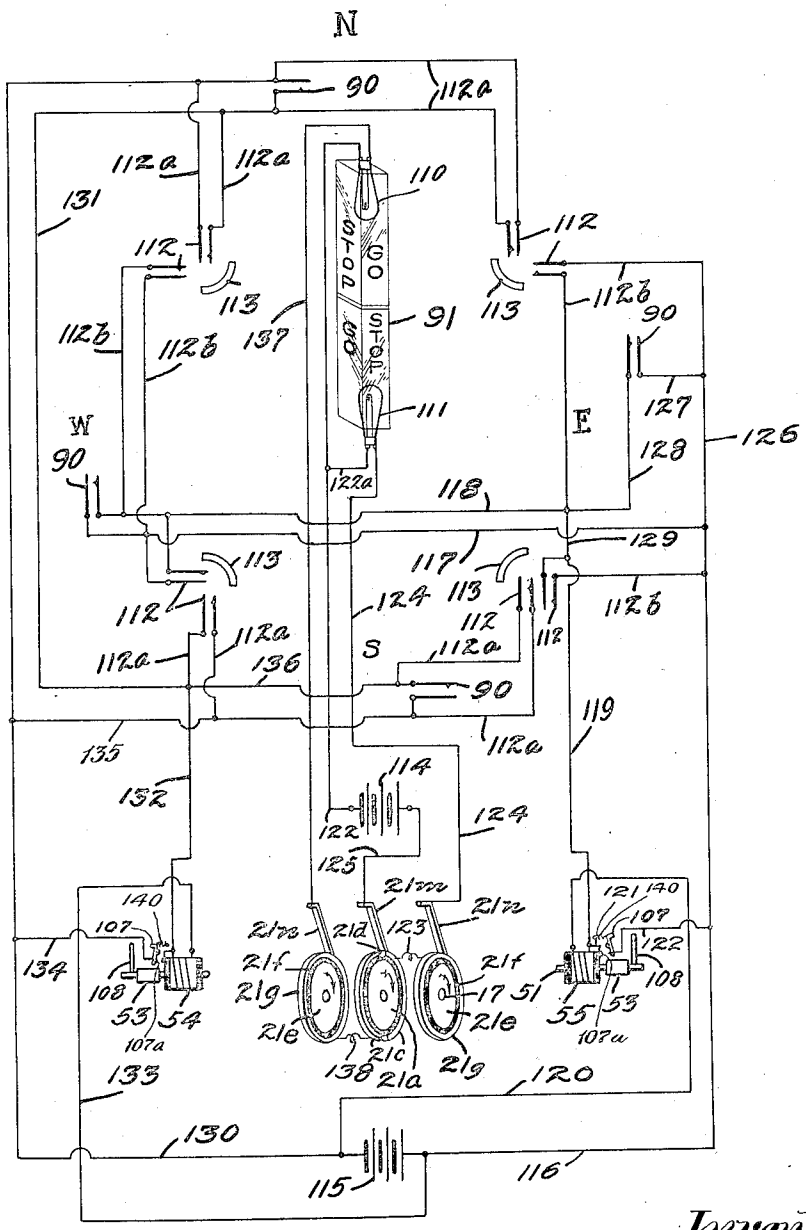
Aug. 11, 1936. T. TONE 2,050,637

TRAFFIC SIGNAL CONTROLLED BY VEHICLES

Filed Aug. 4, 1926 3 Sheets-Sheet 1

Fig. 1



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TRAFFIC SIGNAL CONTROLLED BY VEHICLES

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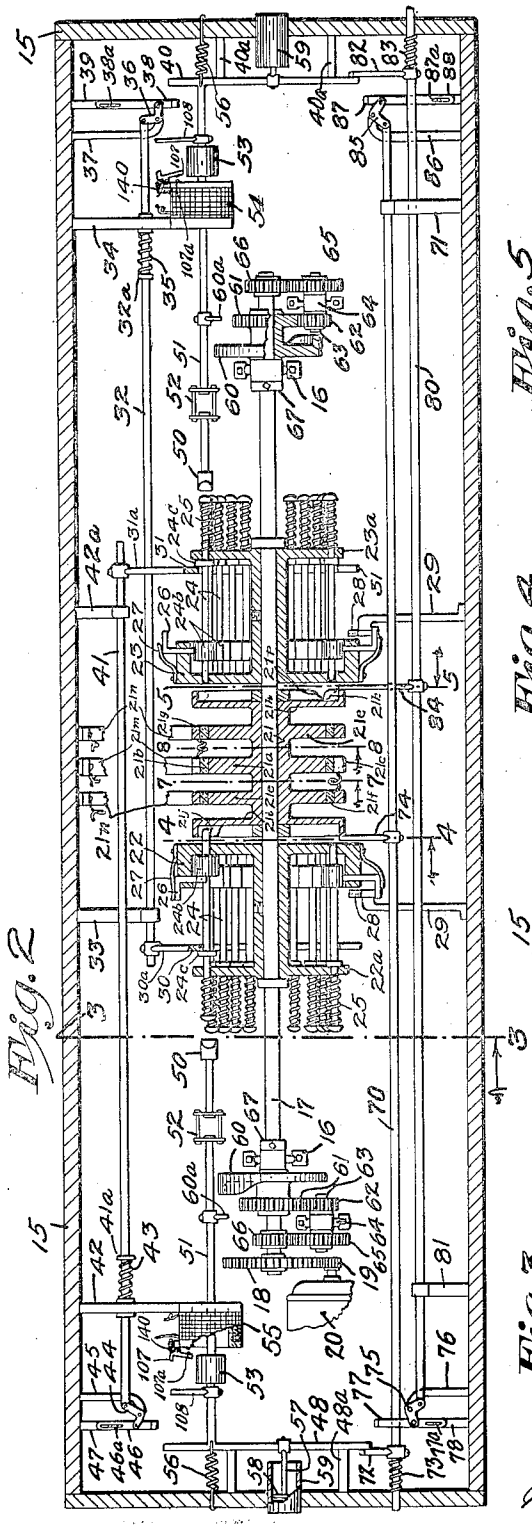


Fig. 2

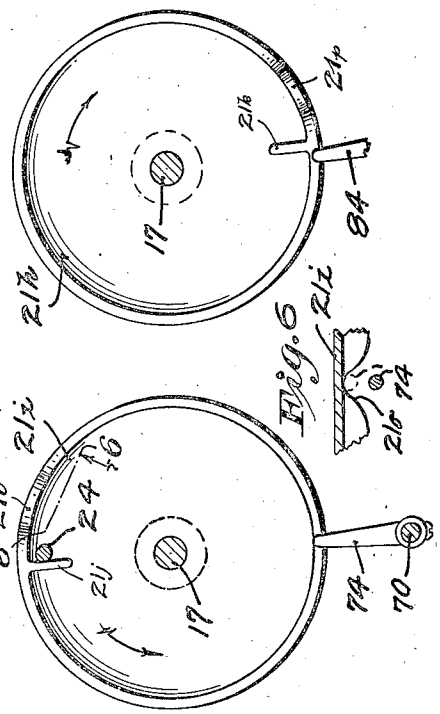


Fig. 5

Fig. 4

Fig. 6

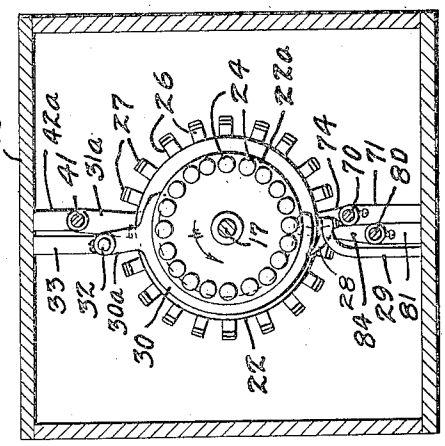


Fig. 3

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TRAFFIC SIGNAL CONTROLLED BY VEHICLES

