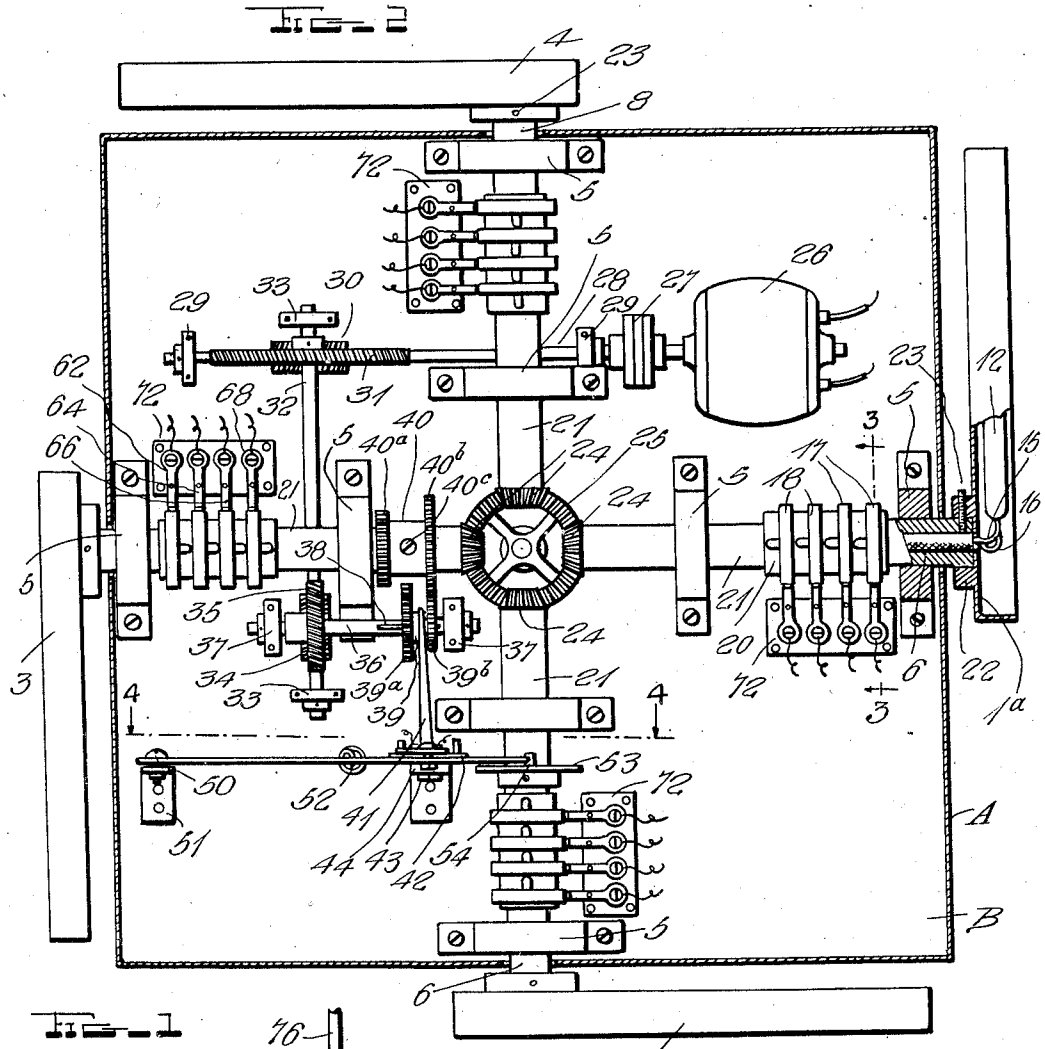
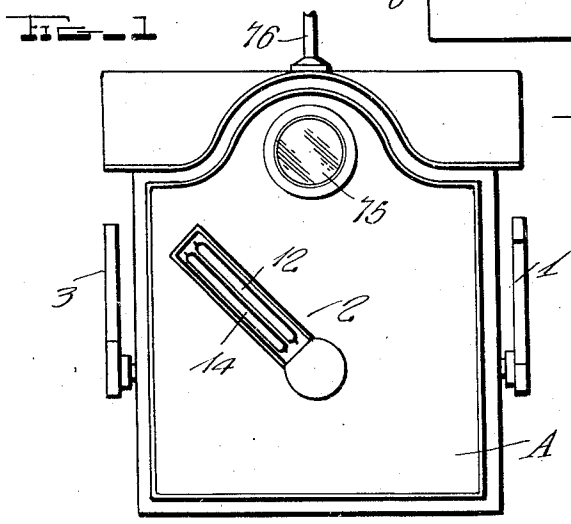
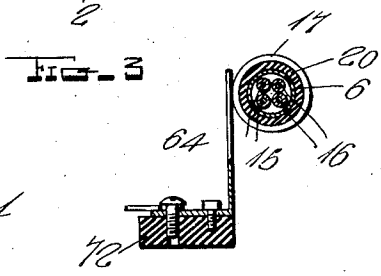
Jan. 2, 1934. A. O. PRICE 1,942,306

