

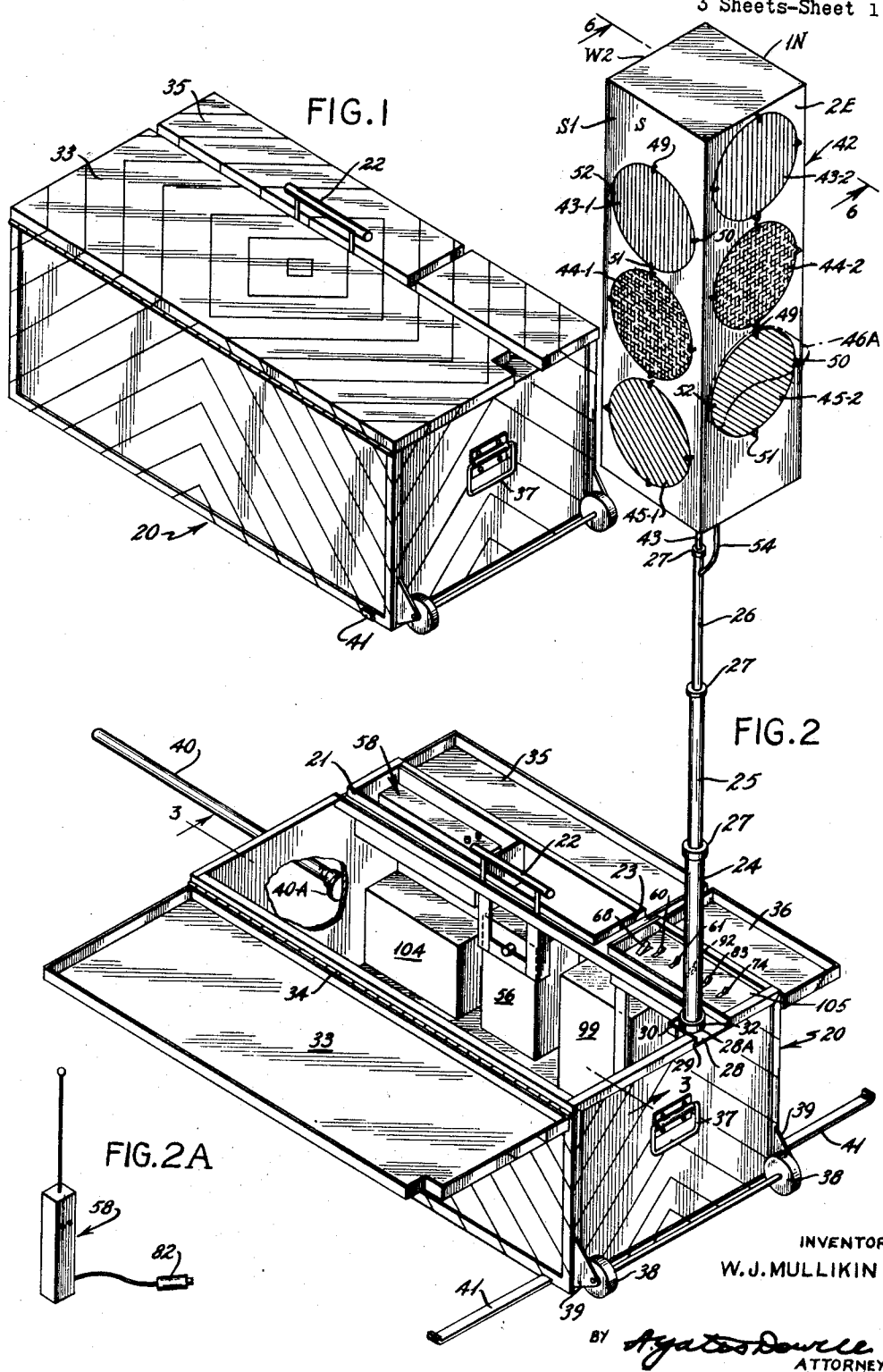
June 14, 1960

W. J. MULLIKIN
PORTABLE TRAFFIC SIGNAL

2,941,185

Filed May 21, 1957

3 Sheets-Sheet 1



June 14, 1960

W. J. MULLIKIN
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3 Sheets-Sheet 2

FIG. 8