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Fig. 7

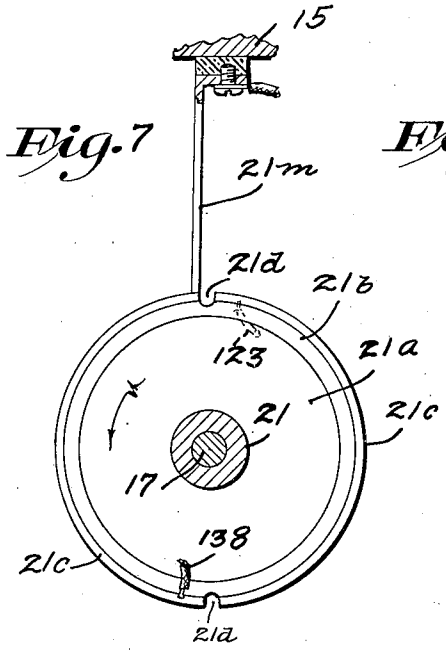


Fig. 8

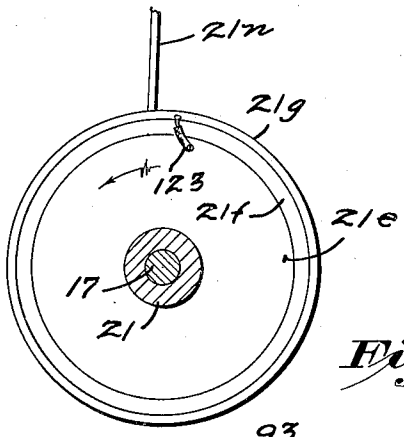


Fig. 9

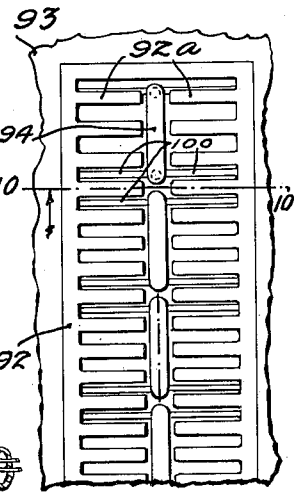


Fig. 11

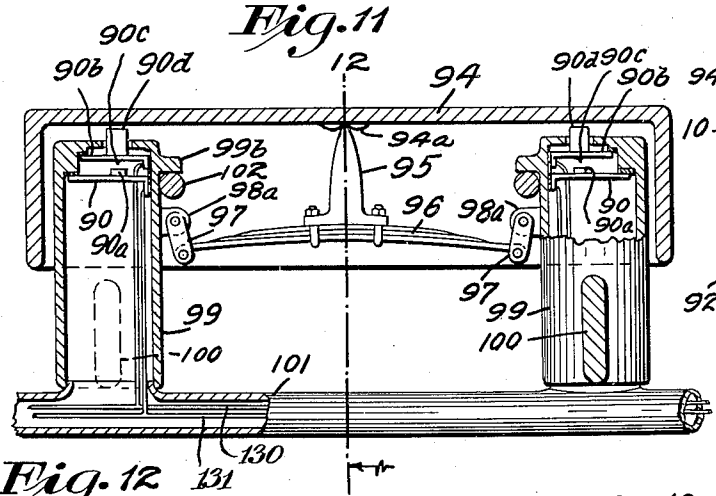


Fig. 12

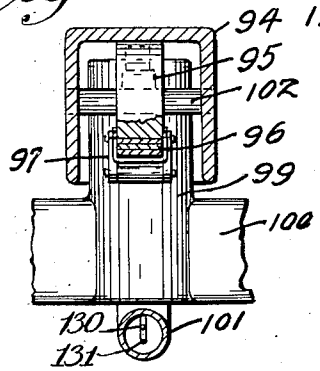
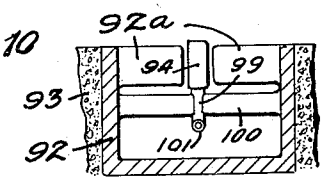


Fig. 10



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UNITED STATES PATENT OFFICE

2,050,637

TRAFFIC SIGNAL CONTROLLED BY VEHICLES

Thomas Tone, Minneapolis, Minn., assignor to General Electric Company, a corporation of New York

Application August 4, 1926, Serial No. 127,025

44 Claims. (Cl. 177—337)

This invention relates to a signal and particularly to a signal for controlling traffic at street or roadway intersections or at the intersection of a street or roadway and a railway. As is well known, such traffic signals are now used in cities at street intersections to regulate the traffic on the streets and make the intersections safe for both vehicles and pedestrians.

It is an object of this invention, therefore, to provide a signal to be disposed at the intersection of two or more thoroughfares to permit traffic to proceed and to restrain traffic on said thoroughfares respectively at said intersection, together with vehicle operated means for setting said signal for said vehicle to proceed on one of said thoroughfares and to hold said signal so set until the vehicle passes said intersection.

It is another object of this invention, to provide a signal for directing the traffic at a thoroughfare intersection, with vehicle operated means disposed in the thoroughfare at some distance from the signal adapted to be operated by a vehicle to set the signal for the vehicle to proceed, together with means for holding the signal so set for a certain period when said means is operated by subsequent vehicles to allow said vehicles respectively to pass the intersection before the signal is changed.

It is still another object of the invention to provide a device as set forth in the preceding paragraph, together with stop means actuated by said vehicle operated means for preventing the signal being set by a vehicle on the other thoroughfare to allow said latter vehicle to proceed.

It is still another object of the invention to provide a signal adapted to be placed at a thoroughfare intersection and to permit traffic to proceed and to restrain traffic on said thoroughfare with vehicle operated means on both thoroughfares, spaced from said signal for setting said signal for traffic to proceed, together with means for preventing the signal being continuously set for traffic to proceed on one thoroughfare longer than a certain definite period of time.

It is a further object of the invention to provide a signal adapted to be disposed at a thoroughfare intersection and to permit traffic to proceed and to restrain traffic on said thoroughfares with vehicle operated means on both thoroughfares at a distance at each side of said signal together with means for giving preference to a vehicle on the thoroughfare for which the signal was last set for traffic to proceed thereon, when said vehicle operated means are subsequently actuated on different thoroughfares simultaneously.

It is also an object of this invention to provide an electrically operated signal adapted to be disposed at a street intersection for regulating traffic on the streets of said intersection and having vehicle operated means spaced at a distance from said signal in said streets, and other means adapted to be operated by a pedestrian for controlling said signal.

These and other objects and advantages of the invention will be fully set forth in the following description made in connection with the accompanying drawings, in which like reference characters refer to similar parts throughout the several views and in which:—

Fig. 1 is a diagrammatic view and wiring diagram of the device;

Fig. 2 is a horizontal section through a casing enclosing the operating mechanism for the device, some parts thereof being shown in plan;

Fig. 3 is a vertical section taken on line 3—3 of Fig. 2;

Fig. 4 is a vertical section taken on line 4—4 of Fig. 2;

Fig. 5 is a vertical section taken on line 5—5 of Fig. 2;

Fig. 6 is a horizontal section taken on line 6—6 of Fig. 4;

Fig. 7 is a vertical section taken on line 7—7 of Fig. 2;

Fig. 8 is a vertical section taken on line 8—8 of Fig. 2, Figs. 4 to 8 inclusive being shown on an enlarged scale;

Fig. 9 is a plan view showing the vehicle operated members;

Fig. 10 is a vertical section on line 10—10 of Fig. 9;

Fig. 11 is a vertical section taken on line 11—11 of Fig. 9; and

Fig. 12 is a vertical section taken on line 12—12 of Fig. 11.

Referring to the drawings, in Fig. 2 is shown a casing 15 having vertical walls, in which casing is largely disposed and housed the operating mechanism for the device. Spaced bearings 16 are secured to the bottom of said casing, in which is journaled a shaft 17 extending longitudinally of casing 15. Said shaft has secured to one end thereof a gear 18 meshing with the pinion 19 secured to the armature shaft of the driving motor 20 mounted in casing 15. A commutator member or assembly 21 is journaled on shaft 17 substantially centrally between the bearings 16, which member comprises a central disk 21a shown in Fig. 7, said disk having adjacent its periphery a portion 21b of insulating material and having

superposed on portion 21b two substantially semicircular segments 21c of conducting material or metal, separated by the spaces or notches 21d. Member 21 also comprises two side disks 21e disposed respectively at each side of the disk 21a, said disks 21e being shown in Fig. 8 and having a portion 21f adjacent their peripheries of insulating material and an outer peripheral portion 21g of conducting material or metal. The member 21 also comprises end disks 21h and 21i disposed respectively at the outer sides of disks 21e, which disks 21e have outwardly directed cylindrical peripheral flanges and as shown in Figs. 4 and 5, the disk 21i has an inwardly and radially extending rib 21j and the disk 21h has an inwardly and radially extending rib 21k having their outer edges flush with the edges of the flanges on said disks. It will be noted that in the assembly the ribs 21j and 21k are disposed substantially 180° apart. The disks 21a and 21e have brushes 21m and 21n slidably engaging their peripheral portions 21c and 21g respectively.

Secured to the shaft 17 in reverse disposition, and at each side of the member 21, are flanged disks 22 and 23 respectively. Each of the members 22 and 23 has an elongated central hub at the outer end of which is a disk 22a and 23a respectively. The disks 22a and 23a are provided adjacent their peripheries with a plurality of circumferentially spaced holes in which are slidable rods 24, said rods having heads at their outer ends between which and the outer sides of the disks 22a and 23a are disposed the compression coil springs 25. The inner ends of the rods 24 extend into holes in the inner ends of the members 22 and 23, but normally do not project through said members. The rods 24 have secured thereto adjacent their inner ends and within the flanges of members 22 and 23, enlarged portions or collars 24b. The rods 24 also have secured thereto adjacent the inner sides of the disks 22a and 23a collars 24c. Members 22 and 23 each have circumferentially spaced radially extending holes formed through their flanges, in which are disposed the rods 26 having end portions extending outwardly substantially at right angles, which portions are engaged by the plate springs 27 secured at one end to the peripheries of the disks 22 and 23. The rods 24 and collars 24b are normally so disposed that the inner ends of rods 26 ride on said collars as shown at the upper side of the disk 23 and the lower side of the disk 22 in Fig. 2. A pawl shaped cam 28 is disposed adjacent one side of each of the disks 22 and 23 in alinement with the end portions of the rods 26, under which said end portions of said rods pass, which cams are adapted to move said rods outwardly, said cams being secured to suitable supports 29 secured to one side of the casing 15.

Semi-annular plates 30 and 31 extend closely about the exteriors of the rods 24 carried respectively in the disks 22 and 23. The plate 30 has an outwardly extending arm 30a secured to a rod 32 slidable in bearings in supports 33 and 34 projecting from one side of the casing 15. Rod 32 has a collar 32a adjacent one end between which and the support 34 is disposed a coil spring 35 surrounding said rod and normally moving the same to the left as shown in Fig. 2. Beyond support 34 the rod 32 is pivoted to one arm of the bell crank lever 36 which is pivoted at its vertex portion to the end of a support 37 projecting from the side of the casing 15, the other arm of the bell crank lever 36 being pivoted to a slide 38 movable transversely of the casing 15 and having a slot 38a in which are disposed pins projecting from a support 39 also secured to one side of the casing 15. When rod 32 is moved to the right as shown in Fig. 2, the slide 38 will be moved outwardly so as to be in alinement with a stop member or bar 40 to be later described. The plate 31 has an outwardly extending arm 31a which is secured to a rod 41 extending longitudinally of the casing 15 and slidable in bearings in supports 42 and 42a extending from the sides of the casing 15.