TRAFFIC SIGNAL

Filed March 25, 1932 4 Sheets-Sheet 1







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TRAFFIC SIGNAL

Filed March 25, 1932 4 Sheets-Sheet 2

FIG. 4

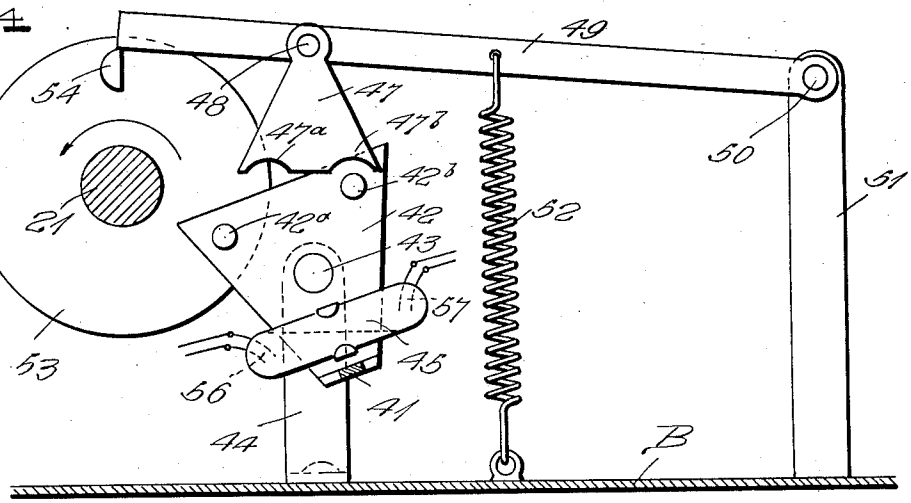


FIG. 5

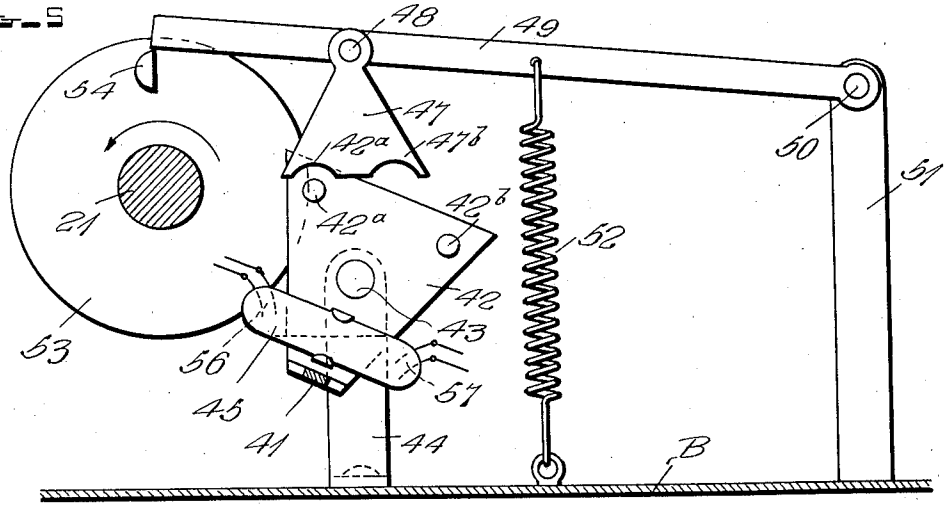
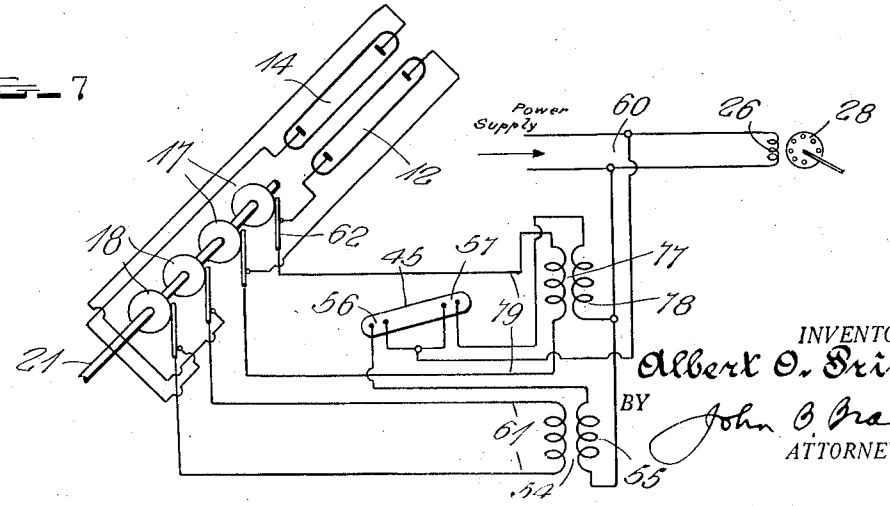