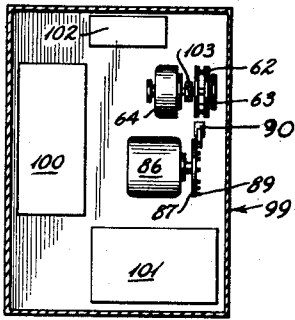


FIG. 9

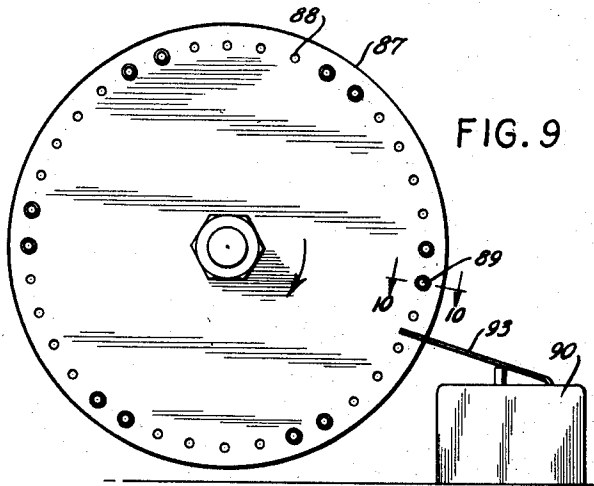


FIG. 10

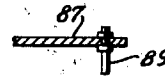


FIG. 11

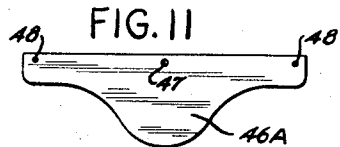


FIG. 13

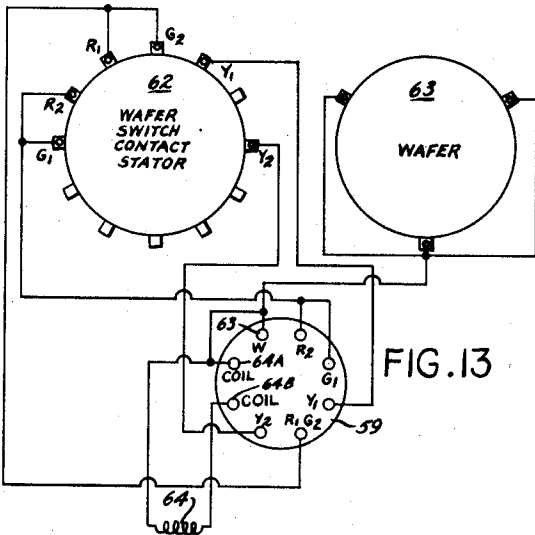
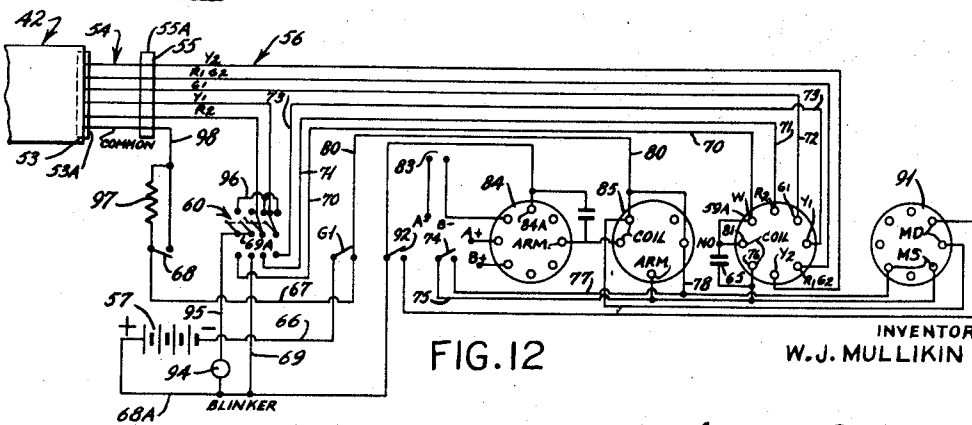


