

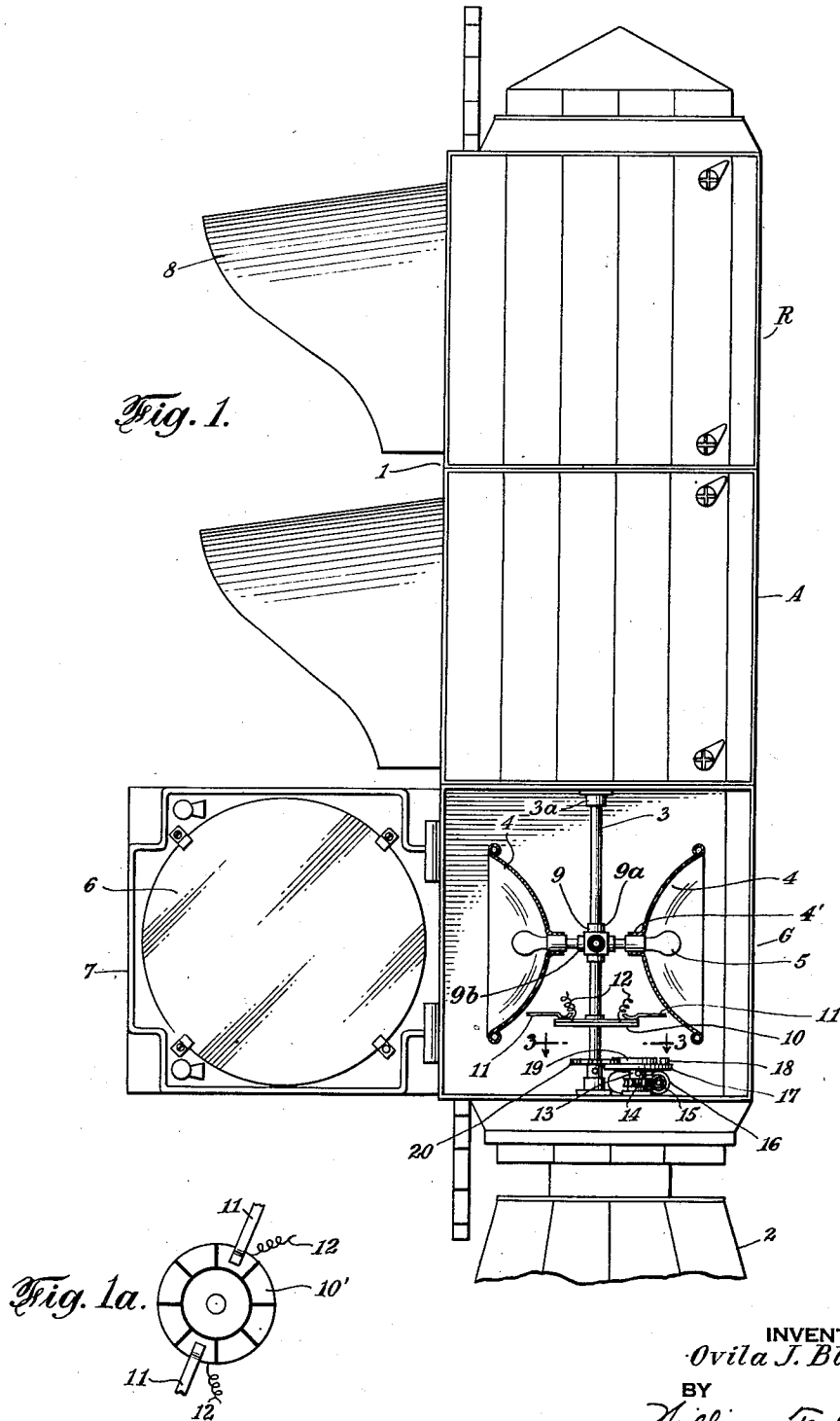
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TRAFFIC SIGNAL APPARATUS

2,557,531

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2 Sheets-Sheet 1



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Fig. 2.