FIG. 7

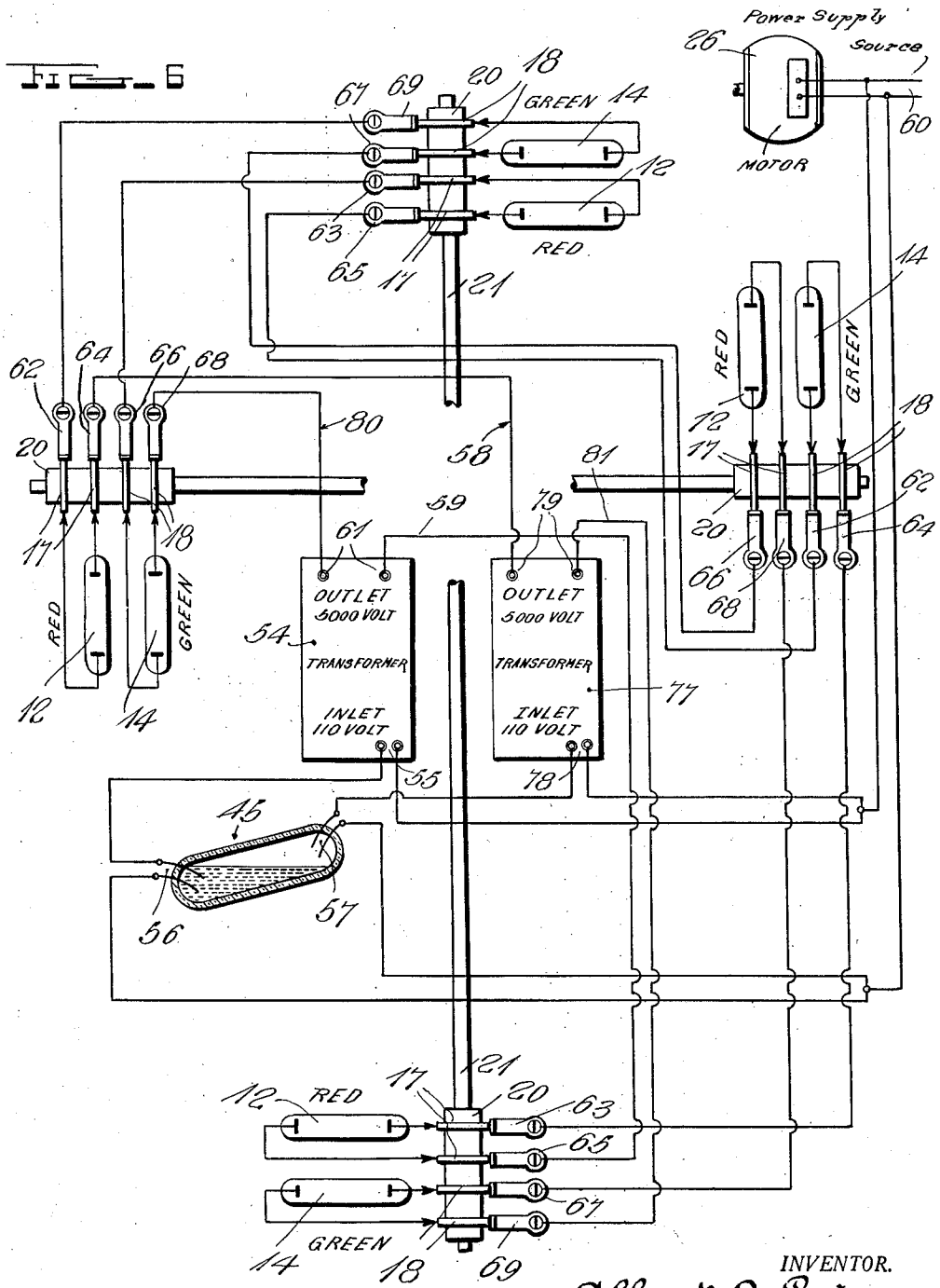


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TRAFFIC SIGNAL

Filed March 25, 1932 4 Sheets-Sheet 3

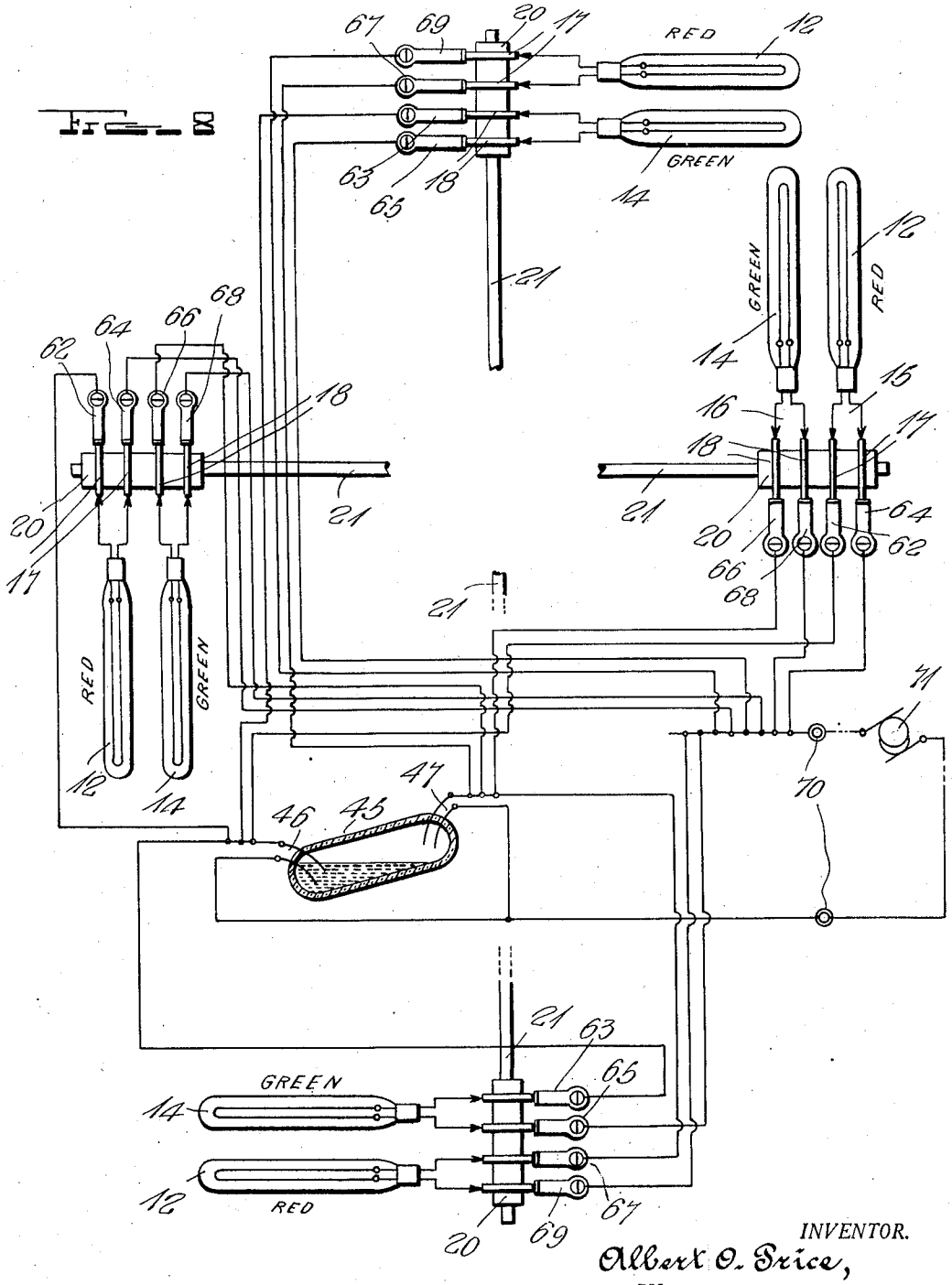


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TRAFFIC SIGNAL

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Patented Jan. 2, 1934 1,942,306

UNITED STATES PATENT OFFICE

1,942,306

TRAFFIC SIGNAL

Albert O. Price, Uhrichsville, Ohio, assignor of one-fourth to Robert W. Rutledge and Scott P. Myers

Application March 25, 1932. Serial No. 601,221

3 Claims. (Cl. 177—327)

My invention relates broadly to traffic signals and more particularly to a simplified construction of traffic signal which is capable of inexpensive manufacture and production and which may be readily installed for the control of traffic and operated more efficiently than traffic signals heretofore known.

One of the objects of my invention is to provide a construction of traffic signal which comprises a casing for mounting the various parts of the traffic signal with driving means within the casing for simultaneously driving moving parts of the traffic signal in positions in which the signals may be readily observed by traffic approaching the signal from opposite directions.

Another object of my invention is to provide a simplified construction of traffic signal which may be suspended centrally of a street intersection having electrically operated changeable color electric lights driven in a ro ary path for attracting the attention of the drivers of motor vehicles for warning the traffic as to the time period during which the traffic is free to move and the time period during which the traffic must be halted.

Still another object of my invention is to provide a construction of traffic signal adapted to be centrally supported at intersecting paths of traffic and including means for mechanically rotating electric lighting devices and means for automa ically controlling the change in color of such lighting devices at predetermined time intervals for controlling the movement of traffic along the intersecting paths of traffic.

A further objec of my invention is to provide a construction of automatic traffic signal having means for mechanically rotating signal lights in positions in which said lights may be observed by approaching traffic in different directions with mechanism for automa ically effecting a change in color of the signal lights at predetermined time periods for controlling the movement of traffic through the intersections.