FIG. 12



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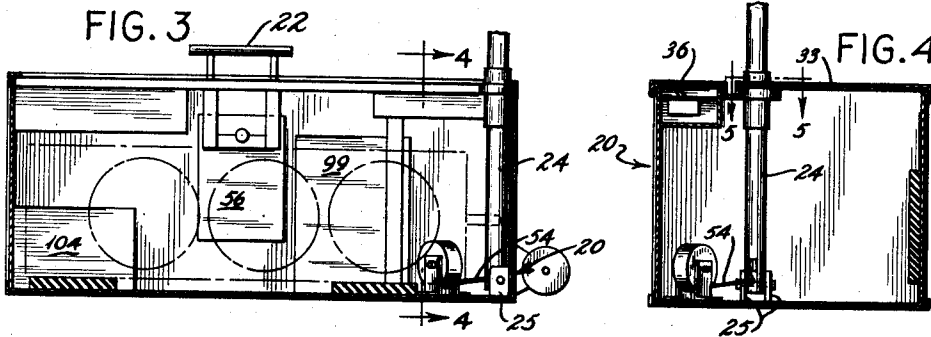
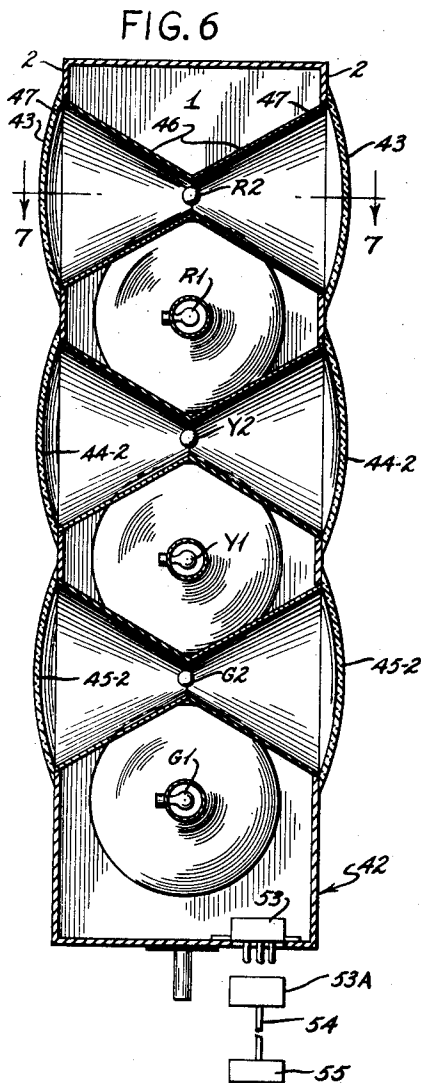
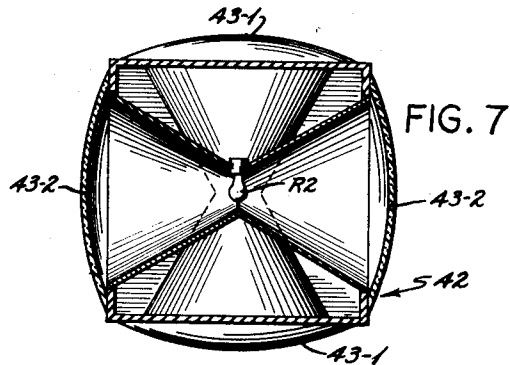
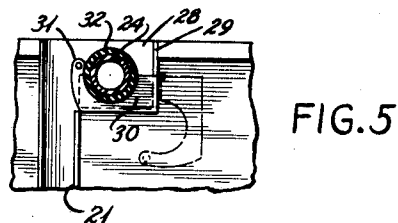
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W. J. MULLIKIN
PORTABLE TRAFFIC SIGNAL

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3 Sheets-Sheet 3



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1

2,941,185

PORTABLE TRAFFIC SIGNAL

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Filed May 21, 1957, Ser. No. 660,616

1 Claim. (Cl. 340—41)

The present invention relates to a signal for use at traffic intersections and adapted for easy transport from one location to another particularly for use around schools during opening and closing of the school and at special events requiring traffic control.

Heretofore, various types of traffic signals have been employed including some of a portable nature but none has been entirely satisfactory from the point of view of the operation thereof, the prompt availability for use and simplicity of transporting from one location to another.

An object of the present invention is to provide a traffic signal which overcomes the defects of the prior art and to provide a readily transportable traffic signal of general utility.

