A. W. KENT.

TRAFFIC SIGNALING SYSTEM.

APPLICATION FILED MAR. 5, 1917.

1,357,875.

Patented Nov. 2, 1920.

3 SHEETS—SHEET 1.

Fig. 5

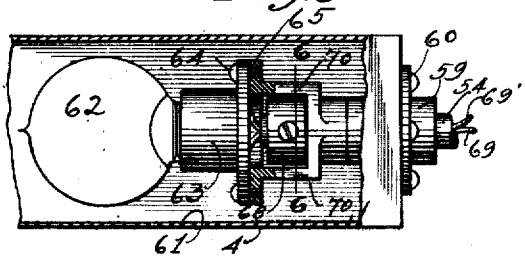


Fig. 2

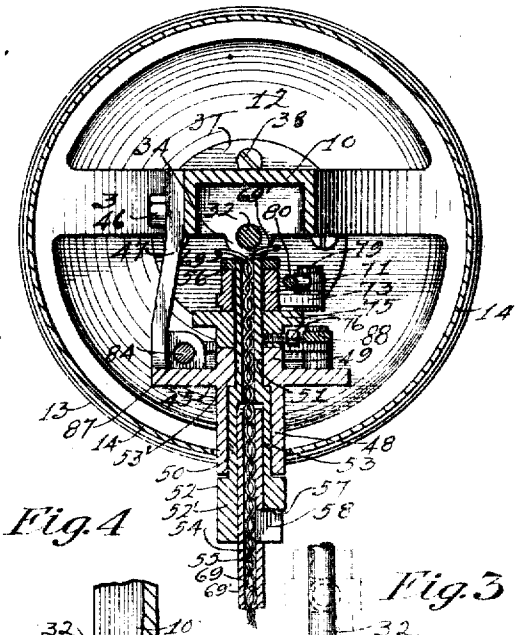


Fig. 6

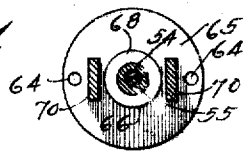


Fig. 1

Fig. 4

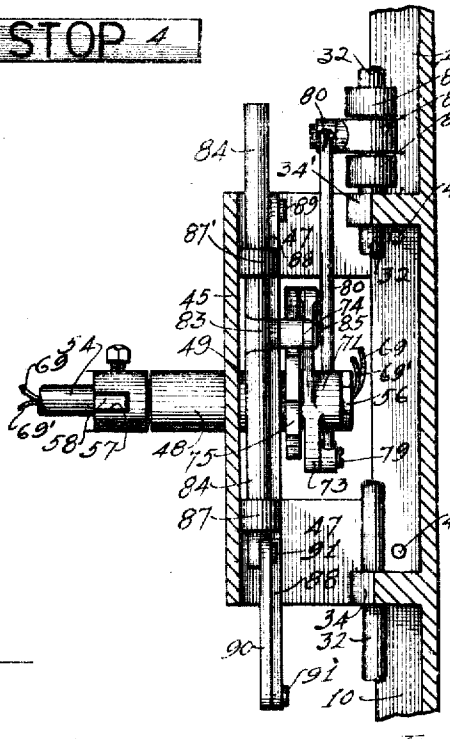
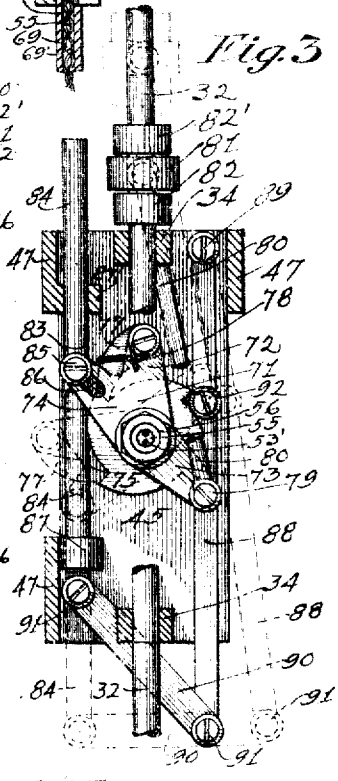


Fig. 3



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3 SHEETS—SHEET 2.