A still further objec of my invention is to provide a construction of mechanism for controlling the operation of traffic signals wherein electrically illuminated semaphores are mechanically driven in a continuously rotary path in positions visible to traffic approaching the signals at the intersection with means for electrically effecting a change in color of the signals and controlling the time interval over which a signal of one color is rendered visible as compared to the time period over which a signal of a contrasting color is rendered visible.

Ano her object of my invention is to provide a construction of traffic signal arranged to be centrally mounted at road intersections and including rotatable semaphores visible to traffic moving toward the road intersec ion from each direction, with means for automatically changing the color of the semaphores for correspondingly controlling the movement of the traffic during predetermined time intervals.

Other and further objects of my invention reside in the improved traffic signal system as set forth more fully in the specification hereinafter following by reference to the accompanying drawings, wherein:

Figure 1 is an elevational view showing the traffic signal of my invention adapted to be suspended at a traffic intersection; Fig. 2 is a plan view of the mechanism housed within the casing which encloses the traffic signal of my invention with the transformers which are employed when neon tubes are utilized in the system of my invention omitted; Fig. 3 is a detailed view illustrating the manner of completing connections to the electric lights carried by the moving semaphores in the signal system of my invention taken on line 3—3 of Fig. 1; Fig. 4 is an elevational view showing the switching mechanism employed for effecting a change in color of the electric lights carried by the moving semaphores forming part of the traffic signal taken on line 4—4 of Fig. 2; Fig. 5 illustrates the switching mechanism for controlling the circuit to the electric lights carried by the semaphores where the switching mechanism has been moved to a position which is the extreme opposite to the position illustrated in Fig. 4; Fig. 6 is a schematic wiring diagram for the several parts of the traffic signal and schematically illustrating the gaseous discharge lamps which may be carried by the semaphore arms for displaying different colors to the traffic at predetermined time periods; Fig. 7 is a schematic view showing the arrangement of the timing switch in circuit with the electric lights carried by each semaphore and illustrating the manner of completing connections to the individual lights on the semaphore; and Fig. 8 shows a modified arrangement of electric lights for the traffic signal of my invention wherein incandescent lamps are used in lieu of gaseous discharge tubes on each of the semaphores.

My invention provides means for displaying a continuously moving signal light to the traffic approaching an intersection from each direction. By virtue of the continuous movement of the signal light the vehicle drivers are warned as to the time period over which a particular color traffic signal shall persist as an electrically controlled mechanism is employed for switching the circuits to the lights carried by each semaphore when the semaphores are all in a vertical position. The driver of an approaching vehicle in glancing at the traffic signal observes the angular position of the semaphore and by judging the rate of movement of the semaphore knows the probable time period during which the traffic

is free to move or is blocked and can govern the operation of his vehicle accordingly. The change of color on each semaphore occurs only at the time that the semaphore is in a vertical position.

Heretofore in the art many traffic signs which depend upon a red "stop" light and a green "go" light have afforded no warning to the driver with respect to the probable time of color change and accidents have occurred by the misjudging of the remaining time interval over which a "go" sign remains operative resulting in the vehicle crossing the intersections against a red "stop" light. In the system of my invention the continuously rotating signal arms or semaphores serve as a constant warning to vehicular traffic as after brief experience drivers readily judge the time required for the green semaphore to move through the remaining angular distance to a vertical position so that such driver knows the approximate time remaining for free traffic in a desired direction at the intersection. At the time the semaphore reaches a vertical position the traffic is forewarned that a change in color will be effected for exhibiting a "stop" signal. The traffic signal of my invention includes provision for predetermining the time of operation of the "go" signal in one direction at a street intersection with respect to the time of operation of the "stop" signal in the opposite direction at the street intersection. This flexibility of control enables the traffic signal to be adjusted for operation at an intersection of a congested boulevard with a rarely travelled cross-street. Provision is made for maintaining the stop signal on the rarely travelled cross-street for longer time intervals than upon the boulevard, thereby offering less interference with congested traffic on the boulevard.

