Sept. 24, 1935. C. ADLER, JR 2,015,612

TRAFFIC SIGNAL

Filed Jan. 13, 1932 3 Sheets-Sheet 1

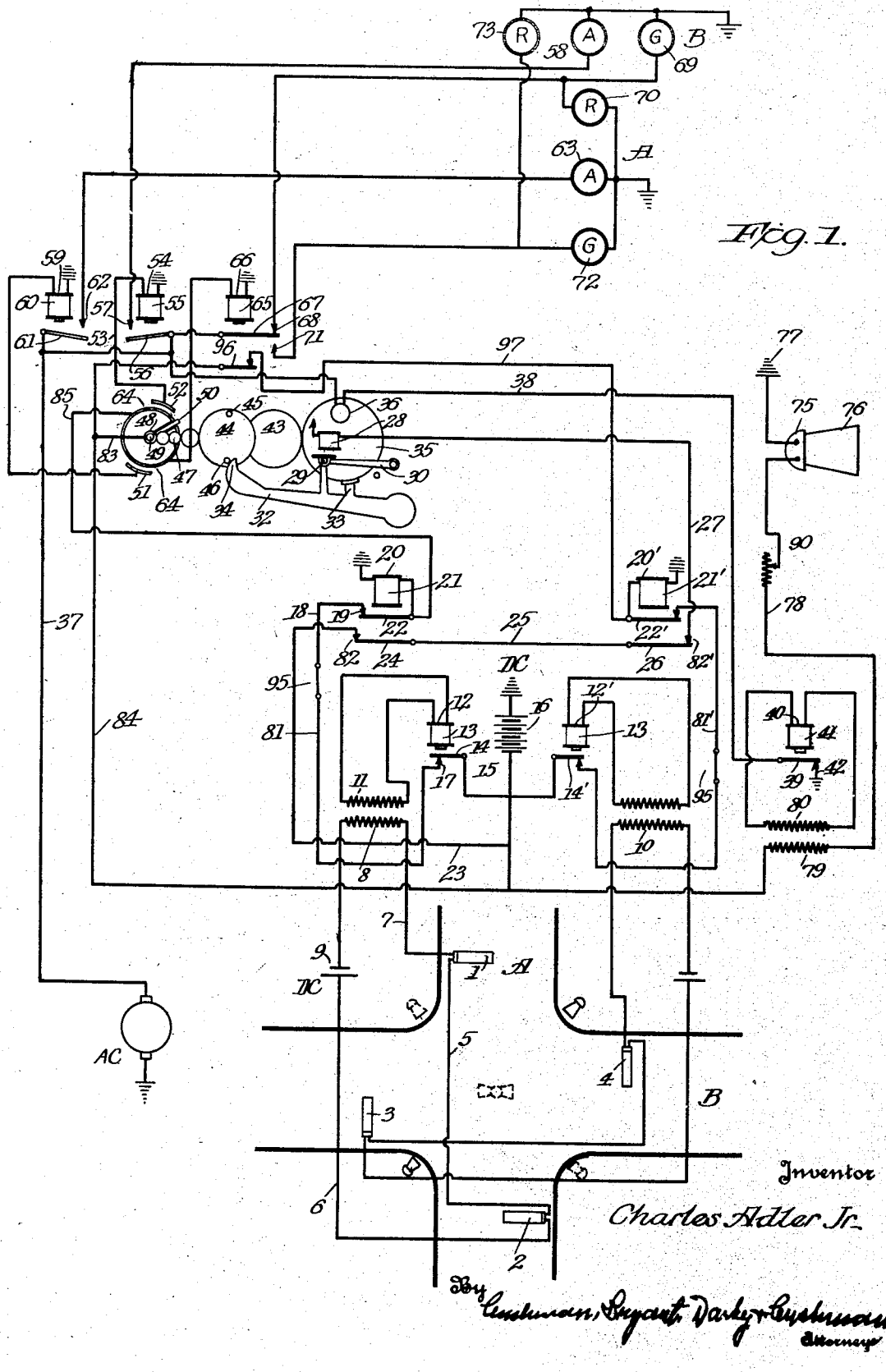


Fig. 1.