The rod 41 has a collar 41a adjacent support 42 between which and said support is disposed a compression coil spring 43 which surrounds said rod. The outer end of the rod 41 is pivotally connected to the end of one arm of the bell crank lever 44 pivoted at its vertex portion to a support 45 extending from the side of the casing 15. The other arm of the bell crank lever 44 has its end pivotally connected to a slide 46 having a slot 46a extending longitudinally thereof through which project pins carried on a supporting member 47 secured to one side of the casing 15. Rod 41 normally is moved to the right as shown in Fig. 2 by spring 43 and when so moved, the slide 46 is moved toward the side of the casing 15 so as to be out of alinement with a stop bar 48 to be later described. When rod 41 is moved to the left, as shown in Fig. 2, the slide 46 will be moved inwardly of said casing so as to be in alinement with bar 48.

A plunger 50 is disposed in alinement with pins 24 at one side of the casing, there being one of said plungers for each set of pins, which plungers are movable by rods 51 connected to said plungers by a lost motion connection illustrated as a yoke 52, in which the plunger and said rods are slidable, said rods 51 having secured thereto the cores 53 adapted to co-operate respectively with solenoids 54 and 55 illustrated as carried respectively by the supports 42 and 34. The rods 51 are also connected at their outer ends to the bars 40 and 48 respectively and said rods and bars are normally urged toward the end of casing 15 by tensile coil springs 56 and have projections 40a and 48a engaging the ends of the casing and forming stop means therefor. Said bars 40 and 48 also have plunger rods 57 secured thereto carrying pistons 58 slidable in the dash pots 59 which are carried in the ends of the casing 15.

The shaft 17 has secured thereto outwardly of bearing 16 reversely disposed cam disks 60 having hubs journaled on said shafts and carrying gears 61. Gears 61 mesh with and are driven by gears 62 carried on shafts 63 journaled in bearings 64 secured in the bottom of casing 15, which shafts have gears 65 secured to their other ends, which in turn are driven by gears 66 secured to shaft 17. The disks 60 are thus driven at much lower speed than the shaft 17. Arms 60a are secured to rods 51 and adapted to co-operate at times with cam 60. The shaft 17 is held from longitudinal movement by collars 67 engaging the inner sides of the bearings 16.

A rod 70 extends longitudinally of casing 15, being slidable in an opening in one end thereof and in a bearing in a support 71 projecting from the side of the casing 15. An arm 72 is secured to and projects inwardly from rod 70 and a coiled compression spring 73 is disposed between said arm and the end of casing 15, said arm 72 having its end in alinement with one end of bar 48. Another arm 74 is secured to and projects inwardly from rod 70 adjacent the disk 21i, which disk has a recess 21o in its flange

adapted to be brought into alinement with the inner end of rod **74**, said recess being spaced slightly circumferentially from rib **21***j*, said rod, as shown in Fig. 6, being circular in cross section and said recess **21***o* having curved sides so as to form cams adapted to move said rod on the rotation of said disk. The rod **70** at its other end is pivotally connected to the end of one arm of the bell crank lever **85**, which lever is pivoted adjacent its vertex portion to a support **86** extending inwardly from the side of the casing **15**, the other arm of said bell crank lever having its end pivotally connected to a slide **87** having a slot **87***a* extending longitudinally thereof and embracing pins projecting from a support **88** extending inwardly from one side of the casing **15**. The inner end of slide **87** is adapted to be projected into and out of alinement with one end of the bar **40**.

A bar **80** extends longitudinally of the casing **15** adjacent the bar **70**, being slidable in an opening in one end of said casing and in a bearing carried on a support **81** extending from the side of the casing **15**. The bar **80** has an arm **82** secured thereto and projecting inwardly therefrom, the inner end of which is in alinement with and at the outer side of bar **40** and a coiled compression spring **83** surrounds rod **80** and is disposed between arm **82** and the end of casing **15**. Another arm **84** is secured to bar **80** and projects inwardly therefrom adjacent the disk **21***h* and said disk has a recess **21***p* in the flange thereof adapted to be brought into alinement with arm **84**, which recess is spaced slightly circumferentially from rib **21***k*. Said recess **21***p* is similar to the recess **21***o* in the disk **21***i* and has cam portions at its sides adapted to act on the cylindrical end of arm **84**. The rod **80** is pivotally connected at one end to the end of one arm of the bell crank lever **75** which is pivotally connected adjacent its vertex portion to a support **76** extending from the side of casing **15**, said bell crank lever having its other arm pivotally connected at its end to a slide **77** having an elongated slot **77***a* therein, into which project pins carried by a support **78** extending inward from the side of the casing **15**. The slide **77** is adapted to have its inner end moved in and out of alinement with bar **48**.

The solenoids **54** and **55** have the windings thereof connected in series in a circuit, with switches **90** which are disposed in each street quite a distance from a signal **91** as illustrated in Fig. 1.

The switches **90** (see Figs. 9 to 12) are carried in a casing **92** which will be placed in the material **93** of the street, which casing is illustrated as of rectangular form with a closed bottom, which bottom will be provided with suitable openings (not shown). The top of casing **92** has ribs **92***a* projecting inwardly from each side. Between the inner ends of the ribs **92** are disposed in spaced relation across the street, the housing members **94**. Each housing **94** is supported centrally on its under side by a bracket **95** having a comparatively sharp edge extending transversely of the housing **94** and between raised portions or ribs **94***a* thereon. The bracket **95** is secured to the central top portion of a leaf spring **96** having its end portions pivotally connected by the shackles **97** to lugs **98***a* extending inwardly from cylinders **99**, which cylinders are rigidly supported from the casing **92** by the cross ribs **100** integrally connected to the sides of said cylinders and said casing. The lower ends of said cylinders **99** are open and fit tightly over bosses projecting upwardly from a conduit **101** which extends lengthwise of housing **94** in casing **92** and transversely of the street, and in which the conductors extending to the switches **90** are housed. The cylinders **99** also have lugs **99***b* projecting inwardly from the sides thereof, engaged by rods **102** which also extend across housing **94** and are secured thereto, said rods limiting the position of housing **94** as it is urged upwardly by spring **96**. A plate **90** is secured to the inside of each cylinder **99** and electrically insulated therefrom, which plate carries the upwardly projecting contact member **90***a*. A resilient plate **90***b* is also secured to the inner side of each cylinder **99** and electrically insulated therefrom, which plates have downwardly projecting contact points **90***c* thereon adapted to engage the contact points **90***a*. The plates **90***b* also have upwardly projecting plugs **90***d* extending through openings in the top of cylinders **99** and adapted to be engaged by the housings **94** when the same are depressed, to cause engagement of contact points **90***a* and **90***c*.

The conductors which are connected respectively to the plates **90***a* and **90***b* as shown in Fig. 1 and as later described are used to operate the solenoids **54** and **55** and as stated are connected in series with the windings thereof. The solenoids **54** and **55** are also provided with an auxiliary circuit including contact points **107***a*, one of which is carried by a pivoted armature **107** carried at one end of the solenoids **54** and **55**. The rods **51** also carry arms **108** secured thereto, the ends of which are adapted to engage the ends of the armature **107** and separate the contacts **107***a* when the cores **53** have moved into the solenoids **54** and **55**.

The signal device **91** shown in Fig. 1 is illustrated as an upright post which will be supported in any suitable manner at the street intersection and the same has four sides facing the two streets intersecting, with the directing words "Go" and "Stop" on said sides. It will be noted that the upper portion of the device has the words "Stop" and "Go" on opposite sides thereof and the lower portion has these words on opposite sides thereof in alternate arrangement. When the upper portion of the signal is displayed or illuminated as by the lamp **110**, the traffic will be allowed to proceed on the street running north and south as indicated by the letters N. S. in Fig. 1, and traffic on the street running east and west, as indicated by the letters E. W. will be restrained or stopped. When the lower portion of the signal is displayed or illuminated, as by lamp **111**, the traffic on the east and west street will be allowed to proceed and traffic on the north and south street will be restrained or stopped.

It is now common in cities to also control the pedestrian traffic at street intersections by the signal which controls the vehicle traffic. In the present apparatus means are provided by which pedestrians can control the signal and for this purpose signal controlling devices such as switches **112** are provided adjacent or inside the curbing **113** indicated in Fig. 1, which switches **112** at each corner are arranged so that one will control the signal **91** to permit traffic to proceed on one street and the other will control the signal so as to permit traffic to proceed on the other street.

In the operation of the signalling device the motor **20** will be constantly driven from some suitable source of power and the shaft **17** and the disk members **22** and **23** will be constantly

rotated, a suitable battery or batteries or other source of power such as indicated at 114 and 115 in Fig. 1, being provided. The devices operated by the vehicle including the switches 90 will be disposed about fifty feet at each side of the signal or at such a distance that it will take about ten seconds for the vehicles to move from said device past the intersection when travelling at the ordinary speed at corners.

Assuming that the signal shown in Fig. 1 has its upper portion illuminated, the signal would be set for "Go" or for traffic to proceed on the north and south street. If a vehicle now approaches the signal on the east and west street from the west, it will pass over one of the housings 94 and will operate the switch 90 shown at the left in Fig. 1. This switch being closed, the solenoid 55 will be energized. The circuit for thus energizing the solenoid may be traced from battery 115 (see Fig. 1) through conductors 116, 117, switch 90, conductors 118 and 119, through the winding of the solenoid and conductor 120, to the other side of battery 115. Solenoid 55 being energized, the core 53 is drawn thereinto.

If the switch 90 should be only closed for a very brief instant, provision is made for holding the solenoid energized until the core 53 has moved completely thereinto. As soon as the solenoid 55 is energized, the armature 107 is pulled up and contacts 107a are closed. If switch 90 opens, the solenoid circuit would then still be closed, the circuit therefor being made through conductors 120, through the winding, conductor 121, contact points 107a, and then through conductor 122 to the other side of the battery 115.