The casing for the traffic signal is indicated at A as enclosing a platform B on which the several parts of the equipment are mounted. The semaphores are illustrated at 1, 2, 3 and 4. Each semaphore includes a reflector member 1*a* which is substantially an elongated trough directed outwardly and which serves as a housing for the electric light devices 12 and 14. The electric light devices 12 and 24 may be gaseous discharge tubes as illustrated in Figs. 6 and 7, or they may be elongated incandescent lamps of different color characteristics as represented in Fig. 8. The electric light devices extend parallel immediately adjacent each other and are electrically connected through conductors 15 and 16 respectively with sets of collector rings 17 and 18 respectively carried by the insulated sleeve member 20 on rotatable shaft 21. Each rotatable shaft 21 is journaled in the traffic signal structure by means of brackets 5 supported from base B. Each shaft 21 is provided with an axially extending bore 6 through which the conductors 15 and 16 pass to the collector rings 17 and 18. The rotatable shafts 21 extend exteriorly of the casing A and are each engaged by a sleeve member 22 secured thereto by set screw 23. The sleeve members 22 carry the respective semaphores 1, 2, 3 and 4 and enable such arms to be angularly fixed to the shafts 20 in the proper positions and adjusted in such position to insure the transmission of the proper signal at the correct time. Each of the rotatably driven shafts 21 terminate in bevel gears 24 adjacent the center of the platform B. A central ring gear 25 meshes with the bevel gears 24 and serves to drive all of the shafts 21 simultaneously. Motive power for driving the traffic signal is furnished by electric motor 26. Motor 26 may be a synchronous alternating current motor similar to the type of motor employed for driving an electric clock. The motor 26 is connected through coupling 27 with shaft 28. Shaft 28 is journaled in bearings 29 and carries a worm gear 30 thereon. The worm gear 30 meshes with the worm wheel 31 carried by shaft 32 which extends normal to the axis of shaft 28. The shaft 32 is journaled in bearings 33 supported from the base B. Shaft 32 carries the worm gear 34 which meshes with the worm wheel 35 which is carried by shaft 36. Shaft 36 is journaled in supports 37 carried by base B. A key 38 on shaft 36 provides a guide for a change speed gear indicated at 39. The change speed gear includes gear members 39*a* and 39*b* of different sizes. The gear members are adapted to be shifted along shaft 36 for establishing a meshing connection with the gear members 40*a* and 40*b* of the change speed gear 40 secured by set screw 40*c* to one of the revolving shafts 21 of the traffic signal mechanism. The ratio of the gears 39*a*—40*a* and 39*b*—40*b* are such that a greater angular velocity is imparted to the shaft 21 when gear member 39*a* is meshed with gear member 40*a* while smaller angular velocity is imparted to the shafts 21 when gear member 39*b* is meshed with gear member 40*b*. The shifting of the change speed gear 39 is effected automatically through the arm 41 which is carried by the angularly rockable plate member 42 shown more clearly in Figs. 4 and 5. The angularly rockable plate 42 is journaled at 43 on bracket 44 supported from base B. The angularly rockable plate 42 carries the mercury switch 45 adapted to close different sets of contacts 56 and 57 in opposite ends of the mercury switch tube 45 in accordance with the angular position of the angularly movable plate 42. The contacts 56 and 57 are arranged in circuit with the red and green electric lights respectively for completing the circuits to these lights as set forth more fully in Figs. 6, 7 and 8. The angularly rockable plate 42 carries pins 42*a* and 42*b* which are acted upon by the cam member 47 having actuating faces 47*a* and 47*b* adapted to engage pins 42*a* and 42*b* for effecting movement of the angularly rockable member 42. The cam member 47 is pivotally mounted at 48 on arm 49. Arm 49 is pivoted at 50 to standard 51 mounted on base B. A spring 52 tends to constantly urge arm 49 and cam 47 toward the pins 42*a* and 42*b* on angularly rockable plate 42. The plate member 53 is carried by one of the shafts 21 as indicated. A pin 54 projects from plate member 53 and operates against the projecting end of the arm 49, for raising the arm periodically at predetermined time intervals in accordance with the rotation of plate member 53 which revolves in the direction of the arrow as shown.

Fig. 4 represents the condition where member 47 has been raised from pin 42*a* and is about to descend on pin 42*b* as soon as pin 54 on plate 53 clears the end of the lever 49. Upon such descent of cam face 47 upon pin 42*b* the angularly movable plate 42 remains in its shifted position shown in Fig. 5 during which arm 49 is raised as pin 54 again approaches in a counter-clockwise direction a position beneath the end of the arm 49, thereby raising the arm to a position where cam face 47*a* is directly above pin 42*a* on angularly rockable plate 42. As pin 55 again leaves the end of lever 49 the cam face 47*a* descends upon pin 42*a* thereby angularly shifting the angularly rock-

able plate 42 to the position illustrated in Fig. 4. As the angularly rockable plate 42 is shifted in position the trigger arm 41 operated to shift the change gear 39 thus changing the rotio of gearing between the driving motor 26 and the rotatable shafts 21 as hereinbefore explained. At the same time the mercury switch contacts are alternately closed shifting the electrical supply circuit from one colored electric lighting system to the electric lighting system of another color for thus operating the traffic signal.