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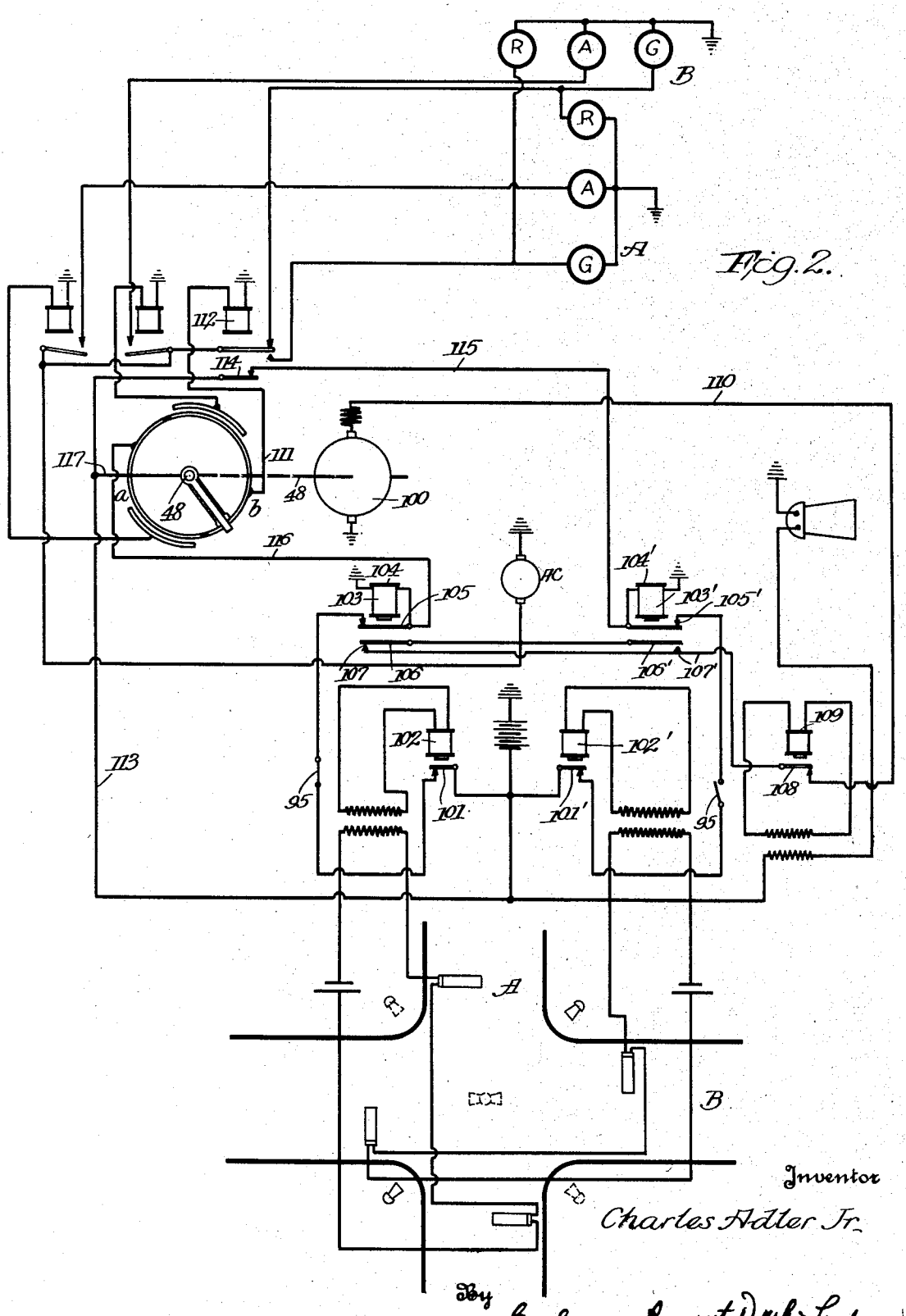


Fig. 2.

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TRAFFIC SIGNAL

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Fig. 3.

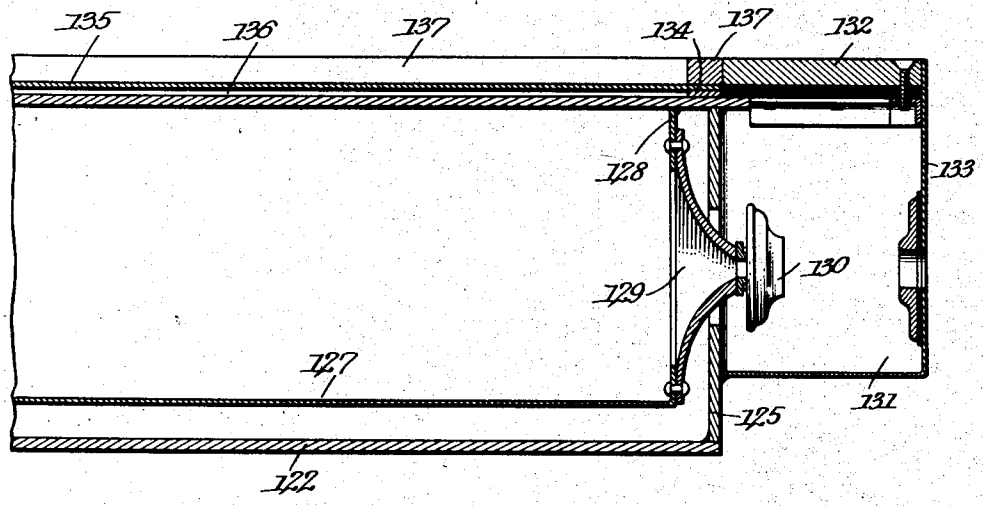
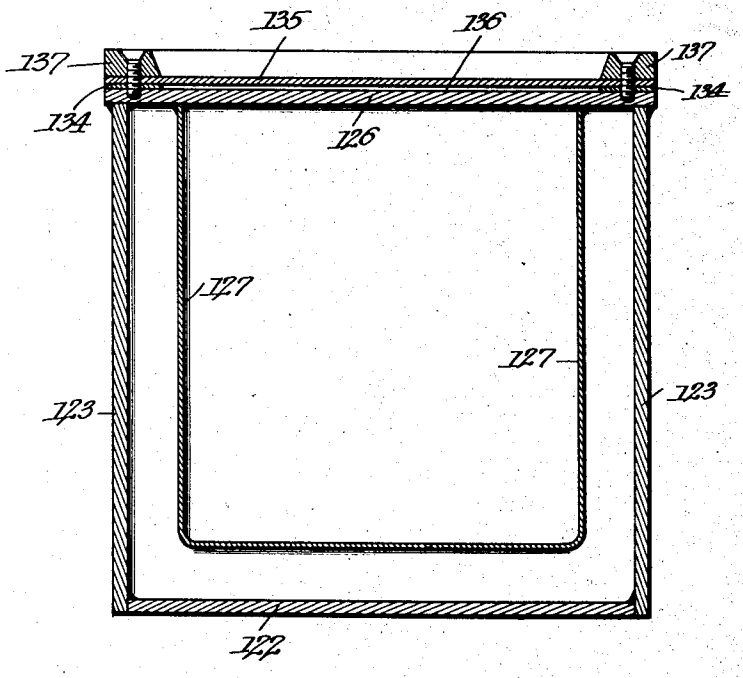


