

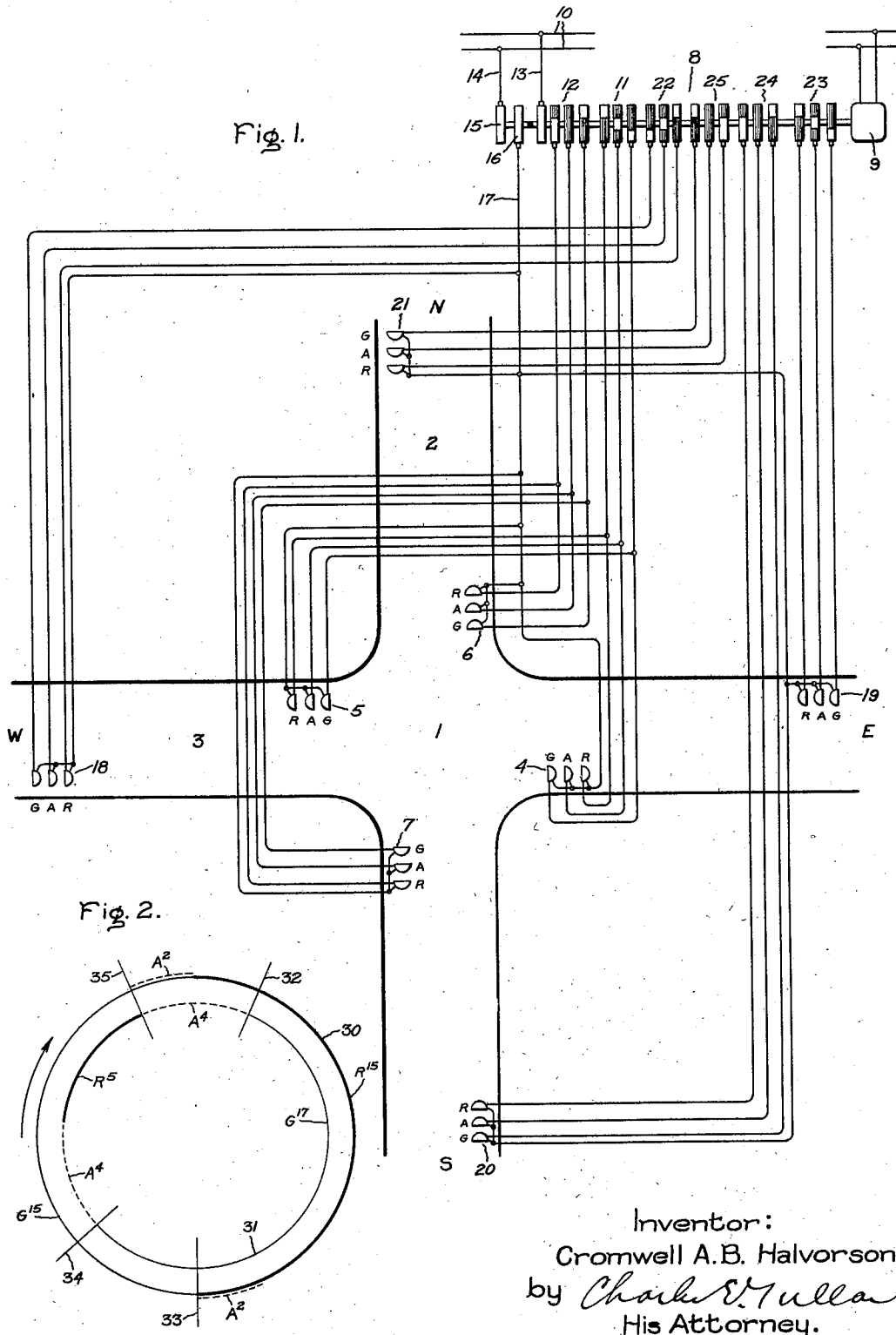
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METHOD OF AND MEANS FOR REGULATING TRAFFIC

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METHOD OF AND MEANS FOR REGULATING
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6 Claims. (Cl. 177—337)

The present invention relates to the regulation of traffic at road intersections and is especially applicable to what may be termed isolated sections, by which is meant intersections where traffic is controlled without regard to neighboring or adjacent intersections, although the invention is not limited thereto necessarily. By the term "road", I mean any intersecting highways, and intend to include by that term streets or other roadways.