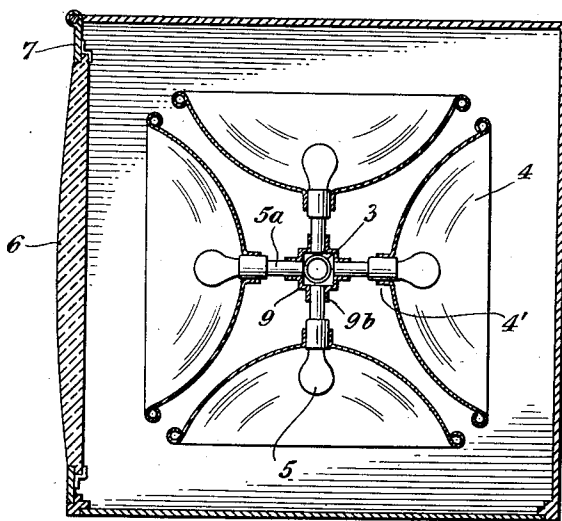


Fig. 3.

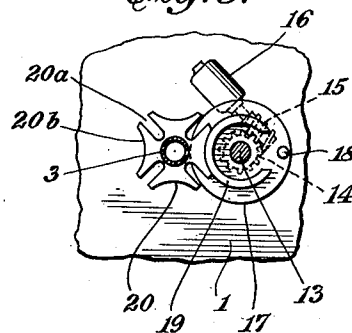
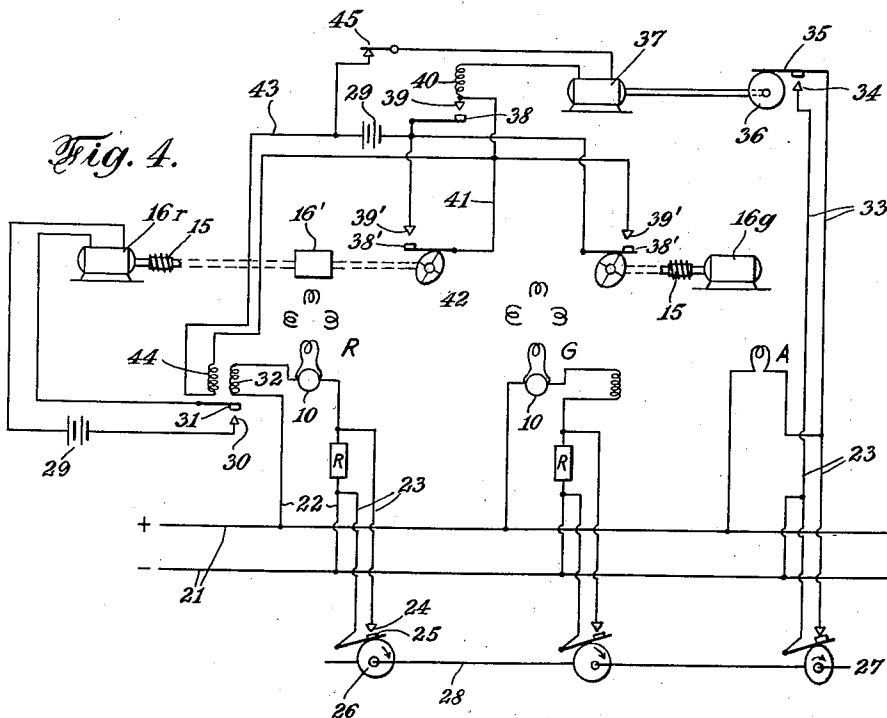


Fig. 4.



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TRAFFIC SIGNAL APPARATUS

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2 Claims. (Cl. 177—337)

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My invention is an improved traffic controlling mechanism; and more particularly apparatus of the kind that employs electrical illumination in changing colors to halt traffic at points on streets and highways and permit it to proceed.

It is an object of this invention to provide a traffic signal installation having multiple electric lamps associated with each of the regular colors, such as green and red, at a traffic signal post so disposed that if a lamp bulb burns out, it is forthwith automatically replaced by another. The full operation of the post is thus continued.

To this end a group of lamp bulbs is disposed upon a shiftable mounting member adjacent each colored lens, such as the green or red lens, in the casing of the apparatus, through which the light emitted by the bulb passes. Suitable means and connections are disposed to be actuated in conjunction with each group, so that whenever a lamp bulb ceases to function, it is swung out of position, and a new lamp moved in.