Fig. 7



Fig. 9

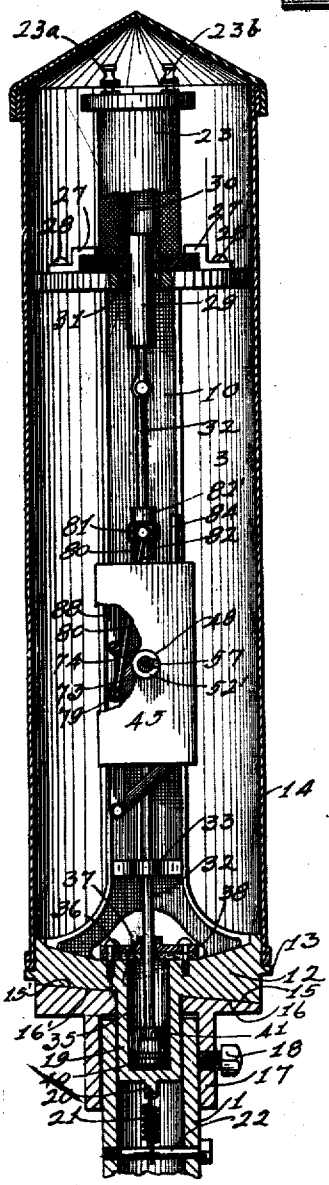


Fig. 8

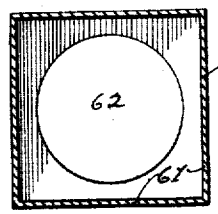


Fig. 10

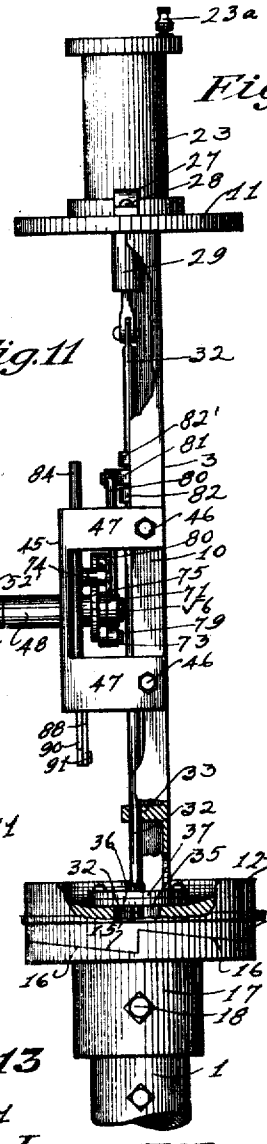


Fig. 11

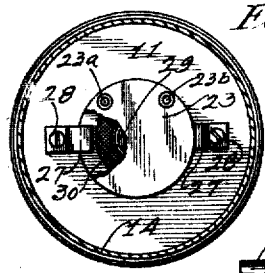


Fig. 12

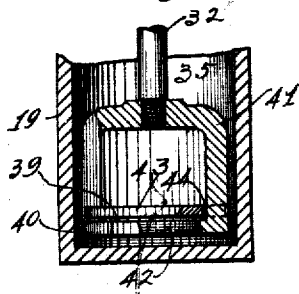
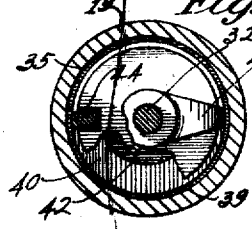


Fig. 13



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1,357,875.

Patented Nov. 2, 1920.