Fig. 4.



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UNITED STATES PATENT OFFICE

2,015,612

TRAFFIC SIGNAL

Charles Adler, Jr., Baltimore, Md.

Application January 13, 1932, Serial No. 586,420

7 Claims. (Cl. 177—337)

The present invention relates to traffic signal systems, and more particularly comprises an improvement upon signals of that character which are generally spoken of as "traffic actuated."

In the present case I employ a traffic actuated means, namely a sound box which is arranged in the highways in advance of the intersection which it is desired to control. Cooperating with such traffic actuated means, but independent thereof, are means arranged at the intersection which are directly sensitive to sound waves created by the passage of vehicles. It is therefore the primary object of the invention to provide a traffic control system wherein the conditions prevailing at the intersection will govern the transfer of the stop and go indication back and forth. In other words, the transfer in accordance with the present system will take place substantially instantaneously with the actuation of the traffic actuated element, but by reason of the means at the intersection, such immediate transfer will be prevented or halted at any point, i. e., subordinated between the movement of the signal mechanism to present "stop" and "go".

It will therefore be seen that the present invention seeks to eliminate, and does eliminate, all timing such as has been heretofore practiced in connection with traffic actuated systems. There is no maximum or minimum period for the particular signal indications as understood in the art, and in fact the signal indications when no traffic is present, are transferred immediately upon actuation of the traffic actuated element, and where traffic is present and sound waves are being created at the intersection, such sound waves control the transfer, i. e., are superior and there is no definite time period for either road leading to the intersection.

The present invention is practicable because it has often been observed that vehicles approach the intersection in a stream and as long as such vehicles are sufficiently close together, the sound vibrations created by them will prevent any transfer of the signal to the other road. When, however, a gap occurs in the vehicle stream, as experience indicates is the usual condition of moving traffic, an actuation of the traffic element on the other intersection will instantly transfer the signal and halt traffic in the line of the traffic stream.

As a condition, however, to such a transfer, if the gap is not sufficiently large, or if the sounds created by the succeeding vehicle are sufficiently intense, actuation of the traffic element will not cause a transfer, or if the transfer has started but is incompleted, the sounds created by the succeeding vehicle will halt such transfer until the sound vibrations are no longer sufficiently intense to be received by the means at the intersection when the transfer will be continued.

It is a further object of the invention to provide a mechanism wherein continuous subsequent actuation of the same traffic element in any one road will have no effect upon the mechanism for transferring right of way.

An additional object of the invention is to provide lamp circuits whereby the signal will operate on the "split amber principle".

A further object of the invention is to provide a signal system which can be made fully automatic, or caused to act as a reverting signal without changing the mechanism.

It is, however, the prime purpose of this invention to avoid the use of any timing mechanism and the signal which has no normal is completely controlled by traffic, being characterized by freedom from any so-called minimum or maximum and having an immediate operable sound actuated signal changing means subordinated, however, to a separately operable control means which is superior to said first named means. Preferably, this independent and superior control is also sound actuated.

Referring to the drawings, I have illustrated in Figure 1 a diagram of my system, and in Figure 2, a further diagram of a modification.

Figures 3 and 4 are detail views of the traffic actuated elements.