In Fig. 6 I have shown the semaphores as including gaseous discharge tubes of the neon type, the gas content of one tube as shown at 14 being adapted to produce a green illumination while the gas content of the opposite tube 12 is arranged to produce red illumination. In order to operate the neon tubes I provide two high voltage transformers indicated at 54 and 77 having input terminals to the primary windings 55 and 78 adapted to be alternately connected to the power supply source 60 in parallel through the mercury switch 45. The secondary terminals of the transformer 54 are represented at 61, to which distributor buses 80 and 59 are connected. The secondary terminals of transformer 77 are indicated at 79 connected to distributor buses 58 and 81. Connections extend from the power source 60 to one of the contacts 56 in one end of the mercury switch 45 and to one of the contacts 57 in the opposite end of the mercury switch 45. The other contact in the set of contacts 56 serves as a distributor to the input terminals of primary winding 55 of transformer 54. The other contact in the set of contacts 57 serves as a distributor to the input terminals of primary winding 78 of transformer 77. Neon tube 12 on the extreme left is energized through conductor 58, through brush member 64 bearing upon one of the conductive rings 17 on insulation member 20 carried by one of the shafts 21 for the left hand traffic signal. At the same time a distribution circuit is completed from the second brush 62, from the secondary terminals 79 of transformer 77. The circuit is completed from brush 62 to brush 69 on the diametrically opposite traffic signal represented at the top of Fig. 6 for establishing a circuit through conductive ring 18 through green neon tube 14 returning through the second ring 18 and through brush 67 through the conductor which connects to brush 66 of the traffic signal at the extreme right of Fig. 6. Brush 66 establishes connection with conductive rings 17 providing an electrical connection through red neon tube 12 returning through the second conductive ring 17 and brush 68 through the conductor which connects to the brush 67 on the traffic signal at the extreme lower part of Fig. 6. The brush 67 establishes connection with conductive ring 18 which connects with green neon tube 14 returning through the second conductive ring 18 through brush 69 to the opposite terminal 79 of the secondary winding of transformer 77. It will be observed that the circuit just traced provides a series path through the red neon lamps on one set of diametrically opposite semaphores and through the green neon lamps on the other diametrically opposite set of semaphores. This series circuit extending from the high voltage side of the transformer 77 is such as to establish simultaneous glow discharge paths in the four neon tubes. The neon tubes on the semaphores in diametrically opposite directions glow in one color and the neon tubes on the semaphores in a direction normal to the aforesaid direction glowing at the opposite color. The circuit may now be traced from the high voltage output of transformer 54 having secondary terminals 61. The left hand terminal 61 connects through conductor 80 with brush 68 on the traffic signal at the extreme left. Brush 68 establishes sliding contact with ring 18 connecting to neon tube 14. The opposite side of neon tube 14 connects through the second ring 18 with brush 66 which is in turn electrically connected with brush 63 establishing slidable connection with one of the conductive rings 17 of the traffic signal at the upper portion of the diagram in Fig. 6. The red neon tube 12 has its opposite terminals connected across the pair of rings 17. The second ring 17 connects to brush 65 and through a series path to brush 62 of the traffic signal at the extreme right of the figure. Brush 62 bears upon ring 18 which electrically connects with one terminal of green neon tube 14. The opposite terminal of the green neon tube 14 connects to the second conductive ring 18 which electrically connects with brush 64 and through a series path to the brush 63 of the traffic signal indicated in the lower portion of Fig. 6. Brush 63 establishes connection with conductive ring 17 which electrically connects with red neon tube 12, the opposite side of which connects through conductive ring 17 with brush 65 which electrically connects through conductor 59 with the opposite side of the high voltage high frequency right hand terminal 61 of transformer 54. The arrangement is such that a series path is formed from the output of transformer 54 through the green neon tubes at diametrically opposite sides of the traffic signal and through the red neon tubes in the other diametrically opposite positions of the traffic signal so that the high voltage is supplied to all of the neon tubes in the series circuit simultaneously. The transformers 54—77 are rendered alternately effective in accordance with movement of the mercury switch 45. In the positions shown transformer 54 is effective. In the opposite position of switch 45 where terminals 57 will be submerged in the conductive fluid within tube 45 transformer 54 will be ineffective and transformer 77 will be energized. This operation is such that the semaphores of one color are energized in one direction of traffic movement while the semaphores of the opposite color are energized in the opposite direction of traffic movement. The mechanism of Figs. 2, 4 and 5 which has heretofore been explained will determine the length of time that the traffic signals of one color are operated to the exclusion of the traffic signals of an opposite color. The red lights are thus energized to control movement of traffic in one direction while simultaneously the green lights are energized for controlling the movement of traffic in the opposite direction.

Fig. 7 diagrammatically illustrates the connection of the two transformers 54 and 77 with one of the neon tube semaphores. It will be observed that a power supply circuit is alternately switched through mercury switch 45 from primary winding 78 to primary winding 55. In order to simplify the disclosure I have shown only a single semaphore but it will be understood that the other three semaphores, or any desired number of semaphores may be electrically connected in series with the neon tubes 12 and 14 for accomplishing the results obtained by the arrangement of Fig. 6.