When the core 53 has moved completely into the solenoid, the arm 108 will engage the upper portion of the arm 107 and will separate the contacts 107a, thus breaking the circuit for the solenoid winding which then becomes de-energized. The armature 107 is normally held open by a spring 140. When core 53 moves into the solenoid 55, rod 51 is moved and after the lost motion in yoke 52 is taken up, the plunger 50 is moved to the right as seen in Fig. 2. Plunger 50 will engage one or more of the pins 24 and move the same to the right, which pins will pass through member 22 and within the flange of disk 21i. As the pins and member 22 are revolving, the pins 24 will engage the rib 21j which will at this time be substantially in the position shown in Fig. 5. The pin 24 will move against the rib 21j and the disk 21i and the commutator assembly 21 will be rotated. The brush 21m, before the rotation of member 21, occupied the position shown in Fig. 7. Upon rotation of the disk 21a, brush 21m moves across the notch 21d to the opposite contact portion 21c and the upper portion of the signal 91 is not now illuminated as lamp 110 is extinguished, and the lower portion of the signal is illuminated as lamp 111 is lighted. The circuit for lighting lamp 111 may be traced from battery 114 through conductors 122 and 122a to said lamp, conductor 124 to the brush 21n of the disk 21e at the right in Fig. 1, through the connection 123 between contact member 21g and the contact member 21c now engaged by brush 21m, through said brush and conductor 125 to the other side of battery 114. The pin 24 continues to rotate the disk 21i until the latter is rotated through substantially 180°. When the pin 24 is first moved into the disk 21i, the collar 24b is moved so that one of the pins 26 snaps, or is moved inwardly by spring 27 in the rear of said collar. The pin is thus held in its inward position. As the member 22 rotates, the pin 26 passes under the cam 28 and is withdrawn so that the spring 25 can again move the pin 24 outward. The pin thus moves away from the rib 21j and releases the disk 21i so that the same is no longer rotated. While the disk 21i is revolving through 180°, the signal 91 has been maintained with the "Go" sign set for the east and west street. The speed of the shaft 17 and of disk 21i is such that the vehicle operating the signal will have time to pass the intersection before the signal is again changed, as the disk 21a must be revolved so that the brush 21m again moves across one of the notches 21d before the signal can be changed. The signal is now as stated, set for vehicles to proceed on the east and west street and the signal will remain in this position until a vehicle approaches on the north and south street and operates the switch 90 thereon.

The same operation would take place had the vehicle described approached from the east. In that case the switch 90 at the right of Fig. 1 would have been operated and solenoid 55 energized. The circuit for energizing the solenoid 55 in this case can be traced through conductors 116, 126, 127, through switch 90, conductors 128, 129, 119 through the solenoid winding, thence through conductor 120 to the other side of the battery 115.

When the pin 24 was moved inwardly by plunger 50, collar 24c engaged the semi-annular plate 30 and moved bar 32 to the right as shown in Fig. 2. Bell crank lever 36 was thus operated and the slide 38 moved inwardly in alinement with bar 40. It was thus impossible for the solenoid 54, even if energized, to move its core 53 and the rod 51 secured thereto, as this would be prevented by engagement of bar 40 with the slide 38. The pin 24 which was moved inwardly and moved the plate 30 will hold said plate in its inward position until collar 24c has moved with the member 22a through substantially 180° and until said pin is released by cam 28, after which spring 25 will retract said pin and spring 35 will again retract rod 32 and the stop slide 38 will be moved out of alinement with bar 40.

It will be noted that if subsequent vehicles going along the east and west street pass over the housings 94 and operate the switch 90, that the solenoid 55 will be energized at each of such times. This will result in the plunger 50 being actuated and one of the pins 24 being moved inwardly through the member 22. This pin, however, will not rotate the disk 21i as the rib 21j is now moved through 180°, and is substantially opposite the cam member 28. The pin member 24 thus moves within the disk 21i without moving the same. The signal 91 still remains set for the vehicles to proceed on the east and west street. At each actuation, however, of the solenoid and a pin 24, the rod 32 is moved so that the stop slide 38 moves into alinement with bar 40 and remains therein through substantially 180° travel of member 22, or until the collar 24b on said pin can move out of engagement with its rod 26. This insures that the signal cannot be changed by a vehicle approaching on the north and south street until the vehicle which has passed the switch 90 on the east and west street has had time to pass the intersection.

After the signal has been set for "Go" on the east and west street, if vehicles should approach on both streets and pass over and actuate the switches 90 therein at the same time, provision is made for giving preference to the vehicle ap-

proaching on the street for which the signal is set for traffic to proceed. When the disk 21*i* has been moved as described, the rib 21*j* on the disk 21*i* is substantially 180° from the position of rib 21*k* on the disk 21*h* and the depression 21*o* in disk 21*i* is opposite or in alinement with arm 74. Spring 73 normally tends to move rod 70 to the right as shown in Fig. 2, so that arm 74 will enter the recess 21*o*. Before this could happen, however, not only must arm 74 and the recess be in alinement, but the bar 48 must be moved to the right by the core 53 of solenoid 55, thus moving said bar 48 away from arm 72 and allowing the spring 73 to act.

When the signal as stated is set for "Go" on the east and west street, and the vehicle crosses the switch 90 on the north and south street, solenoid 54 will be actuated and bar 40 will thus be moved to the left as shown in Fig. 2, against the tension of spring 56. Spring 73 however has moved the rod 70 to the right and the stop slide 87 is moved outwardly by bell crank lever 85, said slide moving into alinement with bar 40. This prevents a complete actuation of the solenoid 54 and prevents the plunger 50 at the right operating one of the pins 24. When the solenoid was initially operated, it only moved far enough to take up the lost motion in the yoke 52.

When solenoid 55 is deenergized spring 56 will retract bar 48 and rod 70 against the tension of spring 73. Stop 38 will be thrown against solenoid 54 upon complete actuation of solenoid 55 and will be released as already described. The dash pot 59 prevents a too quick actuation of the bar 48 under influence of spring 56. With this construction it is seen that when vehicles approach the signal on both streets and cross the street switches simultaneously, preference will be given to the vehicle on the street for which the signal is already set for traffic to proceed.

As stated above, when the signal has been set for traffic to proceed on one street and subsequent vehicles pass over the street switch on the same street, the signal is held in its set position for the traffic to continue on said street. In order that traffic cannot be indefinitely stopped on one street, the cams 60 are provided. When the solenoid 55 has been actuated as already described and rod 51 on the core 53 thereof moved to the right, the pin or arm 60*a* has been moved to the right in position to be acted upon by the cam 60. As stated, this cam moves at much lower speed, owing to the gearing described, than does shaft 17. The cam 60 is designed to make one revolution in about every two minutes. The cam 60 has a wide portion thereon, and as this wide portion comes into alinement with pin 60*a*, it will move back rod 51 and will prevent this rod being moved to the right for a considerably longer period than ten seconds. This will result in preventing subsequent vehicles which pass over the street switches on the east and west street from operating any of the pins 24, to hold the signal in its "Go" position and will give opportunity for the other solenoid 54 which is operated by street switches on the other street to be actuated and to turn the signal for traffic to proceed on said latter street.

The above description has included only the operation of the solenoid 55 which is operated by the switches 90 on the east and west street. The operation will be exactly the same as described when solenoid 54 is actuated, which will be energized by the closing of the switches on the north and south street. When the switch 90 shown at the top of Fig. 1 on the north and south street is closed by a vehicle passing thereover, the solenoid 54 will be energized and the circuit for energizing said solenoid may be traced as follows: through conductor 130 from battery 115, through switch 90, conductors 131, 132, through the winding of the solenoid 54 and conductor 133 to the other side of the battery 115. The solenoid will be energized and will pull up its armature 107 thus closing the contact points 107*a*. When switch 90 opens, the circuit will be closed through the solenoid from battery 115, through conductor 133, the winding of the solenoid 54, the contact points 107*a* and armature 107, and conductors 134 and 130, to the other side of the battery 115. When the solenoid core has completed its movement, the arm 108 will open the circuit by moving armature 107 as already described. When the street switch 90 shown at the lower end of the north and south street in Fig. 1 is actuated by a vehicle, solenoid 54 will also be operated and the circuit for energizing the same may be traced as follows: from battery 115 through conductors 130 and 135 through switch 90 and conductors 136 and 132 to the winding of the solenoid 54 and conductor 133 to the other side of the battery 115. The circuit for illuminating the top portion of the signal 91 by lamp 110 may be traced as follows: from battery 114, through conductor 122, to lamp 110 through conductor 137 to brush 21*n* through the contact portion of disk 21*e* and its connection 138 with the contact portion 21*c* of the central disk 21*a*, through brush 21*m* and conductor 125 to the other side of the battery 114. It will be understood that when the solenoid 54 is operated the stop slide 46 will be moved into alinement with bar 48 by the plate 31, as already described in connection with the plate 30, so that solenoid 55 cannot be actuated to move its core fully therein for at least 10 seconds after a vehicle has passed over one of the street switches 90 which energizes solenoid 54. The cam 60 adjacent the solenoid 54 will also prevent the signal being held for more than two minutes by vehicles passing on the north and south street, in the same manner as already described in connection with the cam 60 adjacent the solenoid 55. The apparatus is thus duplicated at each side of the casing 15 and the operation of the parts for the two streets is substantially identical.

