the transistor 57, the transistor is non-conductive and a positive voltage appears at the point 64. Therefore, the presence of a vehicle in the control segment 14 causes no voltage to appear at the signal inverted point 64; and the absence of a vehicle (after-time lapse) causes a positive voltage to appear at the point 64.

The gate 33 comprises a NOR circuit which will be described subsequently in connection with FIG. 4. A NOR circuit includes a plurality of input terminals and a single output terminal. When an input voltage is applied to any one or more of the input terminals, no voltage will appear at the output terminal. On the other hand, if no input voltage is impressed on any of the input terminals, than a positive output voltage will appear at the output terminal. When a vehicle appears in the control segment 14, an inverted signal of no voltage will appear at the point 64. A resistor 65 couples the signal (no voltage) to a first of the input terminals 66 of the NOR circuit 33. If no inhibiting signals appear at any of the other input terminals 48, 49, or 50, a positive output signal will appear at the output terminal 67, which will constitute the advance call signal to be passed to the traffic controller 27. As shown in FIG. 2, the further inputs leads 48, 49 and 50 are each coupled to receive call signals from conflicting phases of the traffic controller; and therefore, any conflicting traffic will cause a positive voltage to be applied to at least one of the other input leads 48, 49 or 50 to inhibit or prevent the advance call signal from appearing on the output lead 67 of the NOR gate 33.

As previously indicated, the diodes 36 and 37 prevent signals from one source flowing in the wrong direction to another circuit. A resistor 68 couples the phase input of the controller to ground to eliminate spurious voltages which might otherwise appear when both no call signals are generated by either of the circuits 33 or 15.

A resistor 69 passes the inverted advance call signal to the second gate or NOR circuit 47, which functions in the same manner as the NOR circuit 33, except that a different call signal is coupled as an inhibitive voltage to the input lead 51. Therefore, traffic of the westbound straight through lane will inhibit the advance call signal for the left turn phase of the controller 27 (see FIG. 2).

Output leads 71 and 72 will pass call signals from the phases of the traffic controller shown in FIG. 3 to NOR gates in other phases of the controller for inhibiting other advance call signals when a vehicle appears in these phases. Thus if traffic appears in these phases which is conflicting with possible traffic in other phases, the appropriate signal inhibiting voltages will be transmitted via the leads 71 and 72 to these other phases.

As previously indicated, the time delay circuits would not be necessary if the control segment 14 of the advance call detector 13 were extended along the traffic lane to nearly join the control segment 16 of the stop line vehicle detector 15. In this case, the necessary inversion of the call signal could be obtained from a normally closed terminal of the relay switch 54. In this case, the coupling resistor 65 could connect between the normally closed terminal of the relay switch 54 and the input lead 66 of the NOR circuit, thereby eliminating the capacitor 55, the transistor 57 and the other attending circuitry.

The advance call signals could be inhibited by other means rather than the NOR gates as shown. One possible alternative would be to place a number of normally closed relay switches in series between the voltage source +E and the relay switch 54. Call signals from vehicle detectors sensing conflicting traffic could be applied to a relay to open the switches and remove the voltage +E from the vehicle detector 13 and the time delay circuit 32. Indeed, such a call signal might be applied directly to the advance call vehicle detector 13 for temporarily disabling and preventing normal operation of the vehicle detector 13 to thereby eliminate the call signals therefrom.

FIG. 4 illustrates in detail a NOR circuit or gate used in FIGS. 1, 2 and 3. Each input terminal is coupled through a diode 74 to the base electrode of a transistor 75. A resistor 76 is coupled between ground and the base electrode of the transistor 75. A load resistor is

coupled between the emitter electrode of the transistor 75 and the positive supply voltage +E. The transistor 75 will invert any input signals impressed on the base electrode thereof. The diodes prevent back circuits such that a current cannot flow into one of the input terminals and back out through another input terminal. Thus the diodes isolate the various input connections from each other.

This invention provides a more expeditious flow of vehicular traffic through an intersection by providing advance call signals for initiating green lights for approaching vehicles which are at such a distance from the intersection that the vehicle need not slow down unduly. It further provides for inhibiting the advance call signals when conflicting traffic is present.

This invention is claimed as follows:

1. Advance call apparatus for passing signals to a traffic controller having a plurality of phases for controlling vehicular traffic in a plurality of traffic lanes approaching an intersection, said apparatus comprising:

a first vehicle detector for generating an advance call signal when a vehicle appears in a traffic lane at a location remote from the intersection;

a second vehicle detector for generating a principal call signal when the vehicle appears in a segment of the traffic lane adjacent to the intersection;

a coupling means between both vehicle detectors and said controller to call one phase of said controller; and

a signal inhibiting means coupled to receive call signals from other phases for inhibiting the advance call signal of said first vehicle detector when a call signal is received representative of a vehicle appearing in a conflicting traffic lane.

2. Advance call apparatus in accordance with claim 2 further comprising a time delay means coupled to said first vehicle detector for receiving and storing the advance call signal for an interval of time subsequent to passage of the vehicle for continuing to pass the advance call signal to said controller.

3. Advance call apparatus in accordance with claim 3 wherein said storage means comprises:

a capacitor for receiving and storing a charge from the advance call signal generated by said first vehicle detector;

a leakage path coupled to said capacitor for slowly decreasing the stored signal; and

a signal level detecting means coupled to the capacitor for establishing the interval of time for continuing to pass the advance call signal to the controller.

4. Advance call apparatus in accordance with claim 1 wherein said signal inhibiting means comprises a multiple input gate for receiving call signals from conflicting phases of said controller, said gate being coupled between said first vehicle detector and said controller for passing the advance call signal to the controller only when no call signals are received from conflicting phases.

5. Advance call apparatus in accordance with claim 1 wherein a first intersection and a second intersection are spaced apart along one traffic lane, said first vehicle detector for generating the advance call signal for said controller of the second intersection being a vehicle detector for generating a call signal for a controller of said first intersection.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,739,332 Dated June 12, 1973

Inventor(s) Renato G. Martinez

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Claim 2, line 2, change the numeral "2" to --1--.

Claim 3, line 2, change the numeral "3" to --2--.

Signed and sealed this 5th day of March 1974.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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