My invention relates to improvements in automatic electric traffic signal systems, and it consists in the combinations, construction, and arrangements herein described and claimed.

My invention is particularly designed for use at dangerous intersections of highways, in the country rather than the city streets although it could be used in the city where desirable.

An object of the invention is to provide a signal system, the use of which will speed up traffic without danger since it does not depend upon clock mechanisms which often cause unnecessary delays, but which is operated in accordance with the traffic demands automatically.

A further object of the invention is to provide a system of the type described in which the protected intersection is open for traffic upon one of the intersecting highways at all times, unless a vehicle upon the other of said highways shall have energized a signal to be displayed which would then cause traffic upon the first named highway to stop until the vehicle which actuated the signal cleared the crossing.

A further object of the invention is to provide a traffic signal system in which the signal lights, automatically controlled by the vehicles approaching the intersection upon one highway, will remain on for a predetermined period and will then be restored to normal condition.

A further object is to provide a signal system in which, if a number of vehicles are approaching the intersection upon one highway, the signals operated by the first one will be maintained by the succeeding vehicles, and in which the signal lights are only restored to normal when the last vehicle has cleared the intersection.

Other objects and advantages will appear in the following specification and the novel features of the invention will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings forming part of this application, in which:

Figure 1 is a diagrammatic view partly in perspective showing the intersecting highways and the location of the signal lights and the switches which control them.

Figures 2, 3, 4 and 5 are illustrations of the appearance of the lights under varying conditions, and

Figure 6 is a diagrammatic view of the circuits for operating the signal lights.

Figure 7 is an across-the-line diagram of Fig. 6.

Referring now to Figure 1, I have shown there in intersecting highways which I have indicated as "Superior highway" and "Inferior highway" with a signalling device S preferably suspended from poles p. In the form illustrated, the lights of the signal S are controlled solely by the passage of vehicles along the Superior highway. It will be noted that at a predetermined distance from the intersection are the switches A and B for vehicles approaching from the left in Figure 1. Similar switches A' and B' are shown approaching from the right in Figure 1. These switches are set far enough from the intersection to permit a vehicle traveling upon the Inferior highway at a maximum rate of speed to stop before reaching the intersection after the actuating vehicle upon the Superior highway has crossed switch B (or B'). Thus, causing the operation of the lights. The distance between the switches A and B and A' and B' is determined by the time interval desired after the vehicle passes A and before it passes B (similarly for A' and B'). These pairs of switches function as a directional switch and may be combined in a single switch of special design.

In Figure 6 I have shown the circuits which are actuated by the closure of the switches A and B as at the left of the drawing and by the switches A' and B' at the right of the drawing and in the central portion of the figure I have shown the circuits leading to the lights and the devices for controlling the same.

It will be observed that in the mechanism controlled by switches A and B I have provided a relay R, a time switch mechanism T, a multiple contact switch M and a second switch V. Similar mechanism is indicated at the right hand side of the drawing at R', T', M' and V', respectively.

For the controlling of the lights I use a time limit relay G which will open a circuit after the lapse of a relatively long period of time following the beginning of the passage of current through the relay. This interval may be fifteen seconds. A similar switch is shown at K. P is a multiple contact switch and H is a similar switch. P indicates a delayed closing relay which closes a circuit after delay of a relatively short period, say, one to two seconds, after current shall have begun to pass through the relay. O and W are electric contact switches and X, Y and Z indicate electric lamps.

In the drawings I have shown the Inferior highway as being open to traffic unless the signals are set by traffic along the Superior highway but it will be understood that either highway might control the signals for the other. The
normal position of the apparatus is that shown
in Figure 6. In this figure current from the
source of power I passes through 2 to Z, contacts
35 and 36, through the switch P which
thereupon opens its contacts 35 and 36, then
at the contacts 35, 36, through the switch F
which
thereupon opens its contacts 43 and 44
and 45, 46, 47, 48, 49. This energizes the red
or "danger" light Z for the Superior highway and
the green or "clear" light for the Inferior highway.

But it is to be noted that in the normal position
of the apparatus the switch A is at position 12.
When the vehicle approaches the Superior
highway and sets the switch at position 11,
the red or "danger" light is energized for the
Superior highway and the green or "clear"
light for the Inferior highway.

For a second vehicle approaching upon the
Superior highway either following the first
vehicle or traveling in the opposing lane and
in the opposite direction so that the second vehicle
operates switches A or B or A' and B'
before the switch G shall have operated to restore
the system to normal after the passage of the first
vehicle, the following sequence occurs:

1. The system is in the actuated condition as
defined in paragraphs (1) to (4), inclusive,
above.

2. The second vehicle causes switch A to operate
and perform the same functions described
above for the system described previously
but causes none of the devices in those circuits
except switch V to operate because they are already
energized and function as a result of the initial
operation and in addition sets up the
function of the circuit from line I through 29, 30, 31, 32,
33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49,
50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67,
68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85,
86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102.