I have illustrated the invention applied to an intersection having the converging roadways A and B. Preferably in each of said roadways I place a traffic actuated element which is disposed in advance of the intersection. These traffic actuated elements I will indicate as 1 and 2 in street A, and 3 and 4 in street B. They will be more specifically described hereafter, but in the present instance comprise elongated hollow sealed boxes or receptacles which are interposed in the street with their top surfaces flush therewith, and have associated microphones whereby the vibrations created by vehicles moving over the hollow box will be translated to the signal mechanism. The sound boxes 1 and 2 are connected by a wire 5 to each other and are connected in series by the wires 6 and 7 with the primary of a transformer 8. A battery 9 is interposed in the line to the primary. The elements 3 and 4 are similarly connected to the primary of a transformer 10. The secondary or microphone circuit includes the sec-

ondary winding 11, and the relay 12 comprising the usual electromagnet 13 and armature 14. The armature 14 is connected by a wire 15 to a battery or other source of direct current 16. The armature also rests at its other end upon a contact 17 which leads by a wire 18 to a contact member 19 associated with a relay 20 comprising the usual electromagnet 21 and armature 22. There is also connected to the battery by the wire 23 through contact 82 a second armature 24 which is associated with the armature 22 and electromagnet 21 of relay 20. The armature 24 is connected by a wire 25 to a second armature 26 which is connected through contact 82' to a wire 27 leading to an electromagnet 28. This electromagnet 28 is associated with a brake mechanism comprising an armature 29 mounted at the end of a pivoted arm 30 from which armature extends a leg 31 carrying a stop lever 32. The stop lever 32 has an upstanding brake shoe 33, and at one end is provided with a tapered foot 34. The electromagnet 28 is normally energized and therefore supports the trip lever 32 in elevated position.

The braking mechanism just described is adapted to engage a disc 35 which is rotated by means of an induction motor 36. The induction motor is wired to a source of alternating current through the wire 37 and is also connected by a wire 38 to the armature 39 of a relay 40 having an electromagnet 41, which armature is normally down and grounded at 42. The induction motor is normally in circuit and hence operates immediately upon disengagement of the shoe 33. Geared to the induction disc 35 by a gear 43 is the member for engaging the trip lever 32. This member in the present instance comprises a disc 44 having diametrically disposed pins or projections 45 and 46 thereon. The disc 44 is connected by a train of gearing 47 to a shaft 48 carrying insulated contact arms 49 and 50, the contact arm 50 extending beyond the arm 49. Both arms 49 and 50 are connected through leads 83—84 to battery 16 at all times.

The contact 50 is adapted to engage respectively the contacts 51 and 52, which are diametrically disposed about the path of rotary movement of such contacts. The contact segment 52 is connected by a wire 53 with a relay 54 comprising an electromagnet 55 and an armature 56. When the contact 50 is in engagement with the segment 52, it will energize the magnet 55 and lift the armature 56 to engage a contact 57 leading to the amber light 58 on road B. When the contact 50 engages the segment 51, the relay 59 comprising electromagnet 60 is energized to attract the armature 61 to engage the contact 62 which leads to the amber light 63 on road A. The contact 49 engages a circular contact surface which is divided into segments *a* and *b* defined by the diametrically disposed insulated points 64. When the contact 49 engages the segment *b*, as shown in the drawings, the relay 65 has its electromagnet 66 energized to attract the armature 67 into engagement with contact 68, which leads to the green light 69 on road B. The red indication 70 on road A is in multiple with the circuit to the green light 69 and consequently when the green on road B is illuminated, the red on road A will likewise be illuminated. When the contact 49 engages the contact segment *a*, the electromagnet 65 is de-energized and the armature 67 drops into engagement with contact 71 which is connected to the green light 72 on road A and, as shown, the red light 73 on road B is in multiple with the circuit to green light 72 so that illumination of green light 72 on road A will simultaneously illuminate red light 73 on road B.

It is to be observed that by reason of the position of the amber segment 52, coinciding as it does with a portion of segment *b*, that in the transfer from road B to road A, the respective contacts 49 and 50 will engage respectively the contact segment *b* and the amber segment 52. Thus in transferring right of way from road B, there will appear with the green on road B also an amber indication since the lights 58 and 69 will both be illuminated. At the same time, however, the red light 70 on road A will remain illuminated until the contact 49 engages the contact segment *a* when the amber and green on road B will be extinguished and simultaneously red will appear on road B and green on road A.

As stated, the induction motor circuit is normally made through wire 37 from the source of alternating current and wire 38 leading to armature 39 and ground. The relay 40 is associated with a microphone 75 having a megaphone 76 associated therewith, one side of the microphone circuit being suitably grounded, as at 77, and the other side leading by a wire 78 to the battery 16. In the line 78 is a resistance 79 forming a primary transformer coil cooperating with a secondary coil 80 having its terminals connected with the electromagnet 41.

The operation of the invention will now be described, and it is to be observed that with the diagram shown in Figure 1, the green light 69 and the red light 70 are illuminated, the contact 49 engaging the contact segment *b*, and hence the signal is set to move traffic along road B, and halt traffic on road A.

Upon a vehicle passing from one of the traffic actuated elements 1 or 2, or both of them, an alternating E. M. F. is set up in the secondary 11 of the circuit to relay 12, which attracts the armature 14 and breaks the circuit from the battery through this armature and wire 18 to electromagnet 21. The electromagnet being thus de-energized, permits the armature 22 to drop from the contact 19 and the armature 24 to drop from the contact 82. The armatures 22 and 24 are mechanically associated with the relay 20 and simultaneously operated thereby.