A further object is to provide a signal which can be operated from a remote position thereby reducing danger of the operator being struck by vehicles.

A further object is to provide a compact, readily assemblable traffic signal which can be carried from place to place and set up in a minimum of time.

A further object is to provide a signal system which is adaptable to meet all the needs of traffic control at an intersection or other place where traffic control is necessary.

Other and further objects will be apparent as the description proceeds and upon reference to the accompanying drawings wherein:

Fig. 1 is a perspective view of the carrying box for the traffic signal;

Fig. 2, a perspective view of the carrying box open with the traffic signal assembled and ready for operation upon closing the covers;

Fig. 2A is a perspective view of the radio broadcasting control unit.

Fig. 3, a longitudinal section of the carrying box taken on line 3—3 of Fig. 2;

Fig. 4, a transverse section of the carrying box taken substantially on line 4—4 of Fig. 3 with the covers closed;

Fig. 5, a horizontal section of the column supporting portion of the carrying box taken substantially on line 5—5 of Fig. 4;

Fig. 6, a vertical section through the signal light head;

Fig. 7, a horizontal section taken substantially on line 7—7 of Fig. 6;

Fig. 8, a plan view of the control housing with cover removed;

Fig. 9, an elevation of the automatic timing mechanism;

Fig. 10, a fragmentary section of the time control disk showing one of the micro switch operating pins;

Fig. 11, a plan view of the flexible sun shade guard for application to the signal lenses;

Fig. 12, a wiring diagram illustrating the practical connections for the control of the lights; and

Fig. 13, a wiring diagram to the solenoid control octal plug.

Briefly the portable traffic signal of the present invention includes a carrying and storage open top housing or

2

box of a size large enough to house the entire signal including the supporting column, the signal light head and the control mechanism. The box top is provided with longitudinal and transverse troughs which receive flanged edges of covers hinged by other edges to the sides of the box providing a rain tight housing during use and storage.

In addition to conventional trunk handles on the ends of the box and a suitcase type handle on the longitudinal trough above the center of gravity of the box with the signal light head and supporting column stored therein, wheels provided at one end adjacent the bottom and a removable rod handle at the other for convenience in moving the box in the manner of a two wheel cart. Extensible feet telescope into the box adjacent the wheels to increase the effective width of the base.

The box houses a source of power, manual control means, motor controlled timing mechanism, and a remote control portable radio whereby the signal can be controlled from a position out of danger of traffic so the officer operating the signal will be safe and in an advantageous location for observation.

Referring more specifically to the drawing, the traffic signal system of the present invention includes a carrying and storing housing or box 20 made with a metal angle frame of aluminum or the like with the bottom, sides and end made of sheet aluminum suitably fixed to the angle frame by rivets or other means. The box is provided with a longitudinally extending channel trough 21 extending from one end to the other with a transverse trough 22 communicating with the longitudinal trough and extending to one side of the box, the troughs providing channels for carrying water over the ends and sides of the box. Extending upwardly from the longitudinal trough 21 is a suit case type handle 23 located at the approximate center of gravity of the filled box 20 when filled.

A signal light head, a telescopically collapsible supporting column therefor, a manual control, a motor operated time control, a radio control and a source of power are provided within the box. The suit case type handle 23 is preferably of a collapsible type which may be stored in the trough 21 to provide a substantially smooth top surface when the top is closed.

A supporting column formed of telescoping base section 24, intermedial section 25, and top section 26, has the lower end of base section 24 pivotally mounted between a pair of lugs 25, 25 fixed to the bottom and one end of the box, the collapsed length of the column being less than the box length permitting storage in the box. The upper end of each telescopic section is provided with fingers which are threadedly received by an internally tapered threaded collar 27 whereby adjustment is obtained.

To maintain the column in upright condition a plate 28 having a column receiving semicircular notch 28A is fixed to one end of the box 20 and to the trough 21 with a flange 29 extending upwardly therefrom to which a U-shaped flanged retaining element 30 is hinged. The free end of the retaining element has an aperture registering with notch 28A in the plate 28 to secure the retaining element 30 in column supporting position. A resilient rubber collar 32 or the like is provided on the column section 24 for engagement by the plate 28 and element 30 providing a water tight joint.