The switches 112 are provided at the corners of the curbing or sidewalks of a street or roadway, so that if a pedestrian wishes to cross the street, he may operate the signal to stop traffic on one street and thus pass safely thereacross. It will be seen that the switches 112 are merely cut in across the circuits of the street switches 90 and a description of these switches at one corner will suffice for the switches at all of the corners. One of the switches 112 at each corner is connected to or cut in across one of the switches 90 on the north and south street, and the other is cut in across one of the switches 90 on the east and west street. One of the switches at each corner will therefore operate solenoid 54 and the other one of said switches at each corner will operate solenoid 55. The switch 112 at each corner which is connected to switch 90 on the north and south street is connected thereto by the conductors 112*a* which extend respectively from each of the contacts of switch 112 to each of the contacts of switch 90. The switch 112 at each of the corners which is connected to the switch 90 on the east and west street has each of its contacts or

sides connected respectively to the sides or contacts of switch 90 by conductors 112b. It will be seen that when one of the switches 112 is closed, the effect will be the same as closing the respective switch 90 and the circuit for operating the respective solenoid, either 54 or 55, will be the same as already traced for the switches 90.

It will be noted that with the described structure of the switches 90 including the housing 94, that said housing will be supported independently of the switch members 90 and 90b. If the housing 94 is depressed at either end, it will be seen that it will pivot about its support on bracket 95 and will contact one of the plugs 90d. The switches 90 will thus be closed no matter over what part of the housing 94 the vehicles run. The housings 94 as shown in Fig. 9, extend across the street in transverse directions and in slightly spaced relation. It will also be understood that these housings could be placed so that the switches 90 will be operated by a street car or other vehicle moving on a track on the street. The switches 90 and housings 94 will have to extend across the greater portion of the street and from the center thereof to a point adjacent the curb. It will also be noticed that there is a space in casing 92 beneath the conduit 101 and the members 99 so that any moisture running into the casing 92 will not reach the switches 90 but will be drained away.

It will be noted that when the signal has been set for traffic to proceed on one street such as the east and west street and is being held so set for the vehicle to pass the intersection and in the meantime a vehicle operates the switch on the north and south street, the signal will change as soon as the vehicle on the east and west street has had time to pass the intersection or as soon as the shaft 17 has made substantially one-half revolution. This is due to the auxiliary circuit which holds the solenoid energized until the core has moved completely thereinto. As previously described, the stops 40 and 48 prevent the one solenoid from operating for a given length of time after the other has operated. As soon as the stop is removed, however, which will be as soon as the vehicle or pedestrian has had time to cross the intersection or street, the solenoid which was stopped will then complete its movement and the signal will be changed for the vehicle or pedestrian which is waiting to cross the intersection or street.

From the above description it is seen that applicant has provided a comparatively simple and very efficient device for controlling the traffic at intersecting streets. If the traffic is quite continuous on one street, it will be allowed to proceed on this street for a certain period of time. This will result in speeding up traffic as the traffic is not arbitrarily held up on one street if there is no traffic on the other, which is the case where the signal is arbitrarily changed at short periods for each street. At the same time the traffic on one street cannot monopolize the right of way. After a vehicle passes one of the switches 90, it is always assured of having sufficient time to pass the intersection before a vehicle will be allowed to proceed on the other street, as the signal will be held for a certain period of time, which is ten seconds, before it can again be changed. This will be ample time for the vehicle to proceed from the street switch past the intersection, or for the pedestrian to cross the street.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts, without departing from the scope of applicant's invention, which, generally stated, consists in a device capable of carrying out the objects above set forth, in the novel parts and combinations of parts disclosed and defined in the appended claims.

What is claimed is:—

1. In a traffic signal device the combination with a signal adapted to be disposed at the intersection of two thoroughfares and having traffic directing means thereon adapted alternately to be displayed to permit traffic to proceed on one thoroughfare and to restrain traffic on the other thoroughfare, of two constantly driven members one for each thoroughfare, means operated by said members for operating said signal for traffic to proceed on said thoroughfares respectively, a vehicle operated device in each thoroughfare comprising a switch respectively spaced a distance from said signal, circuits adapted to be closed by operation of said vehicle operated devices in said respective thoroughfares, means including a pair of solenoids operated respectively by closing of said circuits for causing said driven members to actuate said first mentioned means to set said signal and a stop means actuated by each of said solenoids to prevent operation of the other solenoid for a definite period.

2. In a traffic signal device the combination with a signal adapted to be disposed at the intersection of two thoroughfares and having traffic directing means thereon adapted alternately to be displayed to permit traffic to proceed on one thoroughfare and to restrain traffic on the other thoroughfare, of a constantly rotated shaft, a member journaled on said shaft having means for setting the signal for traffic to proceed on each thoroughfare alternately when rotated, a member for each thoroughfare secured to said shaft at each side of said member respectively, a vehicle operated device for each of said last mentioned members comprising a switch including a device disposed in each thoroughfare at each side of said signal, electrical circuits closed by operation of said vehicle operated devices, means actuated upon closing of said circuits to connect said first mentioned member to one of said second mentioned members to rotate said first mentioned member to set the signal for traffic to proceed on said thoroughfare in which said vehicle operated device was operated and means actuated by said last mentioned means to prevent said first mentioned member from being connected to the other of said second mentioned members during a certain period of rotation of said shaft.

3. In a traffic signal device the combination with a signal adapted to be disposed at the intersection of two thoroughfares and having traffic directing means thereon adapted alternately to be displayed to permit traffic to proceed on one thoroughfare and to restrain traffic on the other thoroughfare, of a constantly rotated shaft, a commutator element journaled on said shaft comprising a central disk having semi-circular contact members, a side disk at each side of said central disk having circular contact members, brushes respectively engaging said disks, means for setting said signal to permit traffic to proceed on one thoroughfare when said brush of the central disk is on one of said semi-circular contact members and to proceed on the other thoroughfare when said brush is in contact with the other of said semi-circular members, members rotatable with said shaft at each side of said com-

mutator element, vehicle operated devices in said thoroughfares at each side of said signal and at a distance therefrom, and means actuated by operation of said vehicle operated devices for connecting one of said last mentioned members to said commutator element to rotate the same to set said signal and to hold the same set during the rotation of said semi-circular contact member.

4. In a traffic signal device the combination with a signal adapted to be disposed at the intersection of two thoroughfares and having traffic directing means thereon adapted to be displayed alternately to allow traffic to proceed on one thoroughfare and to restrain traffic on the other, of a constantly rotated shaft, a member journaled thereon adapted to operate said signal by the rotation thereof, a disk secured to said shaft at each side of said member, a plurality of circumferentially spaced pins carried in each of said disks, a pair of plungers, one of which is respectively alined with said pins of each disk so that said pins pass in front thereof, solenoids for moving said plungers respectively to move one of said pins and connect one of said disks to said first mentioned member to operate said signal and vehicle operated switches disposed in said thoroughfares at each side of said signal for respectively energizing said solenoids.

5. The structure set forth in claim 4, a stop for preventing operation of one of said solenoids after the other has been operated to connect one of said disks to said first mentioned member and means on each of said pins adapted to operate said stop when said pin is pushed in to connect its disk with said first mentioned member.

6. The structure set forth in claim 4, a stop for preventing operation of one of said solenoids after the other has been operated to connect one of said disks to said first mentioned member, means on each of said pins adapted to operate said stop when said pin is pushed in to connect its disk with said first mentioned member, means for holding said stop in position for a portion of the revolution of said disk and means for releasing said stop and restoring the same to its normal position.

7. The structure set forth in claim 4, a pair of cams journaled on said shaft, and driven therefrom at much less speed than said shaft, and means on each of said plungers adapted to be operated by one of said cams at regular intervals respectively for preventing operation of said plunger to move one of said pins for a certain period of time.

8. In a traffic signal device the combination with a signal adapted to be disposed at the intersection of two thoroughfares, and having traffic directing means thereon adapted alternately to be displayed to permit traffic to proceed on one thoroughfare and to restrain traffic on the other thoroughfare, of a vehicle operated device in one of said thoroughfares spaced from said signal, means actuated by operation of said vehicle operated device for setting the signal to permit traffic to proceed on said thoroughfare, means for holding the signal so set for a determined period until said vehicle has had time to pass said intersection, a vehicle operated device in the other thoroughfare, means actuated by said last mentioned vehicle operated device for setting the signal to permit traffic to proceed on said last mentioned thoroughfare, means operated by said first mentioned device when actuated by said vehicle or a plurality of subsequent vehicles following said vehicle for preventing said signal being set by said last mentioned vehicle operated device for a certain period after said operation by said vehicle or after operation by the last of said plurality of vehicles, and means whereby the means actuated by said last mentioned vehicle operated device will change the signal as soon as said period is ended.

9. The structure set forth in claim 8, said vehicle operated device comprising a solenoid, a vehicle operated switch for energizing said solenoid and mechanism actuated by said solenoid for operating said first mentioned means, said solenoid having an auxiliary circuit holding the same energized after said vehicle operated switch is opened, and means for de-energizing said solenoid after its complete operation.

10. In a traffic signal device, the combination with a signal adapted to be disposed at the intersection of two or more thoroughfares and having traffic directing means thereon adapted to be displayed constantly and alternately to allow traffic to proceed on one thoroughfare and restrain traffic on another thoroughfare, of traffic actuated means for said thoroughfares spaced from said signal at opposite sides of said signal for operation by a vehicle in motion, means actuated by said traffic operated means respectively to set said signal to direct traffic to proceed on its respective thoroughfare for a determined period of time, other means actuated by said last mentioned means for preventing a change in said signal by a traffic operated means on the other thoroughfare for a certain period of time after operation of said other means, means automatically operated after a longer fixed period of time to render said other means inoperative so that the signal may be operated by one of the traffic operated means on said other thoroughfare to set said signal to direct traffic to proceed on said other thoroughfare.