When the armature 24 drops, the circuit from the battery through the wire 23 to the contact 82 is broken, and hence the circuit from the battery through wire 27 to electromagnet 28 is broken, de-energizing this electromagnet and permitting the trip lever to drop out of engagement with the pin 46. Since the motor 36 is constantly energized and is only restrained by the brake shoe 33, it will at once through the gear 43, disc 44 and associated gearing, act to revolve the shaft 48. As the shaft 48 revolves, the contacts 49 and 50 move toward the insulated points 64 and the split amber indication is given on road B with the green and amber lights energized due to engagement of contact members 49 and 50 with segment *b* and amber segment 52. As the insulated contact arms are rotated, and pass into contact with segment *a*, the green light on road A is illuminated and the red light on road B likewise illuminated. At the same time, a circuit is established through wire 83 which is connected to the contact members 49 and 50 and battery 16 through wire 84, on the one hand, and wire 85 which is connected to the contact segment *a*, and to relay 20 and its ground on the other hand. This circuit will energize the electromagnet 21 as soon as contact 49 engages con-

tact segment *a* and attract armatures 22 and 24, thereby energizing electromagnet 28 and drawing up or attracting armature 29 and the brake mechanism.

The trip lever 32 is thus moved up into the path of rotation of pin 45, and when said pin 45 engages the said foot 34, it causes the shoe 33 to engage the periphery of the disc 35 and stop further rotation of the parts. Hence the signal will have been transferred to road A.

It will be understood, of course, that as soon as vibrations created by passage of a vehicle over the sound elements 1 and 2 cease, the armature 14 will drop into engagement with contact 17 and the circuit will be re-established. In this connection, it will be noted that with the signal now set for "go" on road A, the passage of vehicles over the sound elements in road A will not produce any transfer movement, for while the armature 14 will jiggle due to the vibrations set up by the sound elements 1 and 2, the circuit to the relay 20 is independent thereof since said circuit is now made through the wire 85 from contact segment *a*, and therefore armature 24 will not drop. Hence a stream of vehicles may continue to pass over road A without affecting the signal unless one of the sound actuated elements 3 or 4 on road B is actuated.

The purpose of the microphone and associated circuit will now be described.

At this point, however, it should be stated that the disc 35 and the associated mechanism whereby the shaft 48 is operated, are simply actuating means and have for traffic purposes no timing value. Thus actuation of either of the sound actuated members 1, 2, 3, and 4 will cause a substantially immediate transfer of the signal back and forth between the roadways, and whatever time period may be required to effect such transfer is not effective for traffic control purposes as understood in connection with other present automatic transfer systems or the traffic controlled systems of which the present invention is an example.

The microphone 75 is preferably positioned at the intersection. I usually employ two of such microphones which are preferably disposed at the intersection and preferably positioned upon a post or pedestal on the opposed corners. Of course, I may place such microphones in the ground at the intersection. Also, I may use a single microphone positioned in the box or housing for the signal mechanism which is disposed at the intersection. Again, where a centrally disposed signal box is employed, that is, one situated on an island in the center of the intersection, I may place one or more microphones in the proper position so as to be exposed to travelling on both intersecting highways.

The sensitivity of the microphone may be adjusted and controlled by a suitable regulable resistance 90, as shown.

As set forth, the normal circuit to the induction motor 36 is made through the armature 39 which is grounded at 42. However, assuming that vehicles are passing on road A, they will set up sound vibrations, as for example those created by the motor, as well as any incident to the character and condition of the machine, which vibrations will be caught by the microphone 75 to induce an alternating E. M. F. into the secondary 80 to energize the electromagnet 41 and attract the armature 39 to thereby break the circuit to the motor 36.

I will now describe the conditions under which the microphone 75 operates to render the present traffic signal efficient.

In the first problem, where traffic is light on both streets, if the "go" signal is on road B, actuation of elements 1 and 2 will immediately transfer it to road A, and vice versa.

The second problem is where a stream of traffic is passing on road A and traffic desires to cross road B. In this situation, as long as vibrations are set up at the intersection to which the microphone is sensitive, actuation of the elements 3 and 4, is subordinate, and while it will break the circuit and de-energize the brake magnet 28, cannot cause a transfer since the motor circuit through armature 39 is broken because the armature 39 will be attracted by the electromagnet 41 and hence microphone 75 and associated mechanism is superior. Therefore, the signal will not transfer until the sounds either cease or are of less intensity than the sensitivity of the microphone.

With this condition in mind, traffic engineers have observed from experience that in traffic streams there is usually a gap, and hence if one of elements 3 or 4 have been actuated, when this gap occurs and the sound vibrations either cease or become of decreased intensity, the armature 39 will drop and the motor 36 will operate to transfer right of way. Because of the fact that the actuating mechanism comprising the disc 35 and associated parts connected to the shaft 49 move too rapidly to have any traffic control value, advantage can be taken of the gap to transfer the signal without difficulty.