For closing the open top of the box and to provide a top surface free of obstructions for easy storage and transportation, a first cover 33 having a flange around its entire periphery is hingedly connected by means of a piano type hinge to one side of the box, the flange thereof being designed and constructed to overlap the one side and portions of the ends of the box and one flange of the trough 21. The cover 33 has one corner notched to

overlap the flange 29 and the registering flange of the U-shaped retaining element 30. Covers 35 and 36 are similarly hinged to the other side of the box to cover the remaining portions thereof, thereby providing a water tight box both when the signal is in its operative position or stored.

For carrying the box, trunk type handles 37 may be provided at each end. Wheels 38, 38 may be rotatably mounted in brackets 39, 39 the periphery of the wheels being approximately tangent with the bottom surface of the box 20. A removable rod type handle 40 threaded at its inner end is provided for the other end of the box being threaded into a flange 40A whereby the box may be moved from place to place in a manner similar to the manipulation of a two wheel cart.

Extensible feet 41, 41 are slidably mounted in the bottom of the box for projection outwardly as shown in Fig. 2 to increase the effective width of the box thereby increasing the stability, the feet being movable to the retracted position shown in Fig. 1 for storage or transportation.

Mounted on the top of the supporting column is a signal head 42 having a downwardly projecting rod 43 for reception into the upper end of top telescopic section 26 and being retained in adjusted position for height and angularity by the internally threaded collar 27 in the manner previously described. The signal head 42 comprises an elongated casing of square horizontal cross-section with its top and bottom closed. For the purpose of identification, one set of opposite sides of the signal head will be designated "1" to indicate the north and south directions while the other opposite set will be designated "2" to indicate the east and west for the purposes of identification and wiring.

The top lens 43 of each side of the signal head is red, the intermediate lens 44, yellow, and the bottom lens 45, green. Each pair of lenses for example red lenses 43-2, 43-2 on sides 2, 2 of the head 42 are illuminated by a single lamp R-2 which is located at the center of a reflector formed of truncated cones 46, 46 which are joined at their smaller ends and have their outer ends received in reflector-receiving openings 47, 47 in the side walls, 2, 2 of the signal head. The joined truncated cone or funnel like reflectors 46 form an hour glass configuration. It will therefore be observed that lamp R-2 illuminates red lenses 43-2, 43-2 on opposite sides of the signal head. Similarly, the other pairs of lenses on opposite sides of the signal head are illuminated by a single lamp in similar fashion and a repetition of the description thereof will be omitted. It will be evident that a lamp R-1 is positioned below lamp R-2 and illuminates red lenses 43-1, 43-1. The third lamp is designated Y-2, illuminates yellow lenses 44-2, 44-2 and the fourth lamp Y-1 illuminates yellow lenses 44-1, 44-1. The next lamp G-2 illuminates green lenses 45-2, 45-2 and the bottom lamp G-1 illuminates green lenses 45-1, 45-1.

The lenses may be provided with sunshades 46A as shown in Fig. 11 and such sunshades are provided with a central aperture 47 and end apertures 48, 48', the sunshades are adapted to be secured to the signal head by means of L-shaped hooks 49, 50, 51 and 52 positioned around each lens with the free ends of the hooks projecting rearwardly toward the center of the lens, the guard 46A being shown in phantom lines mounted over the lenses 45-2, the opening 47 being placed to receive the hook 49 and the hook 52 being received by the opening 48 and the hook 50 being received by the opening 48'.

The material of the sunshade 46A is sufficiently resilient and of a springy nature to be retained because of its resiliency in an operative position, the lenses 45-2 serving as an additional means to prevent excessive displacement. It will be noted that the hook 51 is not used in the phantom showing in Fig. 1, but it will be evident that the sunshade 46A can be mounted in four different positions by the arrangement shown since the hooks are

identical and are equally spaced whereby the signal is adaptable for use under all conditions of sunlight and the sunshade may be made to prevent vision from an angle to prevent operators of automobiles from anticipating the change of lights.