11. In a traffic signal device, the combination with a signal adapted to be disposed at the intersection of two or more thoroughfares and having traffic directing means thereon constantly displayed and adapted to be displayed alternately to allow traffic to proceed on one thoroughfare and restraining traffic on another thoroughfare, of a traffic operated means in each of said thoroughfares spaced from said signal at each side thereof constructed and arranged to be operated by a moving vehicle for setting the signal and preventing operation thereof by the traffic operated means upon the other thoroughfare for a definite period after each operation thereof to permit traffic to proceed on their respective thoroughfares, and a timing mechanism limiting the time that said traffic operated means can control the signal by a plurality of operations of said traffic-operated means and rendering the signal operable by a traffic operated means on another thoroughfare.

12. In a traffic signal device, the combination with a signal adapted to be disposed at the intersection of two or more thoroughfares and having traffic directing means thereon constantly and alternately displayed to said thoroughfares to direct traffic to proceed on one thoroughfare and restrain traffic on another thoroughfare, of traffic operated devices for each thoroughfare for setting the signal to direct traffic to proceed on its respective thoroughfare, means actuated by a first operation of a said traffic operated device in one thoroughfare when so setting the signal and by a plurality of subsequent opera-

tions of said traffic operated device after said first operation and while the signal is so set thereby for preventing, for a definite period of time after each operation of said traffic operated device, the operation of said signal by the traffic operated device of another thoroughfare should said latter traffic operated device be actuated substantially at any time between the said first operation and the end of said last definite period but permitting an actuation as aforesaid of said latter traffic operated device to operate the signal after said last definite period has expired.

13. In a traffic signal device, the combination with a signal adapted to be disposed at the intersection of two or more thoroughfares and having traffic directing means thereon adapted to be displayed alternately to direct traffic to proceed on one thoroughfare and restraining traffic on another thoroughfare, of traffic operated devices for each of said thoroughfares for setting the signal to direct traffic to proceed on their respective thoroughfares, means actuated by operation of a said device in so setting the signal and in each subsequent operation thereof while said signal is so set for preventing the signal from being set by the device of another thoroughfare for a certain definite period of time after the operation of said second mentioned means, means operated after a longer period of time to render inoperative said last mentioned means so that the signal may be operated by said traffic operating devices for another thoroughfare to direct traffic to proceed thereon, and means for actuating said last mentioned means.

14. In a traffic signal device, the combination with a signal adapted to be disposed at the intersection of two or more thoroughfares and having traffic directing means thereon adapted to be displayed alternately to direct traffic to proceed on one thoroughfare and restrain traffic on another thoroughfare, of a traffic-operated device for each of said thoroughfares, means actuated by a said device for setting said signal to direct traffic to proceed on one of said thoroughfares, and means actuated by said means for holding the signal so set for a certain determined period of time for preventing the operation of the signal by traffic on the other of said thoroughfares, whereby traffic on said first mentioned thoroughfare after operating said device will have time to pass the intersection before the signal can be changed by the traffic operated device on the other thoroughfare and means acting automatically after a fixed period of time longer than said first mentioned period for rendering inoperative said last mentioned means whereby said signal may be actuated by operation of the traffic operated device on the other thoroughfare.

15. In a traffic signal device, the combination with a signal adapted to be disposed at the intersection of two or more thoroughfares and having constantly operated means for directing traffic to go on one thoroughfare and stop on the other, or vice versa, a vehicle operated device in one of said thoroughfares for operating said signal to display a go sign on said thoroughfare and a stop sign on the other, means actuated by said device for holding the signal so set for a determined period of time to permit said vehicle to cross said intersection, a vehicle operated device on the other thoroughfare, means actuated by said latter device for setting said signal to display a go sign on said other thoroughfare and a stop sign on said first mentioned thoroughfare, and means actuated by said first mentioned device when actuated by a plurality of subsequent vehicles for preventing said signal being set by said last mentioned means for a definite period of time after each of said vehicles operates said first mentioned vehicle operated device, should said second mentioned vehicle operated device be actuated substantially at any time between the said first operation of said first mentioned vehicle operated device and the end of said last definite period but permitting an actuation as aforesaid of said second mentioned vehicle operated device to operate the signal after said last definite period has expired, whereby said subsequent vehicles operating said first mentioned device will respectively have time to pass the intersection before the signal is changed by said last mentioned means.

16. The structure set forth in claim 15, and means whereby said means actuated by said last mentioned vehicle operated device will set said signal so that the go sign changes substantially immediately to stop and the stop sign to go as soon as said last mentioned period of time is ended.

17. A traffic signal device adapted to be disposed at the intersection of two or more thoroughfares for directing traffic to go on one thoroughfare and stop on the other, or vice versa, having in combination, a signal having constantly displayed means for traffic including lamps for directing traffic to go on one thoroughfare and stop on the other, or vice versa, a vehicle operated device in one of said thoroughfares, means for operating said signal including an electrical circuit closed by said vehicle operated device for illuminating one of said lamps operating to form a go sign on said thoroughfare and a stop sign on the other, means actuated by said device for holding the signal so set for a determined period of time to permit said vehicle to cross said intersection, a vehicle operated device on the other thoroughfare, means including an electrical circuit closed by said latter device for operating said signal and illuminating one of said lamps operating to form a go sign on said other thoroughfare and a stop sign on said first mentioned thoroughfare, and means actuated by said first mentioned device when actuated by a plurality of subsequent vehicles for preventing said signal being set by said last mentioned means for a definite period of time after each of said vehicles operates said first mentioned vehicle operated device, should said second mentioned vehicle operated device be actuated substantially at any time between the said first operation of said first mentioned vehicle operated device and the end of said last definite period but permitting an actuation as aforesaid of said second mentioned vehicle operated device to operate the signal after said last definite period has expired, whereby said subsequent vehicles operating said first mentioned device will respectively have time to pass the intersection before the signal is changed by said fourth mentioned means.

18. A traffic signal device having in combination, a signal adapted to be disposed at the intersection of two or more thoroughfares and having constantly illuminated traffic directing means thereon including means for directing traffic to go on one thoroughfare and stop on the other thoroughfare, or vice versa, a traffic operated device for one of said thoroughfares, means actuated by operation of said device for setting the

signal to direct traffic to proceed on said thoroughfare, a traffic operated device on the other thoroughfare, means actuated by operation of said last mentioned device for setting the signal for traffic to proceed on said last mentioned thoroughfare, other means actuated by operation of said first mentioned traffic operated device in so setting the signal and in a plurality of subsequent operations thereof, while the signal is so set for preventing the signal being set by operation of said last mentioned traffic operated device for a certain definite period of time starting anew after each operation of said other means within said period of time, and means whereby said means actuated by operation of said last mentioned traffic operated device at substantially any time during said operations of said other means will change the signal as soon as said period of time has elapsed to direct traffic to proceed on the thoroughfare in which said last mentioned traffic operated device is located.

19. A traffic signal device adapted to be disposed at the intersection of two or more thoroughfares having in combination, a signal having illuminating means, a circuit containing certain of said illuminating means for causing said signal to direct traffic to go on one of said thoroughfares and stop on another of said thoroughfares when said circuit is closed, a circuit containing certain other of said illuminating means for causing said signal to direct traffic to stop on said first mentioned thoroughfare and go on the other when said latter circuit is closed, means constantly closing one or the other of said circuits, a traffic operated device in each of said thoroughfares, means actuated by said traffic operated device for causing said last mentioned means to close one of said circuits and open the other, and means actuated by said last mentioned means to hold said closed circuit closed for a definite period of time after actuation of said traffic operated device and preventing closing of said other circuit for said period of time, and means acting automatically and independently of said traffic operated device after a longer period of time to permit said first mentioned means other than said illuminated means to open said closed circuit and close the other circuit.

20. A traffic signal device adapted to be disposed at the intersection of two or more thoroughfares having in combination, a signal having illuminating means, a circuit containing certain of said illuminating means for causing said signal to direct traffic to go on one thoroughfare and stop on another thoroughfare when said circuit is closed, a second circuit containing certain other of said illuminating means for causing said signal to direct traffic to stop on said first mentioned thoroughfare and go on the other when said second circuit is closed, means constantly operated to close one of said circuits and open the other, and vice versa, a traffic operated device in one of said thoroughfares, means actuated by operation of said device for causing said last mentioned means to close said first circuit and open said second circuit, a traffic operated device in the other thoroughfare, means actuated by operation of said last mentioned device for causing said first mentioned means to close said second circuit and open said first circuit, other means actuated by operation of said first mentioned traffic operated device in so closing said first circuit and in a plurality of subsequent operations thereof while said first circuit is still closed for preventing said first mentioned means from closing said second circuit for a definite period of time starting anew after each operation of said other means within said period of time, and means whereby said means actuated by operation of said last mentioned traffic operated device at substantially any time during said operations of said other means will close said second circuit as soon as said period of time has elapsed, to direct traffic to proceed on said thoroughfare in which said last mentioned traffic operated device is located.

21. A traffic signalling apparatus for intersecting traffic thoroughfares having in combination, a right of way indicating device including illuminating means, electric circuits including certain of said illuminating means, some of which circuits are constantly closed for always giving a traffic indication to said thoroughfares, a traffic actuated controller in each of said thoroughfares, mechanism operated when a moving vehicle passes over said controller, a right of way transferring device, means actuated by operation of said mechanism for giving a right of way indication for traffic to go on the thoroughfare in which said traffic actuated controller is operated, means including timing mechanism cooperable therewith, to vary the duration of said right of way indication between a predetermined minimum and a greater period of time, successive actuations of said first mentioned mechanism acting to cause duration of said right of way indication for a greater period than by a single actuation, and means for limiting duration of said right of way indication in the thoroughfare of said operated controller to a predetermined maximum amount.