Another feature is a novel combination of parts by which, in the event of all the lamps of any one group being exhausted, an indication of this state of affairs is given at once; so that a new set of lamps can be supplied immediately to restore the mechanism to complete operative efficiency.

With such ends in view the invention resides essentially in the construction and arrangement of parts and circuits illustrated in the accompanying drawings; but in practice variations in details may be made without departure from the essential structure of the invention, as defined in the appended claims.

On the drawings

Figure 1 is a side view of a traffic post equipped with my invention.

Figure 1a is a detail view of the circuit closer for the lamps of such a traffic post.

Figure 2 is a horizontal section through a compartment of such a post from front to back.

Figure 3 is a horizontal section on line 3—3 of Figure 1; and

Figure 4 is an outline of a diagram of the electrical circuits by which the lamps of the traffic post are controlled and operated.

The numeral 1 indicates a casing or housing mounted at the top of a post or supporting column 2, said casing being divided into three compartments, one above the other, for a red signal, an amber signal and a green signal as indicated by the letters R, A and G on Figure 1.

In the compartments for the red and green signals is a rotatable shaft 3. The interior equip-

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ment of the compartment for the green signal alone appears on the drawings, but the same members will be mounted in the compartment for the red signal above, and will be actuated in the same way. The spindle or member 3 is mounted in bearings 3a at the top and bottom of the compartment containing it and can be turned through a full revolution. Attached to a point adjacent the middle of this spindle 3 and supported thereby are several reflectors 4, each of which is associated with an incandescent lamp bulb 5 at the middle. These bulbs are connected so as to be illuminated one at a time, and the light which these bulbs generate is emitted through a glass lens 6 carried by a door 7 shown on Figure 1 in open position. All of the compartments in the casing 1 are preferably of the same shape, being approximately square in horizontal cross section, with the door 7 carrying the lens at one side thereof and all the lenses facing in the same direction. If desired, each of the doors may also mount on the exterior thereof a hood 8 to prevent undue dispersion of the light which the lamps produce.

The lamps, which are four in number, for example, are attached to the reflector 4 by means of suitable sockets or bearings 4' at the middle of the latter, and are secured to a hollow 4-way bearing member or coupling 9 with hollow bosses or flanges 9a at the top and bottom to enable the member 9 to be mounted on the shaft 3. Preferably this shaft is in two sections, an upper and a lower, with the adjacent ends affixed in the bearing 9a and the opposite ends received in bearings 3a at the top and bottom of the compartment containing it, so that this shaft can be turned to move each lamp 5 and its associated reflector 4 into position facing the lens 6.

The bulbs of the lamps 5 are made fast to necks which enter the coupling or head 9 and the terminals of each lamp are connected to the outside circuit which supplies the electrical power through a circuit closer 10 mounted on the shaft 3 to rotate therewith. This circuit closer 10 will be in the form of a disc carrying contact segments 10' in a circular row at its rim, all of the contact segments being insulated from the disc and from one another. The conductors leading from each lamp to the circuit closer 10 are electrically connected to segments which are diametrically opposite by means of the conductor wires 12 and brushes 11 mounted in fixed position within the compartment of the casing in any suitable manner to press upon and contact with the segments of the circuit closer 10. These brushes 11 are also at opposite ends of a diameter and outside

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current from a circuit connected to both of the brushes will therefore flow to the one segment of the circuit closer, through one wire 12 to one of the lamps and from the lamp back through the other conductor 12 to the opposite segment 10' and then out through the other brush 11. Hence whenever shaft 3 is turned through a quarter of a revolution another lamp and reflector will be swung into position facing the lens 6, and this lamp will simultaneously be connected with the outside circuit to receive current through the brushes 11. The wires 12 for the lamps will of course pass through the head 9a and the side bosses or sockets 9b.