The mechanical features of the invention are believed to be sufficiently described above and the electrical connections and control switches and the like necessary to provide an operative embodiment is shown in Figs. 12 and 13. The signal lamps are connected to a common male plug 53 to which the lamps are connected in the manner shown in Fig. 12 with a common wire which may also be a ground. A cooperating female socket 53A is connected to a cable 54 having corresponding wires and at the other end of the cable a plug 55 is provided which cooperates with a socket 55A at the other end of a supply cable 56. The cable 54 extends into the upper column section 26 and through column section 25 coming out of the bottom column section 24 through an opening having a pulley guide therein, a reel preferably of spring operated automatically wind type keeps the cable 54 under sufficient tension to prevent objectionable bunching within the column. Since the cable 54 is of limited length and has socket 53A at one end and plug 55A at the other end the plug and sockets are disconnected at the time the equipment is stored and are connected after the mechanical adjustments are made and it will be apparent that with this arrangement it is not necessary to have brush contacts and the plug 55 is plugged into a socket 55A to make the proper connection. It will be evident that the plug and socket combination 53, 53A and 55, 55A are of the polarized type so that the connections can only be made in one position thereby assuring the proper connection.

Referring more specifically to Fig. 12, a six volt battery 57 located centrally in the box 20 is connected to a group of six switches shown in the corner of the box 20 covered by the cover 36 and such switches are connected through suitable lines to a plurality of sockets as explained hereinafter.

Upon reference to Figs. 12 and 13 the wires and contacts are generally identified with the lamp having the lens identified in the manner previously described, using the legends Y, G, R, for yellow, green, and red respectively with the numeral 1 indicating the north and south lenses and the numeral 2 indicating the east and west lenses. It will be noted that G-2 and R-1 connect to a common wire and therefore the green lenses 45-2 and the red lenses 43-1 will always be illuminated together. Where it is desired to have the warning lights such as Y-1 and R-2 on at the same time to obtain the desired arrangement with respect to an intersection it may be necessary to rotate the signal head 42 through 90 degrees or the entire box 20 may be rotated through 90 degrees thereby rotating the signal head to accomplish this result.

Briefly, the electrical arrangement is such that the signal lamps in the signal head can be operated manually in sequence, may be operated by a radio control broadcasting unit 58, may be operated by a time control motor driven switching mechanism. There is also a blinker arrangement whereby R-2 and Y-1 may be operated.

In the normal operation of traffic signal lights, the sequence may begin with R-1 and G-2 lamps being lit, in the next sequence the Y-2 lamp is lit for a short period while R-1 and G-2 remain lit and then the signal changes to R-2, G-1 which continues until a change is about to occur when Y-1 is lighted while R-2 and G-1 remain lit and the sequence is then repeated. To accomplish this result the control unit shown in Fig. 13 is used in cooperation with the wiring diagram of Fig. 12, the connection between the control unit of Fig. 13 and the wiring diagram of Fig. 12 is by means of an octal plug 59 in the control unit and the octal socket 59A in the wiring diagram wherein the contacts are designated by the same

5

letters as the lamps. A double throw 4-pole switch 60 in the diagram is assumed to be closed in its down position and the power supply switch 61 is closed, the other switches being in their open positions. The control unit includes a wafer switch contact stator 62 and a rotating contact wafer 63 which are mounted on a common axis with a rotary solenoid or magnetic coil 64 arranged to move the wafer 63 one twelfth ($\frac{1}{12}$) of a revolution for each energization of the coil 64, which coil 64 is connected to the coil contacts 64A, 64B of the octal plug 59. The other connections of the control unit are believed to be self-explanatory, the R-2, G-1 contacts thereof being joined together and to the corresponding contacts of the plug 59 while the R-1, G-2 contacts are connected together and joined to the R-1, G-2 contact of the plug 59.

It will be evident that the octal socket 59A has contacts corresponding to those of the plug 59 with wiring connections therefrom which are believed to be self-explanatory, a condenser 65 being shown across the coil connections to reduce arcing. Assuming the wafer to be in the position shown and superimposed directly upon the wafer switch contact stator 62, contact will be made between the R-2 contact at 10 o'clock and the unconnected contacts at 2 o'clock and 6 o'clock thereby completing a circuit when the plug 59 is plugged into socket 59A and 4-pole double throw switch 60 is in its down position and the power switch 61 is closed and one of the operating switches is closed.