However, it is necessary to safeguard such immediate transfer as where the gap between the vehicles is relatively short, and hence where such a short opening in the traffic stream exists, the vibrations set up by the succeeding vehicle defining the gap will be at once picked up by the microphone to lift the armature 39 and stop the operation of the motor, and hence the transfer of the signal. Thus such transfer may be halted, i. e., is subordinated at any point in the rotating movement of the shaft 49 to the action of the superior microphone circuit. As a result, traffic waiting to cross the intersection must wait until another gap occurs in the stream on road A, when the armature 39 will drop and the motor will continue to operate the parts.

Of course, the same result will obtain if there is a stream of traffic on road B and either of the elements 1 and 2 have been actuated.

It will be seen, therefore, that the invention does not possess any timing structure and that there is an entire absence of a maximum or minimum period of "go" and "stop". Furthermore, the time period is indefinite, depending as it does upon sound vibrations present at the intersection. A transfer of the signal cannot be accomplished unless there be an absence of vibrations or sound waves, or such sound waves as are present are not sufficiently intense to be picked up by the microphone.

The present signal, in addition, permits the transfer to be interrupted at any point in the rotation of the shaft 48, with the result that the transfer although released may be retarded whenever the sound vibrations are such as will be picked up by the microphone. As the result, there is no definite time period for the rotation of the shaft 48 in response to an actuation of the traffic elements.

In some cases there is a natural tendency of the disc 35 to coast slightly, which will act to move

the shaft in the direction of transfer, and of course the vibrations may be such that the armature 39 will jiggle to intermittently move the shaft 48 in the direction of transfer.

It is these important characteristics of the present invention which make it as near to the presence of a traffic officer as it is possible for a machine to be.

The present invention can be made into an automatic reverting signal independent of the sound means by interposing a manual switch 95 in the lead 81 or the lead 81' which switch when thrown open will render the sound means 1, 2, 3, 4 and 75, 76 ineffective.

In this manner, if it is desired to have the signal indication normally green on road A and the mechanism operable to transfer to green on road B, the switch 95 in lead 81 will be opened and permitted to remain so. Thereupon, when the sound elements 3 or 4 on road B are actuated, the relay 12' attracts the armature 14' and breaks the circuit through lead 81' to relay 20', whereupon armatures 22' and 26 drop and the electromagnet 28 is de-energized. The brake lever then drops and the shaft 48 rotates to transfer the signal to road B. Electromagnet 65 being thus energized by connection to the contact segment b attracts not only the armature 67 but also the armature 96, establishing a circuit from the battery 16 through lead 84, armature 96, lead 97 to the relay 20', thereby attracting the armatures 22' and 26.

In the normal operation of the invention with both switches 95 closed, this would re-establish the circuit through the line from battery 16 and leads 23—82—24—25—26—27 to energize solenoid 28 raising brake lever 32 and fix the signal for road B as shown in the drawings, the operation of the parts for each road being the same.

However, with switch 95 in lead 81 open, such circuit cannot be established except when contact 49 engages segment *a*, since armature 24 only contacts with contact 82 when relay 20 is energized, and the latter is only energized when green is given on road A, i. e., through battery 16, lead 84, 83, contact 49, segment *a*, lead 85 to relay 20.

Thus the contact arm 49 will, in the absence of actuation of relay 40 through sound vibrations which, like the other sound actuated means, is rendered ineffective, continuously move over the segment *b*, and return the signal to road A when the circuit above mentioned will be completed and solenoid 28 energized.

The speed at which the disc 35 rotates will be such that notwithstanding it must make a complete revolution to return the green or right of way to road A in the vehicle operated reverting type of signal in accordance with this invention, the time period will not be comparable to that now permitted or required in normal traffic operation. Dependence is therefore placed upon the superior microphone system 75 disposed adjacent the intersection which, in accordance with the sound waves or vibrations created by the passage of moving vehicles, will control the transfer of the signal indication. Hence it will be seen that in this vehicle actuated reverting signal no predetermined minimum or maximum time periods are possible and the transfer is solely regulable by the continuity of the sound waves and their intensity relative to the microphone system. In other words, the vehicle actuated reverting system has no compellable features such as understood in the art. Thus the signal will not change to give the green to road B as long as the sound waves at the intersection are such as to maintain the electromagnet 41 energized and hence there is nothing resembling a predetermined maximum. Similarly if the brake lever has been released by actuation on road B, the rate of transfer can be interrupted and delayed in accordance with the sound waves at the intersection again excluding the use of any predetermined maximum. When the signal indication has been given to road B it will remain on road B only as long as the intensity of the sound waves causes energization of electromagnet 41 in the event of actuation of either the element 1 or 2 in row A. Hence, there is no condition resembling the so-called minimum. When it starts to revert, this reversion may be halted or delayed as the conditions at the intersection, namely the intensity of the vibrations or sound waves, require.

The invention is capable of acting as a full automatic signal by opening both of the switches 95 and then changing the gear ratio between the motor and shaft 48 to produce an appropriate timing, in which event solenoid 28 can never be energized.