3 SHEETS—SHEET 3.

Fig.16

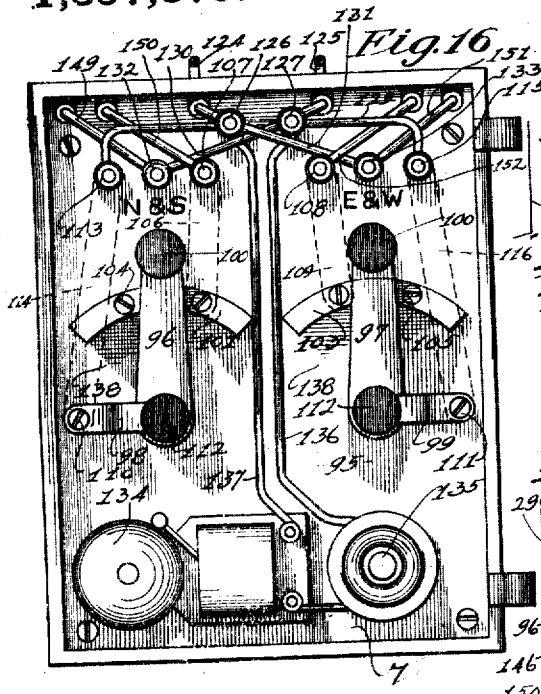


Fig.14

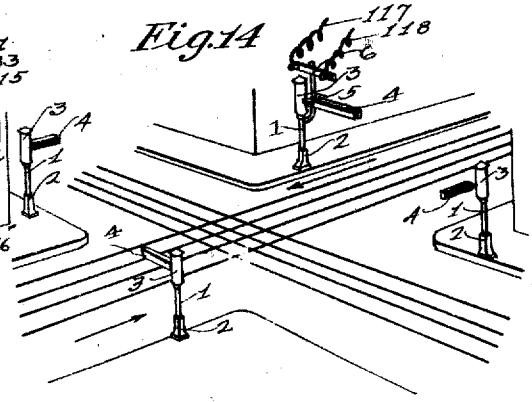


Fig.17

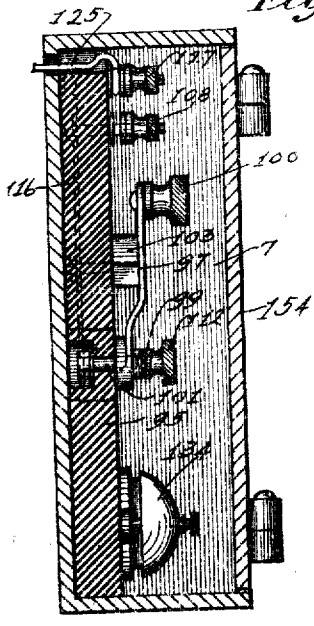


Fig.15

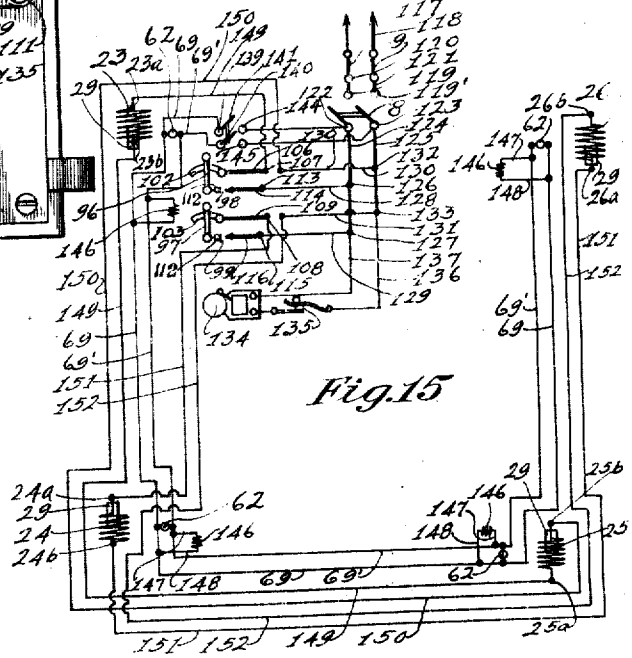
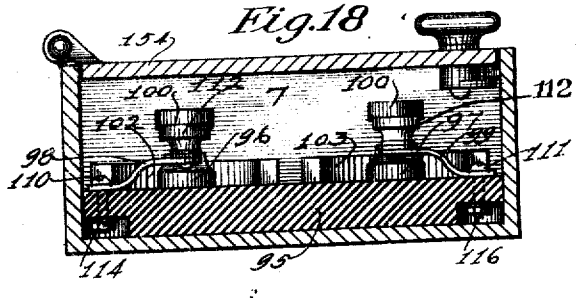


Fig.18



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UNITED STATES PATENT OFFICE.

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TRAFFIC-SIGNALING SYSTEM.

1,357,875. Specification of Letters Patent. Patented Nov. 2, 1920.