At the present time it is the practice to provide at an intersection suitable stop and go signals for traffic in each direction and to operate such signals on a definite time cycle, the total time cycle being split in accordance with the amount of traffic on each road. With such a signalling arrangement, while traffic is proceeding in each direction on one road traffic is lined up in each direction on the other road, and when the signals change the traffic which is lined up then proceeds to cross the intersection. This arrangement has the drawback that when the signals change the traffic lined up waiting for the signals to change is standing still, and after the signals change it must start up from rest, one car after another. Due to this time is lost owing to the delay in starting, and to the speed through the intersection being slow. As a result, delay is occasioned at the intersection and, at times of heavy traffic, the intersection is not used to capacity.

The object of my invention is to provide an improved method of and means for regulating traffic, whereby delay at an intersection due to cars having to get under headway is avoided and whereby the cars are enabled to pass through the intersection at a higher rate of speed than heretofore.

According to my invention I provide the usual timed signals at the intersection for controlling passage of traffic through the intersection, and in addition thereto I provide what I term outpost signals spaced in advance of the intersection signals and synchronized therewith in a manner such that they serve as a primary traffic controlling means, serving to form the traffic into groups and get the groups under way for passage through the intersection when the signals at the intersection change.

For a consideration of what I believe to be novel and my invention, attention is called to the following specification and to the claims appended thereto.

In the drawing, Fig. 1 is a diagrammatic view of a system embodying my invention, and Fig. 2

is a diagram illustrating one timing arrangement.

Referring to the drawing, 1 indicates a road intersection comprising cross roads 2 and 3. For convenience of description, the road 2 may be considered as running north and south as indicated by the letters N and S, and the road 3 may be considered as running east and west as indicated by the letters E and W. At the intersection, 4 indicates the signals controlling east-bound traffic, 5 indicates the signals controlling west-bound traffic, 6 indicates the signals controlling north-bound traffic, and 7 indicates the signals controlling south-bound traffic. In the present instance, conventional signals are indicated, each comprising a green signal for indicating go, a red signal for indicating stop, and an amber signal for indicating change, the respective signals being designated in each instance by the letters G, R and A. These signals are controlled by a suitable timer or circuit controller 8 driven by a motor 9. The circuit controller is indicated diagrammatically only, being shown by way of example. The motor 9 may be any suitable type of constant speed motor such as a synchronous motor, and the circuit controller may comprise suitable disks having insulating and conducting segments with which brushes contact. In actual practice, I may utilize for example a circuit controller such as that shown in my Patent No. 1,856,832, granted May 3, 1932. 10 indicates a source of electrical energy for operating the signal lights. The groups of signal lights 4 and 5 are connected in multiple to the group of circuit controller disks 11, and the groups of signal lights 6 and 7 are connected in multiple to the group of circuit controller disks 12. The contact elements of all these disks are connected to one side of the line by the conductor 13. The conductor 14, disks 15 and 16, and conductor 17 indicate the common return for all the signal lights. As is well understood, in actual practice the circuit controller is adjustable so as to give the desired timing and sequence of the signals. The construction so far described may be taken as typical of any suitable signalling arrangement for controlling traffic at an intersection.

In advance of each of the groups of signals 4, 5, 6 and 7 as regards the direction of traffic, I provide groups of outpost signals 18, 19, 20 and 21, each of which may comprise a green, red and amber signal, similar to the signals at the intersection. Each group of outpost signals is connected preferably to a separate group of contact disks in the circuit controller so that each may

be timed independently of the other. In the present instance, the group of signals 18 is connected to the circuit controller disks 22, the group of signals 19 is connected to the circuit controller disks 23, the group of signals 20 is connected to the circuit controller disks 24, and the group of signals 21 is connected to the circuit controller disks 25.

In the operation of the system, the outpost signals are timed with respect to the signals at the intersection so that at a predetermined time prior to a change from stop to go of an intersection signal, the corresponding outpost signal changes from stop to go, so as to give the traffic accumulated at the outpost signal an opportunity to start up, get under way and reach the intersection at the time the signal at the intersection changes from stop to go. By this arrangement, when the signal at the intersection changes from stop to go, the traffic is at the intersection ready to pass through it, but instead of being stationary it is already under way so there is no delay in its passing through the intersection when the signal changes.

The operation of the improved system will be understood best by a specific example, which example is given by way of illustration and not by way of limitation.