The shaft 3 is shifted a quarter of a revolution at a time by means of an attachment comprising a short shaft 13 mounted on the bottom of the compartment and bearing a pinion 14. This pinion is engaged by worm 15 on the shaft of a motor 16 rotated thereby. Rigid with the pinion 14 is a disc 17, which carries a stud 18 and a circular rib 19, and which is just above the pinion 14; and the rib 19 has its extremities adjacent to the stud 18. The disc 17 with the stud and rib and the pinion 14 may be made in one piece and mounted to revolve on the shaft 13, which may be simply a stud or journal fixed to the bottom on the compartment in proximity to the shaft 3. On the latter and fixed thereto is an escapement wheel 20 which has four radial slots 20a opening through the rim which is thus divided into four parts; and the rim of the wheel between these slots is concave as at 20b, and has the same curvature as the rib 19. The wheel or element 20 is of such size and in such position that the rib 19 usually makes contact with the concave edges of the escapement wheel 20. Thus in operation when the motor 16 turns the disc 17 the rib 19 will hold the wheel 20 against rotation until the stud 18 moves in to enter one of the radial slots 20a of the wheel 20. At this time the gap between the ends of the rib 19 will be in position adjacent the wheel 20 and the stud 18 will therefore turn this wheel through an arc of 90 degrees. At the end of this movement the stud 18 will move out of the radial slot and the rib 20 will again engage one of the concave edges 20b of the wheel 20 so that the latter will stop. With this construction the shaft 3 can be turned 90 degrees at a time to bring the lamps in the compartments containing them and the shaft 3 successively into position to face the lens 6. Since there are four lamps in each compartment, whenever one of the lamps burns out the shaft 3 can be turned to carry the ruined lamp away from the lens 6 and another lamp into adjacent position with respect thereto.

The circuit connections for this mode of operation are indicated in Figure 4. The numeral 21 indicates a pair of supply wires and the lamps for the red, green and amber signals are connected in parallel to the circuit 21 by conductors 22. The lamps for the red and green signals receive current through series resistances R. One of the lamps of each compartment will be connected to the conductors 21 and 22 through the circuit closer 10 above described. The compartment for the amber signal, however, will contain only one lamp connected to the circuit 21 without resistances, and the circuits for each of the lamps of all three signals will include a pair of additional conductors 23, one of which leads to a fixed terminal 24 and the other to a movable terminal 25. The movable terminals for the lamps of the red and green signals will be ac-

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tuated by cams 26, and those for the lamp of the amber signal will be controlled by cam 27, all the cams being on a single shaft 28 to be rotated by connection to an operating unit.

The cams 26 for the lamps of the red and green signals will close the circuits for these lamps in the proper order and for the required length of time, and the cam 27 will operate to bring about the same result in connection with the lamp for the amber signal.

When the cam 27 is operated, the circuit of the lamp for the amber signal is closed and then opened an instant later. The cams for the lamps giving the red and green signals, however, are so arranged in connection with the circuits 23 that they have the effect of short-circuiting the resistances R, so that enough current can pass through these lamps to produce light of sufficient intensity. When the short circuits around the resistances are opened, however, though some current will continue to flow, it will not be enough to make filaments of the lamps for the red and green signals glow to any appreciable extent, and these will in effect be extinguished.

There is a motor like the motor 16 for each of the compartments containing lamps for the red and green signals. These motors are indicated in Figure 4 by the characters 16r and 16g. Each motor will be connected in circuit with a battery 29 and the circuit will contain a fixed terminal 30, and a movable terminal 31, which may be mounted on a pivoted arm and in position to drop upon the terminal 30 by gravity when free. This movable terminal, however, is made of some magnetic metal and above it is a small magnetic coil 32 in series with one of the conductors 22 connecting the lamp to the supply circuit 21. Hence as long as the lamp is unimpaired there will always be enough current in the coil 32 to keep the circuit of the associated motor open. When, however, one of the lamps burns out, no current at all will flow in the conductors 22, and the coil 32 will have no effect. The movable contact 31 now drops into engagement with the fixed contact 30 and the motor receives current to turn the pinion 14 and rotate the shaft 3, so as to swing the ruined lamp out of circuit and bring a new lamp into circuit. The signal is then given as before whenever the associated cam 26 shorts out the resistance R. The action is the same for the compartment to give the red signal and the compartment to give the green signal.

The lay-out of circuit connections also includes means for enabling the lamp for the amber signal to be flashed rapidly in the event of all four lamps in one compartment being burned out; and thus giving an indication that the lamps in the compartment where that situation exists all need replacement.