Tracing the circuit from battery 57, the negative lead 66 from the battery passes to power supply switch 61 and through lead 67 to a dimming switch 68 which is closed and connected to the common wire to the signal head 42. The positive lead 68A from the battery carries current to a lead 69 to the downwardly closed switch 60 through lead 69A to lead 70 to contact W of octal socket 59A to plug 59 to wafer 63 and from such wafer 63 to the wafer switch contact R-2 which is connected to octal plug and octal socket R-2, G-1 which are thereby energized, the R-2 contact being connected by a lead 71 to the downwardly closed switch 60 to the R-2 lead to the signal head.

Assuming counterclockwise rotation of the wafer 63 on the wafer contact stator 62 from the previously described position contacts are now made from wafer 63 with G-1 at 9 o'clock, Y-1 at 1 o'clock, and no connection at 5 o'clock. Consequently, the R-2 and G-1 lamps remain illuminated while the Y-1 lamp becomes illuminated through lead 73 to downwardly closed 4-pole switch 60 to lead Y-1.

After the yellow signal has been on its selected interval, the next step of rotation causes the wafer 63 to make no contact at 8 o'clock, a contact with G-2 at 12 o'clock and no contact at 4 o'clock. This results in energizing of the connected contacts R-1, G-2 in the octal plug and socket and then through the common lead R-1, G-2 to the R-1 and G-2 lamps in the signal head.

Assuming the next step of rotation of the wafer base, no contact is made at 7 o'clock, contact with Y-2 is made at 3 o'clock and contact with R-1 is made at 11 o'clock. This contact continues the energization of lamps R-1 and G-2 as explained above and also results in energization of lamp Y-2 through the Y-2 contacts in the octal plug and socket and thence through the Y-2 lead to the Y-2 lamp in the signal head.

Four phases of a complete cycle of the operation have been explained and it will be understood that the cycle is repeated.

Each step of rotation of the wafer is accomplished by energization of the coil 64 of a conventional rotary solenoid and such energization may be accomplished by means of a manual operating switch 74 which is connected by a lead 75 to the coil contact 76 of the octal plug, the other lead 77 from the switch 74 being connected through leads 78 and 80 to the power supply switch 61 to the negative lead 66 from the source of

6

power. The other coil contact 81 of the octal plug is connected to the wafer 63 and through the lead 70 to the downwardly closed switch 60, lead 69A and lead 69 to the positive battery lead 68. It will thus be seen that step by step rotation of the wafer with resulting control of the signal can therefore be accomplished by the manual switch 74.

For remote operation, the radio broadcasting unit 58 is provided with a manual switch 82 whereby the radio broadcasting unit 58 can send out signals. A selector switch 83 is closed which provides energy from the negative terminals of A and B batteries to a contact of a second octal socket 84 which is connected by suitable connections to a 5-pin socket 85, the 5-pin socket 85 having coil connections of an intermediate relay which coil closes the normally open contact between the ARM (armature) and NO (normally open) contact which contacts are arranged in parallel to the manual operating switch 74 and operate the wafer a step for each energization. The second octal wafer socket 84 and the 5-pin socket 85 are connected by means of cooperating plugs to a conventional receiving radio which operates a relay which closes a circuit between the ARM (armature) contact and a contact 84A thereby energizing the coil contacts of the 5-pin socket 85 which in turn energize the intermediate relay (not shown) which is connected by means of a 5-pin plug to the 5-pin socket 85. By this means the actuation of the manual switch 82 of the broadcasting radio 58 results in step by step operation of the wafer.

The signals may be operated by a timing mechanism driven by a $\frac{1}{3}$ revolution per minute Hayden motor 86 which drives a disc 87 which has a series of apertures 88 extending therethrough and in certain of the apertures shoulder bolts 89 are secured in suitable relation to obtain the proper sequence of operation. It will be noted that there are 6 duplications of pin arrangement shown and the space between adjacent apertures 88 corresponds to 5 seconds of time. The motor driven timing motor and its micro-switch 90 are connected to a third octal plug which cooperates with an octal socket 91, the motor being connected to the plug contacts MD and the micro-switch being connected to the plug contact MS whereby the motor driven control can be obtained by a simple plugging-in action but remains inoperative until the switch 92 for automatic control is closed. It will be observed that the micro-switch 90 is in parallel with the manual control switch 74 and manual control can be obtained by manually moving the spring blade 93 of the micro-switch 90. It will be apparent that the blade 93 of the micro-switch is resilient and contacts the shouldered bolts 89 closing the micro-switch 90 as the disc 87 rotates. With the arrangement of bolts 89 shown, the yellow signal will be on for 5 seconds corresponding to the spacing of the holes 88 and that a change of direction signals occurs every 30 seconds and a complete cycle takes 1 minute. It will be evident that the motor driven control will have to be synchronized in the proper relation at the time it is started and this can be accomplished by manual operation of the manual switch 74 or the micro-switch 90 or the radio control switch.