Application filed March 5, 1917. Serial No. 154,041.

To all whom it may concern:

Be it known that I, ALEXANDER W. KENT, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Improvement in Traffic-Signaling Systems, of which the following is a specification.

My invention relates to traffic signals and has for its object the provision of a set of signaling devices mounted at the street intersection for regulating the traffic, each of the signaling devices being mounted at separate corners of the intersection just inside of the curb line, and connections being provided for operating the signals at the will of the traffic officer or operator.

A further object of this invention is to provide an efficient signaling means composed of several units and arranged so as to permit the operation of the signaling units in pairs for clearing the intersection of the vehicles moving in a single direction while the vehicles moving in the other direction may be stopped, or capable of simultaneous operation, as conditions may require.

A further object is to provide pivoted semaphore heads for the signaling units which may be readily removed from their supports at will and which may be capable of movement on their supports, when for any reason, the tops or superstructures of the vehicles may collide with or engage the semaphores held thereby, so as to prevent damage to the signals.

A further object is to provide means for revolubly supporting the semaphores on the heads for intermittent movement about their axes for starting and stopping the traffic, for lighting the interiors of the semaphores at night or when necessary and for otherwise heating the interiors of the semaphores during cold weather so that ice or snow may not collect thereon and thus obscure the signals.

A further object is to provide a series of solenoids for operating the semaphores and connections therefor which will permit the selective operation of the several signaling units by pairs so as to provide opposing signals for the different directions in which the traffic moves.

A further object is to provide a suitable cushioning means for the semaphore operating means connected with the armatures of the solenoids for preventing any jar or shock to the operating parts, thus insuring against damage thereto. Other objects will appear in the detailed description of my improved system.

Referring to the drawings, Figure 1 is an elevation of one of the signaling units complete. Fig. 2 is a sectional plan of the same on the line 2—2 of Fig. 1. Fig. 3 is an enlarged rear elevation of one of the semaphore supports showing the supporting bracket in section and the operating means mounted thereon. Fig. 4 is a sectional elevation of Fig. 3 on a plane at right angles thereto. Fig. 5 is a longitudinal fragmentary section of one of the semaphores showing the means for supporting the lamp therein. Fig. 6 is a section of Fig. 5 on the line 6—6.

Fig. 7 is a perspective view of one of the semaphores. Fig. 8 is a transverse section of the same. Fig. 9 is a sectional elevation of one of the semaphore heads complete. Fig. 10 is a side elevation of Fig. 9, partly broken away at points to show obscured features. Fig. 11 is a plan of Fig. 9 with the housing shown in section. Fig. 12 is an enlarged sectional elevation of the plunger dash pot employed on each of the heads for cushioning the impact of the plunger. Fig. 13 is a sectional plan of Fig. 12.

Fig. 14 is a perspective view of a street intersection showing the signaling units in position at the several corners of the intersection and the semaphores set for indicating the movement of the traffic in the direction of the arrows on the cross street. Fig. 15 is a circuit diagram showing the electrical connections between the several elements of my device. Fig. 16 is a front open view of the controller box. Fig. 17 is a sectional elevation of Fig. 16, and Fig. 18 is a sectional plan of the same.

Similar characters of reference are used in the several views of the drawings and in the specifications for indicating the same or like parts.

Each of the signaling units is composed of a supporting column 1 which is mounted on a base 2 near the curb line of the sidewalk, a removable and pivotally supported head 3, a semaphore 4, a cross arm support 5 and a cross arm 6, the cross arms and supports being only necessary for overhead electrical connections, and these elements

may be dispensed with when the wires are placed underground, the wires in such case being brought upwardly from the conduits below the surface of the ground through the columns 1 and the bases 2 which support the columns.

A selected one of the signaling units may be used as a master unit for operating the semaphore thereon and all of the other semaphores and a controller box 7 is provided for the master unit which may be suitably attached to the column 1; also a main switch 8 may be provided therefor and suitably attached to the column 1 or to the cross arm support 5, to which the line wires for supplying the electric current for the electrically actuated operating means may be connected, as shown in Fig. 1. Suitable fuses 9 may also be connected with the line wires for preventing the burning out of the coils and other electrical elements which will be hereinafter described.