Assuming that the traffic on the cross roads is about the same on each road, the intersection signals may be set to apportion the time equally between the two roads. For example, the signals at the intersection may be placed on a thirty-second time cycle, 15 seconds being apportioned to the stop and go signals for each road. The caution signal may be arranged to overlap both the stop and go signals by a suitable amount, for example, two seconds, or it may be arranged to precede the stop and go signals. The outpost signals are located a distance in advance of the intersection signals which may vary in accordance with the character of the road and the particular traffic conditions at the intersection. Assuming that the character of the road is the same in each instance, the outpost signals may be located each the same distance from the intersection. In one instance, I have found a distance of 400 feet back from the intersection to be suitable for the outpost signals. The signals at the outposts operate on a cycle of the same length as the intersection signals. However, the division of the time between the stop and go signals is made different, the time of the go signals being lengthened and the time of the stop signals being shortened. Also, it is preferable to utilize a longer caution signal and to have the caution precede the go and the stop rather than for them to overlap. For example, the 30-second cycle for the outpost signals may be split on a cycle comprising 17 seconds go, 4 seconds caution, 5 seconds stop and 4 seconds caution. The arrangement is such that an outpost signal changes to go a length of time in advance of the change to go of the corresponding signal at the intersection sufficient to give a car at the outpost signal time to start up and by driving at a predetermined rate reach the intersection at the time the signal at the intersection changes from stop to go. Assuming that approximately 22 miles per hour is the desired speed at the crossing, then the signal at the outpost may be arranged to indicate go a matter of some 13 seconds prior to the time for the change of the intersection signal to go, the 13 seconds giving a vehicle time to start up and travel the distance between the outpost sig-

nal and the intersection, so as to reach the intersection at the time the signal at the intersection changes to go. With a number of vehicles standing at an outpost signal, the successive vehicles will start up and all will have an opportunity to get under way. Vehicles approaching the outpost at a time when the signal at the outpost is already go, and seeing other vehicles ahead approaching or going through the intersection will not stop at the outpost but will increase in speed so as to catch up with the other vehicles and go through the intersection with them. Under these circumstances, a vehicle travels the distance between the outpost signal and the intersection in a time less than that of the preceding vehicles. By this means it will be seen that while both the intersection and outpost signals indicate go, traffic is enabled to approach the intersection at a higher rate of speed than would be the case otherwise, thereby enabling more traffic to be put through the intersection during the allotted period.

At a predetermined time before the intersection signal changes from go to stop, the outpost signal changes from go to caution and then to stop, thereby stopping traffic at the outpost signal even though the intersection signal still indicates go. This timing is arranged so that all vehicles which have passed the outpost signal will have time to get through the intersection before the change at the intersection from go to stop. As a result, no vehicles will be stopped at the intersection when the signal at the intersection changes from go to stop. However, vehicles may be already accumulating at the outpost signal.

Fig. 2 is a circle diagram illustrating one timing arrangement by way of example, the circle 30 indicating the time cycle of an intersection signal and the circle 31 indicating the time cycle of the cooperating outpost signal. In the diagram, the heavy line indicates red or stop signal, the light line indicates go or green signal, and the dotted line indicates caution or amber signal. These are designated by the letters R, G and A, and the exponents indicate number of seconds. The travel of the cycle is in the direction indicated by the arrow. The total time cycle indicated is 30 seconds. At the intersection signal the time is divided into fifteen seconds red and fifteen seconds green with a two second overlap of the amber preceding each change to red and to green. At the outpost the time is divided into seventeen seconds green and five seconds red, there being four seconds amber preceding the change to red and four seconds amber preceding the change to green. In this case the amber does not overlap the green and the red, although the arrangement may be such that it does overlap if found desirable. The green signal at the outpost comes on at the point 32 which is thirteen seconds in advance of the point 33 at which the intersection signal changes from red to green. Both signals are then green up to the point represented by the line 34, after which the outpost signal turns to amber and then to red to indicate stop for approaching vehicles. From the point 34 to the point 35 at which the caution signal appears at the intersection is a period of nine seconds during which cars which have passed the outpost signal before its change to amber may proceed through the intersection, the last cars clearing the intersection during the two seconds of caution, if necessary.

Assuming in the example of Fig. 2 that a car

is stopped at an outpost signal when the outpost signal is red. The driver first sees the signal change from red to amber and prepares to start, and when the signal changes to green at the point indicated 32, the driver then starts toward the intersection. The signal at the intersection is red, but the driver knows that by proceeding at the prescribed speed it will change to green at the time he reaches the intersection. He drives accordingly, and goes through the intersection on the green. The outpost signal is now green for seventeen seconds and all cars approaching continue past it and through the intersection. A driver passing the outpost signal just as it changes from green to amber knows that he has approximately eleven seconds to run through the intersection and accordingly he increases his speed somewhat so as to get past the intersection before the signal at the intersection changes to red.