As explained above there are times when a red signal such as R-2 should be energized and the yellow signal Y-1 should be energized and in this type of operation it is desirable to have a blinking action which is accomplished by means of a blinking device 94 connected to the positive lead 68A from the battery while a lead 95 is connected from the blinker to two blades of the 4-pole switch 60, the switch 60 being closed in its upper position supplying power to the lead 96 which is connected to two of the upper contacts of the switch which are in turn connected to leads Y-1 and R-2 respectively which result in simultaneous blinking of the lamps Y-1 and R-2.

Another feature of the invention is the dimming resistance 97, arranged in shunt across the dimming switch 68 connected to a common lead 98 of the signal head.

It will be evident that when the switch 68 is open the resistance 97 will be in series with any lamp being energized and such resistance will result in reduction of the illumination from the lamps.

The control mechanism is conveniently located in a housing 99, which is shown to contain a radio receiver 100, radio A and B batteries 101, and the intermediate relay 102. The motor-driven control unit including motor 86, disc 87, and the bolts 89, as well as the wafer 62, and the stator contact 63 with the rotary solenoid operating coil 64, and the ratchet 103, for producing the step-by-step rotation of the wafer located in housing 99.

From the above description it will be evident that applicant has provided a traffic signal which can be carried in the box 20 with all the mechanism housed therein including the supporting column made of telescoping sections 24, 25, and 26, the signal head 42, the radio broadcasting unit 58 and the handle 40.

Further, the structure provides for rapid assembly and certainty of operation because of the simple connections made with electric plugs and sockets which can be assembled in only one position. Further, the radio, the intermediate relay, the rotary solenoid operated wafer control switch, and the motor driven automatic timing control can each be readily connected or disconnected with the circuit of Fig. 12 by the plug and socket connections for replacement, inspection, and/or repair and therefore any failure of operation can be readily corrected without removing the traffic signal from operation.

It is also contemplated that an automatic battery charger 104 will be provided with each traffic signal and the operation may be accomplished directly from an additional source of power without using the battery, if desired.

It will be noted that the switches are arranged in a panel 105, and the same reference numerals are applied to the switches in the panel as are used in the wiring diagram of Fig. 12, namely; the dimming switch 68, the 4-pole double-throw blinker control switch 60, the power supply switch 61, the motor driven automatic timer control switch 92, the radio control switch 83, and the manual operating switch 74.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is illustrated in the drawings and described in the specification, but only as indicated in the accompanying claims.

What is claimed is:

A traffic signal system comprising a signal head for

main and cross streets, said signal head having green, amber and red lights for the control of traffic on the main street and having green, amber and red lights for the control of traffic on the cross street with electrical connections including a coil actuated stepping switch operated one step at a time, a manually controlled switch, a radio controlled switch and a timer controlled switch, in parallel with each other and in series with said coil, to energize and deenergize the coil of the stepping switch, the contacts of said stepping switch being arranged to provide sequential operation of the lights on the main street from red to green and from green to simultaneous green and amber for a minor portion of a period and then back to red, and simultaneously with such sequential operation of the lights on the main street from the green light on the cross street to simultaneous green and amber light for a minor portion of a period to red, thence back to green, said switches providing for selective operation by the manually controlled switch, the radio controlled switch or the timer controlled switch, a timer to control the timer controlled switch, said timer having means to close and open the timer controlled switch, said timer being of a nature to be stopped in random position of the means to open and close the timer controlled switch, said random stopping and alternate manual or radio controlled operation and the return to timer controlled operation resulting in a possibility of improper period of amber light, the proper amber period being obtainable by operation of the manually controlled switch to provide the amber light for the acceptable portion of the green light period, the correction being obtainable during operation of the timer of the timer controlled switch by the timer.

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