Each of the heads 3 has a cast channeled standard 10 with a flat circular top 11 and a base 12 which is provided with an annular rib 13 for supporting the circular housing 14. The upper surface of the base 12 is concave so as to drain the oil which may be used for lubricating and other purposes hereinafter described to the center of the base and the lower surface of the base has two helically inclined surfaces 15 and 15′ which correspond to and are adapted to seat on the similar surfaces 16 and 16′ of the flanged support 17 which is attached to the upper end of the column 1 by means of one or more set screws 18, or otherwise. A depending boss 19 is formed on the base 12 and extends downwardly into the hollow of the pipe or column 1 and is provided on the end with a lug 20 to which is attached one end of a spring 21, the lower end of this spring being attached to a bolt or pin 22 which is rigidly held in the column. The spring 21 thus holds the head in resilient and frictional contact with the supporting flange 17 on the column, and when the head is turned on the column the base 12 will be raised slightly by means of the sliding contact between the inclined surfaces 15 and 15′ with the surfaces 16 and 16′ on the support 17. The angularity of the surfaces 15 and 15′ and 16 and 16′ should be sufficient as to insure the prompt restoration of the head 3 to normal position, by means of the tension of the spring 21, when the head is released, and as will be hereinafter more clearly described, it will never become necessary to turn the head on the column more than one quarter of a revolution and this will prevent the disengagement of the respective inclined surfaces on the base 12 and the support 17.

The top 11 of the base supports a solenoid 23, in the master unit shown in Fig. 1, and similar solenoids 24, 25 and 26 in the other units, which are centrally positioned thereon and are attached thereto by means of clamps 27 held by screws 28. An armature 29 is provided for each of the solenoids which is movable in the hollow 30 of the solenoids and through the central openings 31 in the tops 11. A vertically movable plunger rod 32 is slidably supported in bearings 33, 34 and 34′ formed on the standards 10 at convenient intervals. The upper ends of the rods 32 are pivoted to the lower ends of the armatures 29.

The boss 19 on the base 12 of each of the heads, has a central bore 35 forming a chamber therein which is closed at the lower end and is adapted to hold a quantity of oil. The upper end of the chamber 35 terminates in the concave surface of the base and is covered by means of a leather washer 36 and a cap 37 which is attached to the base 12 by means of screws 38. The plunger rod 32 extends downwardly through and is slidable in the cap 37 and is provided in the chamber 35 with a dash 39 having a circular bottom 40 slightly less in diameter than the chamber 35 and a stirrup 41 which is suitably attached to the lower end of the rod 32. A central opening 42 is formed in the bottom of the dash which is normally covered by a disk 43 which has notches 44 at opposite points on its periphery for slidably engaging the sides of the stirrup 41. Thus when the rod 32 is moved upwardly the disk 43 will, by means of the pressure of the oil in the chamber 35, be forced tightly against the upper side of the bottom 40 of the dash, but a downward movement of the rod will move the disk upwardly from the bottom and permit the oil to flow through the opening 42. The oil in the chamber 35, when the plunger rod 32 is operated by the armature 29 of the solenoid, thus serves as a buffer or cushion for the armature and prevents shock and damage thereto, but when the rod is restored to normal position, the resistance to the movement of the plunger is minimized by the flow of the oil through the bottom of the dash. The purpose of this feature will be brought out more clearly as the description progresses.

About midway between the top and bottom of the standard 10 on each of the heads, I provide a bracket 45 which is attached to the sides of the standards by means of bolts or screws 46 extending through the legs 47. Each of the brackets has an outwardly extending boss 48 and a shorter inwardly extending lug 49. The outer bosses are provided with counterbores 50 which communicate with the bores 51 of the inner bosses and a spindle 52 having the large outer portion 52′, the central reduced portion 53 adapted to seat in the counterbore 50 and the inner reduced portion 53′ adapted to seat

in the bore 51, extends entirely through the bracket and the bosses thereon and the outer end thereof is bored out to receive the smaller spindle 54 which has a still smaller bore 55, while the inner end is bored to correspond to the bore 55 and is threaded to receive a nut 56 at the inner end. The outer end 52′ of the larger spindle 52 has a notch 57 formed therein to receive a key 58 suitably attached to the smaller spindle 54 which is extended at the outer end through the boss 59 and flange 60 attached to the semaphore housing 61, as shown in Figs. 2, 4 and 5.