I find it advantageous to use the longer amber signals at the outposts because it gives a driver a longer period during which to anticipate a change to red or to green and enables him better to control his speed and often avoid having to stop. Also, it results in having a much shorter red signal at the outpost.

The outpost signals may be spaced different distances from the intersection to meet any particular conditions. For example, if one approach to an intersection is up hill, the outpost signal may be placed advantageously closer to the intersection, since vehicles will get under way and travel more slowly up hill. On the other hand, if an approach to an intersection is down hill, then the outpost may be placed further away from the intersection since vehicles will get under way and travel faster down hill.

By my improved system, it will be seen that vehicles are always under way at the intersection and pass through the intersection without stopping. There is no traffic congestion or stoppage of traffic at the intersection. There is no danger of collision due to cross traffic, since all the traffic at an intersection is moving along the same road and the traffic on the cross road is being stopped at an outpost or is approaching from an outpost, no cross traffic being stopped at the intersection.

A relatively short time cycle can be utilized, thus limiting the amount of actual stoppage of traffic. In cases of heavy traffic, the system operates to form the traffic into groups or platoons at the outpost signals and then passes such groups or platoons across the intersection, first along one road and then along the other. This serves to utilize the intersection at its maximum capacity.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with a particular method and apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the particular method and apparatus disclosed are only illustrative, and that the invention may be carried out with such modifications as come within the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. A traffic signalling system for an intersection comprising stop and go signals at the intersection, outpost stop and go signals spaced from the intersection, and means for actuating said signals in timed relation to each other so that a go signal at the outpost appears a predetermined

length of time in advance of the go signal at the intersection sufficient to enable stopped traffic to accelerate and travel the distance between said signals before the go signal appears at the intersection and such go signals at the intersection continuing after the go signal at the outpost disappears a predetermined length of time shorter than said first length of time sufficient to permit traffic which is in motion and has passed the outpost signal to pass through the intersection.

2. A traffic signalling system for a plurality of intersecting highways comprising stop and go signals for each highway at the intersection, outpost stop and go signals for each highway spaced from the intersection, and means for actuating said signals in timed relation such that for each highway the outpost "go" signal precedes the intersection "go" signal by a predetermined time interval sufficient for a stopped vehicle to accelerate to full speed and the intersection go signal overlaps the corresponding outpost stop signal by a predetermined interval shorter than said first interval and sufficient for a vehicle in motion to travel from the outpost signal through the intersection.

3. A traffic signalling system for a plurality of intersecting highways comprising stop and go signals for each highway at the intersection, outpost stop and go signals for each highway spaced from the intersection, and means for actuating said signals in timed relation such that for each highway the intersection go signal overlaps the corresponding outpost stop signal by an interval sufficient for a vehicle to travel from the outpost signal through the intersection and the outpost stop and go signal periods are shorter and longer respectively than the stop and go signal periods of the corresponding intersection signal.

4. A traffic signalling system for an intersection comprising stop and go signals operating on a definite time cycle for controlling traffic at the intersection, stop and go outpost signals operating on a definite time cycle and correlated with the signals at the intersection so that a car starting from standstill at the outpost signal when it changes to the "go" indication will be given a predetermined interval of time sufficient to accelerate up to full speed by the time the intersection signal changes to the "go" indication and whereby a vehicle in full motion at the instant the outpost signal changes to the "stop" indication will be given a predetermined shorter interval sufficient to pass through the intersection before the intersection signal changes to the "stop" indication.

5. A traffic signalling system for a highway intersection comprising stop and go signals at the intersection, stop and go outpost signals spaced from but in the immediate vicinity of the intersection for forming the traffic into groups for passage through the intersection, and means for operating said signals in such manner that traffic is started at said outpost signals before the corresponding intersection signals change by a predetermined time interval sufficient for said traffic to accelerate to full speed from its stopped position and reach said intersection at the time of said change, and traffic is stopped at said outpost signals before the intersection signals again change by a second predetermined time interval sufficient only for vehicles to travel the distance between said signals at full speed before said second change.

6. The method of regulating traffic at the intersection of a plurality of highways having out-

post and intersection signals which comprises alternately stopping the traffic on each highway at points spaced from but in the immediate vicinity of the intersection and then starting said traffic at said points a predetermined time interval before said intersection signals change which time is sufficient to allow said traffic to accelerate to full speed and reach said intersection at the time said intersection signals change, whereby the traffic passing through the intersection is always in full motion at the instant the intersection signals change.

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