22. A traffic signal device having in combination, a signal adapted to be disposed at the intersection of two or more thoroughfares having traffic directing means thereon simultaneously displayed to both thoroughfares and adapted to be displayed to alternately allow traffic to proceed on one thoroughfare and to restrain traffic on another thoroughfare, a vehicle-operated switch in each of said thoroughfares, a mechanism actuated by said switch and being constructed and arranged for operation by a moving vehicle or a plurality of vehicles following said vehicle to actuate said mechanism to set said signal to direct traffic to proceed on its respective thoroughfare for a definite period of time after each operation of said mechanism regardless of the operation of the switch in the other thoroughfare and a timing mechanism for limiting the total time that said signal can be held by a plurality of vehicles to direct traffic to proceed on said thoroughfare.

23. A traffic signal device having in combination, a signal adapted to be disposed at the intersection of two or more thoroughfares and having traffic directing means thereon constantly displayed and adapted to be displayed alternately to allow traffic to proceed on one thoroughfare and to restrain traffic on another thoroughfare, a single switch at each side of said signal in each thoroughfare adapted to be operated by a single impulse given by a moving vehicle passing thereover or by subsequent moving vehicles, mechanism actuated by said switch for setting said signal to direct traffic to proceed on its respective thoroughfare when so operated and holding said signal set for a definite period after each operation of said mechanism and a timing mechanism for limiting to a definite time the period in which said signal can be held for so directing traffic.

24. In a traffic signal device the combination

with a signal adapted to be disposed at the intersection of two or more thoroughfares, and having traffic directing means thereon adapted alternately to be displayed to permit traffic to proceed on one thoroughfare and to restrain traffic on the other thoroughfare, of a vehicle-operated device in one of said thoroughfares spaced from said signal, means actuated by said device for setting said signal to permit traffic to proceed on said thoroughfare, means actuated by said last mentioned means for holding the signal so set for a determined period to permit said vehicle to pass said intersection, a vehicle-operated device in the other thoroughfare, means actuated by said latter device for setting the signal to permit traffic to proceed on said last mentioned thoroughfare and means actuated by said first mentioned device when actuated by a plurality of subsequent vehicles for preventing said signal being set by said last mentioned vehicle-operated device for a certain definite period after each of said vehicles operates said first mentioned vehicle-operated device should said second mentioned vehicle-operated device be actuated substantially at any time between the first operation of said first mentioned vehicle-operated device and the end of said last definite period but permitting an actuation as aforesaid of said second mentioned vehicle-operated device to operate the signal after said last definite period has expired, whereby said subsequent vehicles operating said first mentioned device will respectively have time to pass said intersection before said signal is changed by said fourth mentioned means.

25. The structure set forth in claim 24 and means actuated by said last mentioned vehicle operated device for changing said signal as soon as said last mentioned period has elapsed whereby the last of said subsequent vehicles has had time to pass the intersection.

26. In a traffic signal device the combination with a signal adapted to be disposed at the intersection of two thoroughfares and having traffic-directing means thereon adapted alternately to be displayed to permit traffic to proceed on one thoroughfare and to restrain traffic on the other thoroughfare, of a vehicle-operated device in one of said thoroughfares spaced from said signal for setting said signal when operated by a vehicle to permit traffic to proceed on said thoroughfare, means for holding said signal so set for a determined period until said vehicle has had time to pass said intersection, a vehicle-operated device in the other thoroughfare, means actuated by said last mentioned vehicle-operated device for setting said signal to permit traffic to proceed on said last mentioned thoroughfare, other means operated by said first mentioned device when actuated by said vehicle or vehicles following said vehicle within a definite period for preventing said signal being set by said last mentioned vehicle-operated device for a certain period starting anew after each operation of said other means within said period of time and means whereby the means actuated by said last mentioned vehicle-operated device at substantially any time during said operations of said other means will change said signal as soon as said latter period is ended.

27. In a traffic signal device the combination with a signal adapted to be disposed at the intersection of two or more thoroughfares and having traffic directing means thereon adapted to be displayed alternately to direct traffic to proceed on one thoroughfare and restrain traffic on another thoroughfare, a single traffic-operated device at each side of said signal in one of said thoroughfares adapted to be operated by one momentary impulse, means actuated by operation of either of said devices for setting said signal to direct traffic to proceed on said thoroughfare, a single traffic-operated device in another thoroughfare at each side of said signal adapted to be operated by one momentary impulse, means actuated by operation of either of said last mentioned devices for setting the signal for traffic to proceed on said last mentioned thoroughfare, means actuated by operation of either of said first mentioned traffic-operated devices in so setting the signal and in a plurality of subsequent operations thereof while the signal is so set for preventing said signal being set by operation of said last mentioned traffic-operated devices for a certain definite period starting anew after each operation of said other means within said period of time, and means whereby said means actuated by operation of said last mentioned traffic-operated device at substantially any time during said operations of said first mentioned traffic operated devices will change said signal as soon as said period of time determined by said fourth mentioned means has elapsed to direct traffic to proceed on the thoroughfare in which said last mentioned traffic-operated devices are located.

28. In a traffic signal device the combination with a signal adapted to be disposed at the intersection of two or more thoroughfares and having traffic directing means thereon adapted to be displayed alternately to direct traffic to proceed on one thoroughfare and to restrain traffic on another thoroughfare, a traffic-operated device for one of said thoroughfares, means actuated by operation of said device for setting said signal to direct traffic to proceed on said thoroughfare, a traffic-operated device on the other thoroughfare, means normally actuated by operation of said last mentioned device for setting the signal for traffic to proceed on said last mentioned thoroughfare if said first mentioned device has not been operated for a certain definite period, other means actuated by operation of said first mentioned traffic-operated device in so setting said signal and in a plurality of subsequent operations thereof while the signal is so set for preventing said signal being set by any intermediate operation of said last mentioned traffic-operated device for a certain definite period of time after operation of said other means, means whereby said means actuated by said intermediate operation of said last mentioned traffic-operated device will change said signal as soon as said period of time determined by said other means has elapsed to direct traffic to proceed on the thoroughfare in which said last mentioned traffic-operated device is located and additional means actuated by said last mentioned traffic-operated device in so changing said signal and in a plurality of subsequent operations thereof while said signal is set as changed for preventing said signal being set by any intermediate operation of said first mentioned traffic-operated device for a certain definite period of time after each operation of said additional means.

29. In a traffic signal device the combination of a signal adapted to be disposed at the intersection of two or more thoroughfares and having traffic directing means thereon adapted to be dis-

played alternately to direct traffic to proceed on one thoroughfare and to restrain traffic on another thoroughfare, a traffic-operated device in one of said thoroughfares, a second traffic-operated device in another of said thoroughfares, a pair of means respectively moved to off-normal position by operation of said devices for setting said signal to direct traffic to proceed on its respective thoroughfare, other means moved to off-normal position for holding said signal so set for a definite period of time after operation of said other means, means independent of said traffic-operated devices for restoring said two first-mentioned means to normal position when said period of time has elapsed whereby said signal may be changed by operation of said second mentioned traffic-operated device, and means actuated by one of said pair of means respectively for holding said signal when operated by said first mentioned traffic-operated device and in a plurality of subsequent operations thereof, while said signal is so set for preventing said signal being set by operation of said other one of said pair of means when actuated by said second mentioned traffic-operated device for changing said signal until said period of time has elapsed to direct traffic to proceed on said thoroughfare in which said second mentioned traffic-operated device is located should said latter traffic-operated device be actuated substantially at any time between the said first operation and the end of said last definite period but permitting an actuation as aforesaid of said latter traffic-operated device to operate the signal after said last definite period has expired.

30. In a highway traffic signal system for intersecting highways, a signal for indicating "Go" and "Stop" signals to each highway, traffic-operated means associated with one highway for receiving an impulse, means operated by said means upon receiving said impulse for operating said signal to indicate "Go" on that highway and "Stop" on the other highway, a timing device associated with said first mentioned means for holding said signal so set for a predetermined time after said operation and for a predetermined time after each of a plurality of subsequent impulses received by said first mentioned means, traffic-operated means associated with the other highway for receiving an impulse and means for operating said signal to indicate "Go" on said other highway and "Stop" on said first mentioned highway after any intermediate operation of said traffic-operated means on said other highway as soon as said time has elapsed after the last operation of said traffic-operated means on said first mentioned highway.

31. In a highway traffic signal system for intersecting highways, a signal, traffic-operated means associated with one highway and adapted to operate said signal to indicate "Go" on that highway and "Stop" on the other highway, a timing mechanism associated with said means for holding said signal so set for a predetermined time after the operation of said means and after each of a plurality of subsequent operations of said means, a traffic-operated means on the other highway, and a second timing means independent of said traffic-operated means arranged to permit operation of said signal by said traffic-operated means in the other highway after an intermediate actuation thereof and after a longer period of time than said first mentioned period of time, whereby vehicles passing on said first mentioned highway may not hold said signal over a period determined by said last mentioned timing mechanism, and a vehicle which has approached said intersection and operated the traffic-operated means in said other highway may secure right of way.

32. In a traffic signal device the combination with a signal adapted to be disposed at the intersection of two or more thoroughfares and having traffic-directing means thereon adapted to be displayed alternately to direct traffic to proceed on one thoroughfare and restrain traffic on another thoroughfare, a traffic operated device disposed at one fixed distance at each side of said signal in one of said thoroughfares, means actuated by operation of either of said devices for setting said signal to direct traffic to proceed on its respective thoroughfare, a traffic-operated device in another thoroughfare disposed at one fixed distance at each side of said signal, means actuated by operation of either of said last mentioned devices for setting said signal for traffic to proceed on said last mentioned thoroughfare, other means actuated by operation of either of said first mentioned traffic-operated devices in so setting said signal and in a plurality of subsequent operations thereof while said signal is so set for preventing said signal being set by operation of said last mentioned traffic-operated devices for a certain definite period of time starting anew after each operation of said first mentioned traffic-operated devices within said period of time and means whereby said means actuated by operation of said last mentioned traffic-operated device at substantially any time during said operations of said first mentioned traffic-operated devices will change said signal as soon as said period of time determined by said third mentioned means has elapsed to direct traffic to proceed on the thoroughfare in which said last mentioned traffic-operated devices are located.