A lamp 62 is supported in each of the semaphore housings in a socket 63 which is attached by means of screws 64 to the flange 65 of the lamp support 66 loosely held on the inner end of the spindle 54 between the boss 67 and the set collar 68, the lamp being connected with the lighting circuit by means of wires 69 and 69′ which are extended through the bore 55 in the spindle 54 and the similar bore in the spindle 52. The lamp support 66 has a pair of arms 70 which connect the flange of the support to which the lamp socket is attached to the hub of the support, and the arms are so spaced as to permit the insertion of the set collar 68 into position on the spindle 54.

A wrist plate 71 having three arms 72, 73 and 74 formed thereon, is loosely held on the inner end of the spindle 52 between the nut 56 and the ratchet 75 which is tightly held on the spindle by means of a set screw 76, or otherwise. The ratchet has four teeth and is adapted to be moved a quarter of a revolution at each operation of the pawl 77 which is pivoted to the arm 72 on the wrist plate 71, a spring 78 of light tension being provided for holding the pawl in engagement with the ratchet.

The lower arm 73 of the wrist plate is pivoted on a screw 79 to the lower end of the connecting rod 80, which is attached by means of a similar screw or pin to the collar 81 loosely held on the plunger rod 32 between the two set collars 82 and 82′ above the bracket 45, this connection serving to move the wrist plate 71 and the ratchet 75 a full quarter of a revolution with each upward movement of the rod 32.

The arm 74 on the wrist plate 71 is pivotally attached to the squared portion 83 of the vertically slidable rod 84 by means of a screw or pin 85 extending through the slot 86 in the arm, and the rod 84 is held in bearings 87 and 87′ formed on the inner side of the bracket 45. In order that the resistance to the movement of the plunger rod 32 may be minimized and to prevent the ratchet 75 from turning when the rod 32 is restored to normal position, I provide a lever 88 which is pivoted on a screw 89 to the inner side of the bracket 45, is extended downwardly to a point substantially below the bracket 45, and is connected at its lower end with the lower end of the rod 84 by means of a bar 90 pivotally held on screws 91 at opposite ends. The lever 88 when in normal position is parallel with the rod 84 and the connecting bar or link 90 assumes a diagonal position with respect thereto, as shown in Fig. 3; but when the rod 84 is moved downwardly in its bearings by the wrist plate 71, as the rod 32 is moved upwardly by the armature of the solenoid, the lever 88 is forced outwardly until the bar 90 assumes almost a true horizontal position, as indicated by broken lines in Fig. 3. The bar or lever 88 carries a roller 92 at a point opposite the ratchet 75 which is in the plane of and is adapted to engage the teeth of the ratchet for locking the movable parts against movement when the rod 32 is stationary, but as the rod 32 begins its upward movement and the rod 84 its downward movement the lever 88 is gradually moved outwardly from its normal position and the roller from engagement with the ratchet 75, thus reducing the friction on the ratchet 75 and minimizing the effort required to operate the rod 32. As the rod 32 begins its downward movement however, the lever 88 is gradually restored to normal position and the roller 92 to engagement with the ratchet 75, thus preventing the backward movement of the ratchet when the parts are being restored to normal position. In the drawings, the relative positions and the extent of movement of the operating parts are somewhat exaggerated for clarity, but it is obvious that the extent of movement of the lever 88 and the roller 92 should be calculated so as to insure the accomplishment of the objects thereof. It is likewise apparent that inasmuch as the periphery of ratchet teeth is in the form of an evolute curve, preferably, a very slight movement of the lever is required to move the roller 92 to correspond to the curve of the teeth, and the arrangement should be such as to prevent the disengagement of the roller from the ratchet and to merely compensate for the movement of the ratchet so as to reduce the friction and resistance to the movement of the plunger.