In lieu of the gaseous discharge tubes illustrated in Figs. 6 and 7 I may employ tubular

incandescent lamps of different colors as shown in Fig. 8. The circuit connections to the several lamps are similar to the connections provided in Fig. 6 except that high voltage transformers 54 and 74 are omitted and connections extend to switch 45, directly from terminals 70 to which power is supplied through the power source which I have designated generally at 71. The incandescent lamps are not connected in series as are the gaseous discharge tubes but are arranged in multiple as will be noted by tracing the rearranged wiring. Similar reference characters have been used to designate the similar parts employed in the wired arrangement of Fig. 6. The switch 45 directly controls the energization of circuits of lamps of one color in one direction and lamps of the opposite color in the opposite direction.

It will be observed that in Fig. 8 the arrangement of brushes which bear upon the conductive rings leading to each of the semaphore arms are rearranged in order to provide for the parallel connection of the incandescent lights as distinguished from the series connection of neon tubes employed in the traffic signal.

As indicated in Fig. 3 each brush which establishes connection with a revolving conductive ring is well insulated from the base B through the insulated member 72.

By virtue of the change speed gearing I provide means whereby the time of operation of the traffic lights in one direction of movement of traffic may be maintained different from the time of operation of the traffic in the opposite direction. The change in speed occurs precisely at the moment of change in color of the lights. In order to warn the moving traffic as to the time of change of color of the lights the change of color occurs simultaneously at each semaphore when the semaphores are extending vertically. The rate of speed of all of the semaphores during the operation thereof at one color will be different from the rate of speed of the same semaphore when operated at a different color by virtue of the periodic operation of the change gear device with the change in color of the traffic signal. This permits the installation of the traffic signal of my invention on busy thoroughfares and at intersections with cross-roads which are more rarely travelled as the semaphores will be arranged to show green lights for a greater time period on the busy boulevard while showing a red light for a shorter period and conversely the movement of traffic on the cross-road will be controlled by a green light for a shorter time period and by a red light for a longer time period thereby avoiding a congestion of traffic along the heavily travelled boulevard.

In the event that the automatic traffic signal should fail I provide emergency traffic control lights at 75 of the general class as represented, for example, in Letters Patent No. 1,648,629, granted November 8, 1927, to Taylor and Young for Traffic regulation system, to either indicate that the automatic mechanism is not in use or to actually control traffic or for use in emergency conditions in the event of fire or accident. By the selection of the proper size of gears the rate at which the traffic signals is governed may be accurately controlled. The traffic signal may be suspended by means of a conduit 76 from above through which the energizing conductors are passed or a suitable pedestal mounting may be provided for erecting the traffic signal in a tower.

Wherever, in the specification, I have referred to the use of "neon" tubes, I desire that this term be understood as a generic term for gaseous discharge tubes.

Various changes may be made in the gearing and in the arrangement of the time operated mechanism and I desire that it be understood that modifications may be made and that no limitations upon my invention are intended other than are imposed by the scope of the appended claims.

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

1. In a traffic signal, motive means, a rotary shaft, speed change gearing for driving said shaft from said motive means at different speeds including a shiftable element for selecting the speeds, an indicator operatively connected with said shaft and moving in a definite path when the shaft is rotating, independent illuminating elements for said indicator for controlling movement of traffic, a circuit for supplying current to a selected one of said illuminating elements including a switch, means actuated upon the indicator reaching a predetermined position in its path of movement to operate said switch and cause current to flow to another of said illuminating elements, and means moving with said switch and operated by the operating means for the switch in conjunction with the switch to shift the shiftable element and vary the speed at which the shaft rotates.

2. In a traffic signal, motive means, a rotary shaft, means for driving said shaft from said motive means including a shiftable speed controlling element, an indicator operatively connected with said shaft and moving in a definite path when the shaft is rotating, independent illuminating elements for said indicator for controlling movement of traffic, a circuit for supplying current to a selected one of said illuminating elements including a switch means having a rockably supported mounting and a switch element carried thereby and adapted to cause flow of current to a predetermined illuminating element according to the position into which the mounting is rocked, means actuated upon the indicator reaching a predetermined position to rock said mounting from one position to another, and an arm extending from said mounting and engaging said shiftable element to actuate the same when the mounting is rocked from one position to another.

3. In a traffic signal, motive means, a rotary shaft, means for driving said shaft from said motive means including speed change gearing having a shiftable element for selecting speeds, an indicator operatively connected with said shaft and moving in a definite path when the shaft is rotating, independent illuminating elements for said indicator for directing movement of traffic, a circuit for supplying current to a selected one of said illuminating elements including a switch means having a rockably supported mounting and a switch element carried thereby and adapted to cause flow of current first to one illuminating element and then to the other illuminating element as the mounting is rocked from one position to another position, a second shaft rotated from the first shaft, means actuated from the second shaft during rotation thereof for rocking said mounting between said positions, and an arm projecting from said mounting and engaging the shiftable element for shifting the same and changing the speed at which the first shaft rotates when the mounting is rocked.

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