33. In a traffic signal apparatus, the combination of a signal adapted to be disposed at the intersection of a plurality of thoroughfares and operable to disclose stop and go indications to said thoroughfares respectively, timing means, a vehicle-operated device located in one thoroughfare for operating said timing means to cause said signal to indicate "Go" to said thoroughfare and "Stop" to the other of said intersecting thoroughfares and for maintaining this signal for a predetermined minimum time after each operation of said device, means for limiting to a predetermined maximum the time that the signal may be so maintained to give these indications, a vehicle-operated device on another of the intersecting thoroughfares and means operated by the momentary operation of said device by an approaching vehicle for causing said signal to indicate "Go" to said second thoroughfare and "Stop" to said first thoroughfare as soon as said timing means operates.

34. In a traffic signaling system the combination of a signal adapted to be disposed at the intersection of a plurality of thoroughfares and provided with traffic directing means adapted to alternately allow traffic to proceed and to stop on said thoroughfares, of a plurality of traffic-operated devices in each of said thoroughfares spaced from said traffic directing means in the path of the approaching traffic, the devices of each street respectively being arranged to operate in multiple with each other, means actuated by said devices on one thoroughfare for setting said signal to direct traffic to proceed on the last said thoroughfare, means actuated by

said last mentioned means for holding the signal so set for a certain determined period of time after being so set and for preventing the operation of the signal by traffic on the other of said thoroughfares whereby traffic on said first mentioned thoroughfare after operating said device will have time to pass the intersection before the signal can be changed by the traffic-operated device on the other thoroughfare and means acting automatically after a fixed period of time longer than said first mentioned period for rendering inoperative said last mentioned means whereby said signal may be actuated by operation of the traffic-operated means on the other thoroughfare.

35. In a traffic signal device the combination with a signal adapted to be disposed at the intersection of two or more thoroughfares and having traffic directing means thereon adapted to be displayed alternately to allow traffic to proceed on one thoroughfare and restrain traffic on another thoroughfare, of traffic-operated means for operating said signal comprising a constantly rotated shaft, a member journaled thereon and normally not driven comprising a switch adapted to be rotated to operate said signal, a disk secured to said shaft, one side of said disk having a plurality of circumferentially spaced pins longitudinally movable therein, a plunger in front of which said pins successively pass, means for moving said plunger to move one of said pins toward said member, means on said member engageable by said pin when so moved to connect said member to said disk to rotate said member to operate said signal and means for actuating said plunger.

36. The structure set forth in claim 35, said last mentioned means comprising a solenoid having a core connected to said plunger and said traffic operated means also comprising a switch and a circuit adapted to be closed by said switch for energizing said solenoid.

37. The structure set forth in claim 35, means for holding said pin in its pushed in position for a portion of the revolution of said disk and means for releasing and restoring said pin to normal position.

38. In a traffic signal device the combination with a signal adapted to be disposed at the intersection of two or more thoroughfares and having traffic directing means thereon constantly and alternately displayed to allow traffic to proceed on one thoroughfare and to restrain traffic on another thoroughfare, of a traffic operated device for each of said thoroughfares, a plurality of means actuated by said devices, respectively for setting said signal normally at a uniform period after operation of its respective device to permit traffic to proceed on its respective thoroughfare, means actuated by one of said plurality of means for holding the signal continuously so set for a certain determined period of time after each of a plurality of operations of said device, and preventing the operation of said signal by the other of said means should the same be actuated by operation of its respective traffic operated device substantially at any time between the first of said plurality of operations and the end of said last determined period but permitting an actuation by said other of said plurality of means after said last determined period has expired whereby traffic after operating said device will have time to pass the intersection before the signal can be changed by the traffic operated device in the other thoroughfare.

39. In a traffic signal device the combination with a signal adapted to be disposed at the intersection of two thoroughfares and having traffic directing means thereon alternately operated to direct traffic to go on one thoroughfare and stop on another, a traffic operated device spaced at opposite sides of said signal in both of said thoroughfares, means actuated by operation of one of said traffic operated devices to set said signal to direct traffic to go on its respective thoroughfare and means actuated by said operation or by a second operation of said device within a certain definite period to prevent setting of said signal by operation of the traffic operated device on the other thoroughfare for a certain definite period, after said operation or after said second operation, and means whereby when said second mentioned period is ended a traffic operated device on the other thoroughfare which has been operated during any of the aforesaid periods may cause a change in said signal and prevent operation thereof by said first mentioned traffic operated device for a definite period of time after each of two successive operations thereof.

40. A traffic signal device having in combination, a signal adapted to be disposed at the intersection of two thoroughfares and having traffic directing members thereon constantly and alternately displayed to direct traffic to proceed on one thoroughfare and to restrain traffic on another thoroughfare, of traffic operated devices in each of said thoroughfares, a pair of means respectively actuated by said traffic operated devices for setting said signal to direct traffic to proceed on the respective thoroughfares of said devices and to restrain traffic on the other thoroughfares and means actuated by a first operation of one of said pair of means and coacting with the other in so setting the signal and by a plurality of subsequent operations thereof when actuated by said traffic operated devices after said first operation and while said signal is so set for preventing for a definite period of time after each operation thereof the operation of the other of said pair of means in response to an actuation by said traffic operated devices when said latter actuation occurs at any time between said first operation and the end of said last period of time, said other of said pair of means being adapted to change said signal after the expiration of said last period of time.

41. In a traffic signal device, the combination with a signal adapted to be disposed at the intersection of two thoroughfares and comprising a stationary member having lamps mounted thereon, certain of said lamps being constantly and alternately illuminated to constitute means directing traffic to go on one thoroughfare and stop on the other thoroughfare, of a traffic-operated device for each thoroughfare, means actuated by said devices respectively and including conductors extending to said lamps for operating said lamps to direct traffic to go on its respective thoroughfare and stop on the other, means actuated by a first operation of one of said means when so operating said lamps and by a plurality of subsequent operations of said one means after said first operation and while the lamps are so operated thereby for preventing the operation of said lamps by the other of said means for a definite period of time starting anew after each operation of said one means during said period of time if the traffic-operated device in said other thoroughfare has been operated at any time between said first operation and the end of said last mentioned definite period but whereby the

said lamps are changed by such an actuation on the other thoroughfare when said last mentioned period is ended.

42. A traffic signal device having in combination, a stationary member adapted to be disposed at the intersection of two thoroughfares and having illuminating means mounted thereon constantly displayed to all of said thoroughfares, a circuit containing certain of said illuminating means, a traffic actuated device in one of said thoroughfares, means actuated by said traffic actuated device for closing said circuit and setting said signal to direct traffic to go on one of said thoroughfares and stop on the other thoroughfare, a second circuit containing certain other of said illuminating means, a traffic actuated device in the other thoroughfare, means actuated by said last mentioned traffic actuated device for closing said second circuit and setting said signal to direct traffic to go on said other thoroughfare and stop on said one thoroughfare, one or the other of said circuits being constantly closed, means actuated by a first operation of said second mentioned means and by a plurality of subsequent operations thereof to hold said first circuit closed and said signal set for a definite period of time after each of said operations of said second mentioned means and means preventing the operation of said third mentioned means to close said second circuit and set said signal if said traffic actuated device in the other thoroughfare has been operated at any time between the first operation of said second mentioned means and the end of said last period, said third mentioned means being adapted to change said signal after the expiration of said last period of time.

43. In a traffic-signal device, the combination with a signal adapted to be disposed at the intersection of two or more thoroughfares and having traffic directing means thereon constantly and alternately displayed to direct traffic to proceed on one thoroughfare and restrain traffic on another thoroughfare, of a traffic actuated device for each thoroughfare for setting the signal to direct traffic to proceed on its respective thoroughfare, and means for each thoroughfare operated respectively by a first actuation of a said traffic actuated device when setting the signal in its thoroughfare, and by a plurality of subsequent actuations thereof while the signal is so set, for preventing for a definite period of time after each actuation of said traffic operated device for setting of said signal by the traffic actuated device of another thoroughfare should said latter traffic actuated device be actuated substantially at any time between the said first actuation and the end of said last definite period, whereby said latter traffic actuated device of another thoroughfare cannot change said signal until the last of said definite periods has expired.

44. In a traffic-signal device, the combination with a signal adapted to be disposed at the intersection of two thoroughfares and provided with traffic directing means operable to direct traffic to proceed on one of said thoroughfares and to restrain traffic on the other of said thoroughfares respectively, a traffic operated device in one of said thoroughfares, means normally actuated by operation of said device for setting said directing means to direct traffic to proceed on said thoroughfare and responsive to a plurality of subsequent operations of said device while the signal is so set for maintaining said signals so set for a definite period of time after each of said operations of said device, means for rendering said last-mentioned means inoperative at the end of a time period longer than said first-mentioned time periods, a vehicle operated device in said second thoroughfare, means normally operated thereby for setting said directing means to indicate traffic to proceed on said second thoroughfare and for maintaining said signals so set for a definite period after each of a plurality of operations of said second device while the signal is so set, means for rendering said last-mentioned means inoperative to maintain said proceed indication in said second thoroughfare after a time period longer than the said first-mentioned periods, and means in each thoroughfare operable to change said directing means responsive to any intermediate operation of the traffic operated devices in the thoroughfare not having the proceed indication at the end of said longer period or at the end of the last of said short periods if the total length of the shorter periods is less than the said longer period.

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