3. The third vehicle causes the corresponding
switch B to operate instantaneously which sets
up the same circuits as defined previously but
causes none of the devices in those circuits
except switch V to operate because they are already
energized and function as a result of the initial
operation and in addition sets up the
function of the circuit from line I through 29, 30, 31, 32,
33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49,
50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67,
68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85,
86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102.
The system will not be operated by vehicles travelling away from the intersection. Should such vehicles travel so far into the lane or lanes habitually used by opposing traffic as to pass over the switches A and B, these switches will be closed but in the reverse order for operation. Since no means is provided to hold B closed until A is closed, it will immediately open and prevent the operation of switches B. The switch A will remain closed for the time determined by the time limit relay T but this time is so short that the switch will be returned to its normal condition before an approaching vehicle can reach it, as the vehicle which is travelling on the wrong side of the road will require more time to clear the traffic lane for the approaching vehicle than is required to release the circuits through the switches controlled by the relay T.

In Figure 1, as stated, I have shown two circuits which are actuated by switches on the runway, i.e., the switches A—B and A'—B'. It will be apparent from an inspection of the drawings that a vehicle approaching from the right of Figure 1 will operate the switches precisely in the same manner as that already described as approaching from the left so that a description of the operation of one of the circuits will suffice for both.

In Figs. 2 to 5, inclusive, I have shown the various conditions that exist. Figure 2 shows the normal condition with the "danger" signal Z showing on the Superior highway and the "clear" signal Z' showing on the Inferior highway. Both signals are displayed by energizing a single lamp which shows to the respective highways through properly placed colored lenses. In Figure 3 the condition is shown where there is one vehicle in the block on the Superior highway. At this time the light X, which indicates "clear" is shown on the Superior highway and the "danger" light X' on the Inferior highway. These signals are displayed by a single lamp as above described in connection with signals Z and Z'.

In Figure 4 is shown the condition where there are two vehicles in the block. Here the "clear" lights X and Y are shown on the Superior highway while the two "danger" signals X' and Y' are shown on the Inferior highway.

In Figure 5 the condition is indicated where the second vehicle is in the block on the Superior highway when the first vehicle has cleared and in the instance the "clear" signal Y is shown on the Superior highway and the "danger" signal Y' on the Inferior highway.

It will thus be seen that I have provided a system which is automatic and in which the delays occasioned by the holding up of traffic, for instance, on a highway in the country where there are no vehicles even in sight on the intersecting highway, are obviated since, as stated, it is the presence of vehicles on one highway that controls the lights while the predetermined interval of time. After the lapse of an interval of time sufficient for these vehicles to have passed the intersection the system is restored to normal.

I claim:

1. An automatic electric traffic signal system for highway intersections comprising a "danger" signal light normally displayed for one highway, a "danger" signal light adapted to be displayed at times for the other highway, a "clear" signal light normally displayed for the intersecting highway, a pair of "clear" signal lights adapted to be automatically displayed at times for one highway on each side of the intersection for maintaining the "danger" signal for the second highway in operation while causing the second "clear" signal for the first-mentioned highway to be displayed, the means actuated by the conjoint action of the pair of switches also including means for delaying the cutting off of the "clear" signal light after both pairs of switches have been operated.

2. An automatic electric traffic signal system for highway intersections comprising a "danger" signal light normally displayed for one highway, a "danger" signal light adapted to be displayed at times for the other highway, a "clear" signal light normally displayed for the intersecting highway, a pair of "clear" signal lights adapted to be automatically displayed at times for the first-mentioned highway, a pair of roadway switches on one highway on each side of the intersection, the switches of each pair being spaced apart and being at a definite distance from the intersection, means actuated by the conjoint action of that pair of switches on the side of the intersection by approaching traffic for changing the "danger" signal light to "clear" and the "clear" signal light to "danger" and including means which is adapted to be set in motion by a second vehicle passing over one of the pairs of switches nearest the intersection for maintaining the "danger" signal for the second highway in operation while causing the second "clear" signal for the first-mentioned highway to be displayed, the means actuated by the conjoint action of the pair of switches also including means for delaying the cutting off of the "clear" signal light after both pairs of switches have been operated.

3. An automatic electric traffic signal system for highway intersections comprising a "danger" signal light normally displayed for one highway, a second "danger" signal light adapted to be displayed at times for the other highway, a "clear" signal light normally displayed for the intersecting highway, a pair of "clear" signal lights adapted to be displayed automatically for the first-mentioned highway, a pair of roadway switches on one highway on each side of the intersection, the switches of each pair being spaced apart and being at a definite distance from the intersection, said switches being actuated in a definite sequence by vehicles, means successively actuated by the conjoint action of the switches in proper sequence on the side of the intersection by approaching traffic for changing the "danger" signal light to "clear" and the "clear" signal light to "danger", and including means which is adapted to be set in motion by a second vehicle passing over one of the pairs of switches nearest the intersection for maintaining the "danger" signal for the second highway in operation while causing the second "clear" signal for the first-mentioned highway to be displayed.

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