While I have indicated that the speed of the shaft 48 is normally such that a transfer will take place, were it not for the microphone system, substantially instantly, it will be understood that this speed of transfer, namely the rate at which the shaft 48 rotates, can be regulated as desired. I prefer, however, that the time of transfer in the vehicle actuated system from red to green be quite rapid, in fact, such that the time period would not be acceptable in normal traffic signal operation.

It will be understood that the ratio of the gearing between the disc 44 and the shaft 48 is such that the arm carrying the contacts 49 and 50 will rotate at the same speed as the disc 44. This may be varied, if desired, but it is preferred that they have the same speed of rotation.

Referring to Figure 2, I have illustrated a construction which is substantially similar to that shown in Figure 1, but in which a motor, preferably a series motor 100, drives the shaft 48 to rotate the contact members 49 and 50.

The signal being set for "go" on road B, it is to be observed that actuation of either of the traffic actuated elements 1, 2, will cause the armature 101 of relay 102 to be attracted, thereby breaking the circuit from the battery to the electromagnet 103 of relay 104. This will de-energize the electromagnet and permit the armature 105 thereof and armature 106 which is mechanically connected with armature 105, to drop. Armature 106 will engage the contact 107 which leads to the armature 108 of microphone relay 109. Armature 108 is electrically connected with the motor through lead 110. Thus the circuit to the motor includes the source of alternating current, armature 106, and the circuit just described. The control of the motor is obtained in the same manner as heretofore described in connection with the microphone 75. Since the insulated arms carrying the contacts 49 and 50 are mounted upon the same shaft 48 as the motor drive, the speed of the two will be the same. Hence sound waves and vibrations set up at the intersection will be picked up by the microphone and the motor will be halted and delayed, as with the construction shown in Figure 1. I prefer a series motor in some instances for the purposes of simplicity, and of course I may change the relative speeds of the motor to the contactor arms as desired,

for example by imposing gearing between the motor and shaft 48.

In the illustration given in Figure 2, the green light on road B is operating, but the transfer of right of way is substantially similar to that set forth in connection with Figure 1. As with the construction shown in Figure 1, the mechanism which is operated by actuation of the respective sound elements for the respective streets of the intersection is similar, and I have therefore simply described the operation of the apparatus as far as possible to effect transfer of right of way from road B to road A, it being understood that the circuits to the lamps are identical with the prior described arrangement.

In connection with the construction of Figure 2, it will be understood that the motor will stop whenever the contact 49 engages either of the segments *a* or *b*, this being due to the circuits established on the one hand through line 111 to relay 112, whereby the circuit from the battery through line 113, armature 114 and line 115 to relay 104' is completed, breaking the contact between armature 106' and contact 107'. In the same manner, when the contact 49 engages the segment *a*, the motor circuit is broken by reason of the energization of relay 104 through the medium of line 116 and line 113 leading from the battery through line 117 to the contactor and lifting relay 106.

Referring to Figure 1, and providing there are no sound waves at the intersection such as would affect the relay 40, movement over one of the sound boxes in one highway will start the transferring of the signal, and if immediately thereafter the sound box in the other intersecting road be actuated, the brake will not be applied. This will be clear, since if the element 2 be actuated, the brake lever will be released and the contactor arm will move to present the right of way to road A. If, immediately upon actuation of element 2, or, to make it clearer, immediately after the brake lever has dropped, releasing the adjacent pin 45 or 46, element 3 be operated, the signal will return to give right of way to road B. This is due to the fact that while armature 24 may be picked up when the contact 49 is on segment *a*, armature 26 cannot be picked up until the contact 48 is on segment *b*, and consequently the electromagnet 28 will remain de-energized. Of course, this transfer of right of way in accordance with my invention will be too rapid for practical traffic regulation, and in actual operation the microphone 75 will pick up vibrations from the first car and delay or retard the return of the signal to road B since the induction motor will at least, if there be only a single car crossing road A, be halted or stopped for sufficient time to properly control the intersection and prevent any dangerous result. As will be observed, the signal is operated by independent sound actuated means, (one subordinate, namely the transferring means, actuated by elements 1, 2, 3, and 4, and the other superior, namely the microphone control 75—39—41) and is free from any minimum or maximum timing. Furthermore, the signal does not require any normal.

It will be understood that a single microphone 75 may be employed, and where I employ two or more microphones, whether they be positioned at the corners of the intersection or on an island in the center, I prefer to connect them in series.

In the drawings, I have indicated the batteries by the numerals D. C., and the source of operating current for the motor as A. C., although it will be understood that direct current can be employed where available.

The construction shown in Figure 2 may be adapted for a reverting signal or full automatic signal by interposing switches 95 similar to those of Figure 1 and changing the gear ratio between the motor and shaft 48.

In normal operation, no timing is provided for, the signal being solely responsive to conditions at the intersection, and in the absence of sounds or vibrations at the intersection, the actuating means has no traffic control value. In this manner, I obviate the use of such objections as time extension, since no minimum or maximum is provided for in normal operation and transfer being solely under control of microphone 75 is indefinite.

The microphone or microphones may be sensitive to vibrations, sound waves, or both, and adjusted to pick up and handle all character of conditions prevailing at the intersection.