This arrangement consists of two electric conductors 33 attached each to one of the conductors 23 of the lamp for the amber signal; one conductor 33 leading to a fixed terminal 34, and the other to a movable terminal 35 to be operated by cam 36 on the shaft of another motor 37. The cam 36 will normally keep the terminal 35 lifted but it will be so shaped and operated as to permit this terminal 35 to drop often enough to operate the lamp for the amber signal as required between the times when the circuit for this amber signal is closed by the cam 27.

The motor 37 will be supplied with current from a circuit of its own containing a battery 29, a movable terminal 38 and a fixed terminal 39,

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both in series with a magnetic coil 40 and the battery 29 and motor 37. The movable terminal 38 will normally drop by gravity but when it engages the terminal 39 the magnetic pull of the coil 40 will hold the two terminals together.

This can be brought about by means of a shunt circuit from one terminal of the battery to the terminal 39 through a movable terminal 38' and a fixed terminal 39' and wires 41. The weight of the terminal 38' will normally keep it out of engagement with the terminal 39' but it can be lifted by a cam 42 which may be suitably coupled to the motor 16r by transmission gearing, if necessary, indicated at 16' and designed to operate in such a way that whenever the motor for the lamps to give the green signal, or for those giving the red signal, turns far enough to swing the shaft 3 through the last part of a full revolution, the cam 42 will also turn and cause the contacts 38' and 39' to engage. As soon as this happens the coil 40 closes the contacts 38 and 39 near the battery and the circuit of the motor 37 is thus closed and it stays closed when the cam 42 turns far enough to release the contact 38' which it engages. This cam 42 will be so mounted and coupled to the motor 16r that the motor must move the shaft 3 at least four times through successive quadrants before the local circuit 41 will be closed by the cam 42. Thus the lamp for the amber signal will be kept flashing until all the burned out lamps have been replaced by the operator or attendant.

The circuit of the motor 37 also has another circuit in shunt with the battery and coil 40 as indicated at 43 and containing a coil 44 adjacent to coil 32. With this circuit as soon as the motor 37 starts to operate the circuit of the motor 16r or 16g will be broken and these motors will stop and the cams 42 will rotate no further. Hence the shafts 3 controlled by the motors 16r and 16g will not continue turning after the four lamps successively burn out. After the last lamp fails, the exhausted group of lamps will receive one more impulse about the axis of the shaft 3 as the motor turns to actuate the cam 42, and thus start the motor 37; but the lamp for the amber signal will continue to flash until the lamps in the other two compartments are replaced with new ones. The attendant then opens the switch 45 which breaks the circuit of the motor 37, replaces the four lamps and the entire apparatus is then in condition for normal operation, with both cams 42 just beyond the position where they have lifted the movable contacts 38', and requiring rotation through substantially another whole revolution before the motor 37 will again be actuated. This is as it should be because with four new lamps mounted upon the head 9, a complete

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revolution of shaft 3 will have been effected when the four lamps again burn out; and the motor to bring about this revolution will have to shift the shaft 3 successively through four arcs of 90 degrees each, the cams 42 moving to the same extent and in step therewith.

The connections, cams, etc. for the motor 16r governing the lamps in the compartment for the red signal are shown in full on Figure 4; and are duplicated for the motor 16g but for the sake of convenience are not fully illustrated in Figure 4.

The coil 44 is of course a magnetic coil and operates to lift terminal 31. Such a coil opens the circuit of the motor 16r or 16g so as to stop either motor, while motor 37 continues operating and keeps the amber lamp flashing.

Having described my invention, what I believe to be new is:

1. Traffic signal apparatus comprising a housing, a plurality of lamps therein, a shaft on which said lamps are mounted, means for operating the shaft to rotate same to shift a new lamp into operative position whenever a lamp is burned out, connections to a supply circuit for said lamps, means comprising a motor to rotate said shaft, and a circuit to energize the motor, said circuit being controlled by said connections, another lamp in said apparatus, and means comprising circuits and connections for causing said other lamp to flash repeatedly when all of the first named lamps have been burned out, to indicate that replacement of said lamps is necessary.

2. The traffic signal apparatus according to claim 1, which further comprises connections controlled by the last named means to break the circuit of said motor and stop the same as soon as the flashing of said additional lamp commences.

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