The operation of the semaphore heads is regulated and accomplished by means of the controller which is mounted in the box 7 and is composed of a slate or fiber base 95 suitably attached to the rear wall of the box, and the indicators 96 and 97 having the contacts 98 and 99 associated therewith, as shown in Figs. 16, 17 and 18. The indicators comprise metallic levers having hard rubber or fiber buttons 100 suitably attached thereto and the lower ends of the levers are pivoted by means of the stems 101 to the base 95. Sectors 102 and 103 of copper or

brass are secured to the base 95 by means of screws 104 and 105 and are adapted to be at all times in firm contact with the levers 96 and 97 of the indicators, respectively. The sector 102 is connected by means of one of the screws 104 and the bus bar 106 on the bottom of the base 95 with the terminal 107, and the sector 103 is similarly connected with the terminal 108 by means of one of the screws 105 and the bus bar 109.

The contacts 98 and 99 are composed of springs secured at their lower and outer ends to the base 95 by means of bolts 110 and 111, respectively, and are provided with buttons 112 of fiber or hard rubber at their upper ends above the fulcrum ends of the levers 96 and 97. The contact 98 is connected with the terminal 113 by means of the bolt 110 and the bus bar 114, and the contact 99 is similarly connected with the terminal 115 by means of the bolt 111 and the bus bar 116. The indicators, as shown, are in neutral positions in the box, and normally occupy positions at one end of the sectors, so that when it is desired to operate the semaphores, they may be moved to the opposite ends of the sectors, thus visibly indicating to the operator the conditions obtaining at the intersection. It should be understood that the indicators are always in contact with their associated sectors, one of the indicators, as shown, being provided for each street at the intersection, and so marked with the name of the street or the direction in which the traffic moves on the street, and the movement of the indicators does not effect the operation of the semaphores this being accomplished by depressing the buttons 112 on the contacts 98 and 99 so that the inner ends of the contact springs will engage the lower ends of the indicators and thus complete the circuit and energize the coils of the solenoids, as will be hereinafter described.

The line wires 117 and 118 are connected with the fuses 9 which are in turn connected with the terminals 119 and 119′ of the main switch by wires 120 and 121. The main switch 8 is connected by means of its terminals 122 and 123 and the wires 124 and 125 with the main line terminals 126 and 127 in the controller box. In the box the line terminals 126 and 127 are connected respectively, by means of wires 128 and 129, with the terminals 113 and 115, and by means of wires 130 and 131 with the terminals 132 and 133, respectively.

A bell 134 may be provided, if desirable, in the controller box with a push button 135 for operating the bell, the push button being connected in series on the wire 136 which leads to the line terminal 127 and the other side of the line to the bell is formed by the wire 137 leading to the terminal 126. As shown, the bell and its button are connected with the line wires but if necessary a small transformer may be connected in the line, or a battery used for supplying the current for the bell which serves to sound an alarm when the semaphores are operated.

Referring to Fig. 15, it will be observed that the lighting circuit consisting of the wires 69 and 69′ which are connected with the lamps 62 within the semaphores extend to all of the lamps at the intersection and may be connected at a point near the master signal unit to the terminals 139 and 140, respectively, of the lighting switch 141 which may be suitably located on the column 1 of this unit. Wires 142 and 143 connect the other switch terminals 144 and 145 with the line terminals 122 and 123 at the main switch. Heating coils 146 may be bridged across the line, as shown, or connected in series therewith in each of the semaphore housings by means of the wires 147 and 148 for heating the interiors of the semaphore housings and preventing the collecting of ice and snow thereon which would obscure the signals in cold weather.

As hereinbefore stated, it is desirable, in order to clear the intersection for preventing accidents and any suspension of the traffic or congestion thereof, to connect the signaling units in pairs, and for this reason, the diagonally opposite coils 23 and 25, are connected in series by means of wires 149 and 150, and the coils 24 and 26 are connected similarly by means of wires 151 and 152.

The wire 149 leads from the terminal 132 in the controller box to the terminal 23^a of the coil 23; thence from the terminal 23^b of this coil to the terminal 25^a of the coil 25. The wire 150 leads from the terminal 25^b of the coil 25 to the terminal 107 in the box. The terminal 107 is connected by means of the bus bar 106, sector 102, indicator 96, contact 98, bus bar 114, terminal 113 and wire 128 with the line terminal 126, and the circuit is completed when the contact 98 is depressed by the connection of the terminal 132 with the line terminal 127, thus energizing the coils 23 and 25 and operating their associated semaphores.