When used as a reverting signal, traffic elements in one street will not be necessary, as will be understood.

Referring to Figures 3 and 4, the construction of the sound producing highway elements 1, 2, 3, and 4 will be explained.

Each of these elements makes use of an outer shell comprising a bottom 122; two side walls 123 and two end walls 124 and 125. This shell, in practice, is of a rectangular shape and is about five feet ten inches long, more or less; about ten or eleven inches in width and between nine and ten inches in height. In practice, this shell is embedded in the highway.

A cover 126 is provided over the top of the hollow shell and from the under side of this cover there depends an inner shell 127. This inner shell is formed of metal that is very much thinner than that of the outer shell and is closed at the bottom, sides, one end and of course at the top, because its upper edges are preferably welded to the under side of the cover 126. There is no contact between the sides, ends, or bottom of this inner shell 127 and the sides, ends or bottom of the outer shell and said inner shell is absolutely hollow.

One end 128 of the inner shell has a circular opening 129 therein and a microphone structure 130 is attached to said end over said opening.

This microphone structure projects through an opening in the end wall 125 of the outer shell and this projecting portion of the said microphone is confined in a separate end-chamber 131 formed on the end of the outer shell and accessible by means of a detachable cover 132, so that access may be gained to the microphone for the purpose of connecting or disconnecting the wires leading thereto. These various wires, in practice, are carried through pipes to one wall 133 of the microphone chamber.

I have found in practice that it is quite desirable to provide a second covering over the cover 126 of the shell because sound vibrations in the inner shell are so readily set up that a heavy rain, or hail beating down directly on the cover 126 will cause vibrations at the microphones which will cause an operation of the signal mechanism. To avoid this, I use a rectangular shim 134 around the marginal edges of the cover 126 and I provide a plate of thin saw steel 135 which is stretched over but spaced from the top surface of the cover 126, so as to form a gap 136 between said plate and cover so that when rain or hail beat down on

the steel plate, there will be no direct transmission of sound to the inner shell.

A rectangular frame 137 is bolted through the marginal edges of the saw-steel plate to the cover to hold the said plate in spaced relation above the cover.

It is, therefore, to be understood that each of the sound-producing highway elements has the form of one hollow receptacle within another, and that each element is embedded in the highway, preferably with the rectangular frame 137 flush with the upper highway surface, so that the wheels of a vehicle may pass over the frame and the saw-steel plate without jolt or jar to a vehicle or its occupants.

It is also to be understood that there are no movable parts or switches that have any movement as the result of actual contact with the vehicle wheels and, therefore, nothing to get out of order or requiring constant maintenance as is the case where movable switch contacts are actuated by the passage of vehicles.

I claim:

1. A signal system for intersecting traffic lanes having a right-of-way signal indication for separate display to said lanes, means actuated by traffic on one lane to display the right-of-way to that lane, and means actuated by the sound of traffic on the lane having the right-of-way for maintaining such right-of-way so long as such sound actuates the last said means.

2. A signal system for intersecting traffic lanes having a right-of-way signal indication for separate display to said lanes, means actuated by traffic passing in said lanes to transfer right of way back and forth between said lanes, and means actuated by the sound of traffic on the lane having the right-of-way for maintaining such right-of-way so long as such sound actuates the last said means.

3. A signal system for intersecting traffic lanes having a right-of-way signal indication for separate display to said lanes, means actuated by traffic passing in said lanes to transfer right-of-way back and forth between said lanes, said means comprising sound actuated devices, and means actuated by the sound of traffic on the lane having the right-of-way for maintaining such right-of-way so long as such sound actuates the last said means.

4. A signal system for intersecting traffic lanes having a right-of-way signal indication for separate display to said lanes, means actuated by traffic passing in said lanes to transfer right-of-way back and forth between said lanes, said means comprising sound actuated devices disposed in said lanes, and means actuated by the sound of traffic on the lane having the right-of-way for maintaining such right-of-way so long as such sound actuates the last said means.

5. A signal system for intersecting traffic lanes having a right-of-way signal indication for separate display to said lanes, means actuated by traffic passing in said lanes to transfer right-of-way back and forth between said lanes, said means comprising sound actuated devices disposed in said lanes, and separate means actuated by the sound of traffic on the lane having the right-of-way for maintaining such right-of-way so long as such sound actuates the last said means.

6. A signal system for intersecting traffic lanes having a right-of-way signal indication for separate display to said lanes, means actuated by traffic on one lane to display the right-of-way to that lane, means actuated by the sound of traffic on the lane having the right-of-way for maintaining such right-of-way so long as such sound actuates the last said means, and means for transferring right-of-way to another lane when traffic ceases to operate said sound means in the other lane.

7. A signal system for intersecting traffic lanes having a right-of-way signal indication for separate display to said lanes, means actuated by traffic on one lane to display the right-of-way to that lane, means actuated by the sound of traffic on the lane having the right-of-way for maintaining such right-of-way so long as such sound actuates the last said means, and means operated by traffic in another lane operable to transfer right-of-way to that lane but subordinate to said last named sound actuated means.

CHARLES ADLER, JR.