The wire 151 is connected with the terminal 133 in the box and leads to the terminal 24^a of the coil 24, thence from the terminal 24^b of the coil to the terminal 26^a of the coil 26. The wire 152 leads from the terminal 26^b of the coil 26 to the terminal 108 in the box which in turn is connected by means of the bus bar 109, sector 103, indicator 97, contact 99, bus bar 116, terminal 115 and wire 129 with the line terminal 127, and the circuit is completed when the contact 99 is depressed by the connection of the terminal 133 with the line terminal 126,

thus energizing the coils 24 and 26 and operating the semaphores connected therewith.

It should be understood that one set or pair of semaphores may be operated an instant before the operation of the other pair, and it is possible to keep one line of traffic open and the other closed until the congestion has been dissipated and the intersection entirely cleared, thus greatly facilitating the handling of the traffic.

A suitable door 154 may be provided for the controller box and hinged at one side as shown and the door may be provided with a suitable lock so that during the time the system is not in operation the contents of the box may not be tampered with.

In the form of structure shown the semaphores are designed to rotate intermittently a quarter of a revolution at a time and in only one direction when the plunger rod 32 is raised by the solenoids but it is apparent that the semaphores may be made to oscillate if desirable. The semaphores are extended parallel with the open line of traffic and across the closed line of traffic, the rotation thereof serving to change the signals from "stop" to "go" or vice versa. In the event, however, of the collision of the top of a vehicle with the semaphore, provided the latter should be extended sufficiently, the impact of the vehicle top with the semaphore would cause the entire head to revolve a quarter of a revolution, or less, until the obstructing portion of the vehicle may clear the semaphore, when the head would be automatically restored, as hereinbefore described.

It is conceived to be possible to modify the structure and certain of the elements shown herein without enlarging the scope or departing from the spirit of my invention, for it is obvious that existing conditions may render a change necessary in many cases from the particular methods shown.

Having thus described my invention, what I claim is:

1. A traffic signaling system comprising signaling means at each of the corners of the intersection, each of said signaling means including a head, a semaphore movable independently thereof about a horizontal axis for directing the course of the traffic, wiring for electrically connecting all of said signals, electro-mechanical actuating means for said semaphores, and co-acting means operated by said actuating means for rendering said semaphores operative, while normally holding said semaphores inoperative.

2. A traffic signaling system comprising a plurality of signaling devices composed of stationary supports having horizontally movable heads and pivoted semaphores supported on said heads, said devices being interconnected for simultaneous and selective operation, a solenoid for actuating each of said semaphores, ratchets for actuating said semaphores, secondary actuating means connecting said solenoids with said ratchets, and means engaging said ratchets for holding said secondary actuating means against backward movement after each operation.

3. A traffic signaling system comprising signaling devices at the corners at the intersection composed of stationary supports having separate heads held thereon and pivoted semaphores on said heads, electro-mechanical actuating means for said semaphores, and auxiliary means connected with said electro-mechanical means and operable thereby for preventing the backward movement of said semaphores.

4. A traffic directing system comprising a plurality of signaling devices composed of stationary supports having heads held thereon provided with pivoted semaphores, interconnected electrical actuating means for said semaphores, intermittently operable electro-mechanical means for connecting said semaphores with said actuating means, and coöperating ratchet means connected with said intermittently operating means for effecting the forward movement and preventing the backward movement of said semaphores.

5. A traffic directing system comprising a plurality of signaling devices composed of stationary supports, a head on each of said supports, said means having pivoted semaphores supported thereon for directing the course of traffic, a solenoid mounted on each of said heads and having electrical connections for effecting the operation thereof, an operating element attached to the inner end of each of said semaphores, a ratchet element also attached thereto, slidable armatures for said solenoids connected with said operating members, and means for engagement with said ratchet element and adapted to control the backward movement of said operating elements.

6. A traffic signaling system comprising stationary supporting means at the corners of the intersection, a horizontally pivoted semaphore on each of said heads, a solenoid supported on each of said heads, a reciprocating armature for each of said solenoids, an operating member attached to each of said semaphores and connected with each of said armatures, means engaging said operating member and operable thereby, said means being adapted to control the backward movement of said armatures for regulating the movement of said semaphores.

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