

Oct. 29, 1968

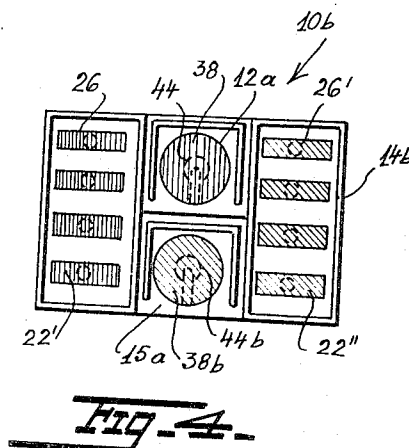
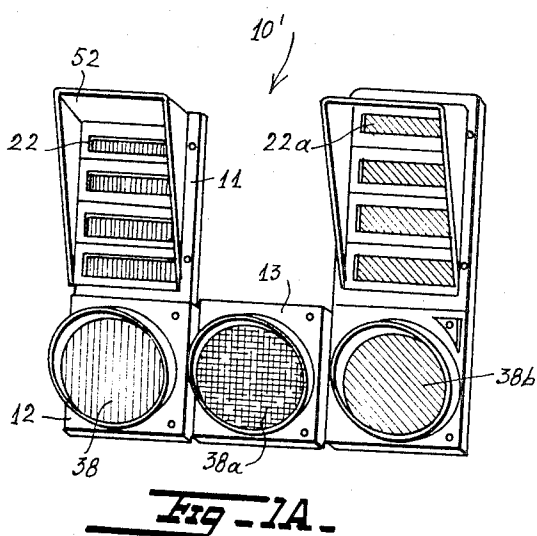
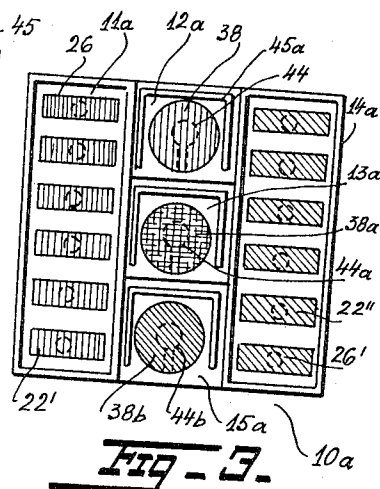
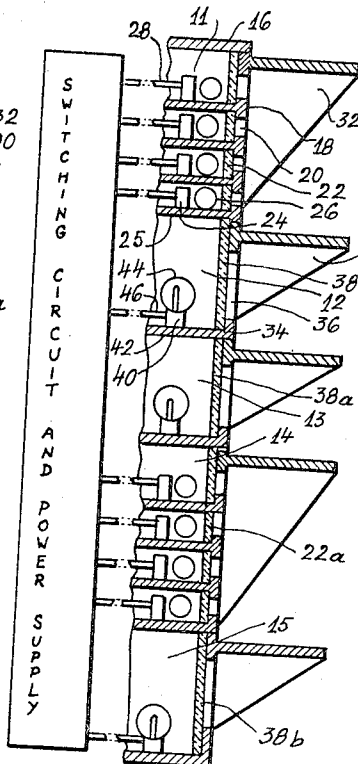
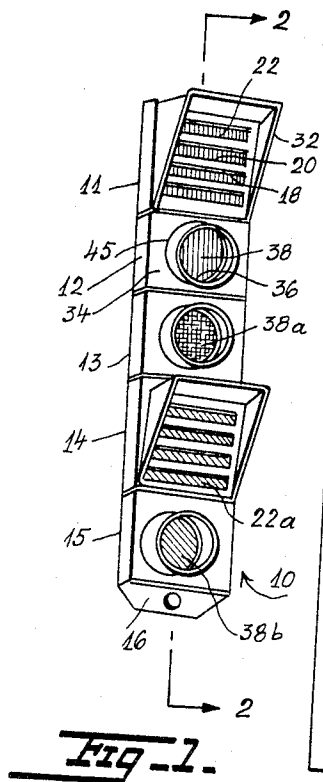
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3,408,623

SAFETY TRAFFIC SIGNAL LIGHT

Filed Aug. 9, 1965

5 Sheets-Sheet 1



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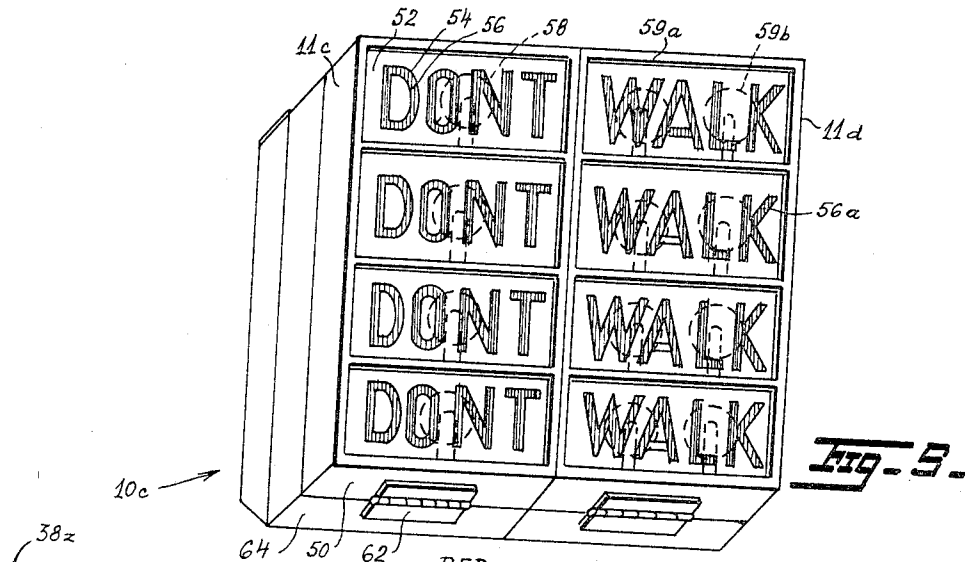


Fig. 5.

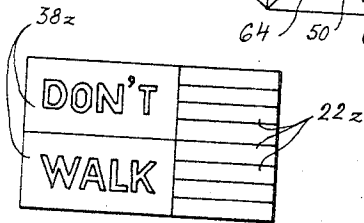


Fig. 10.

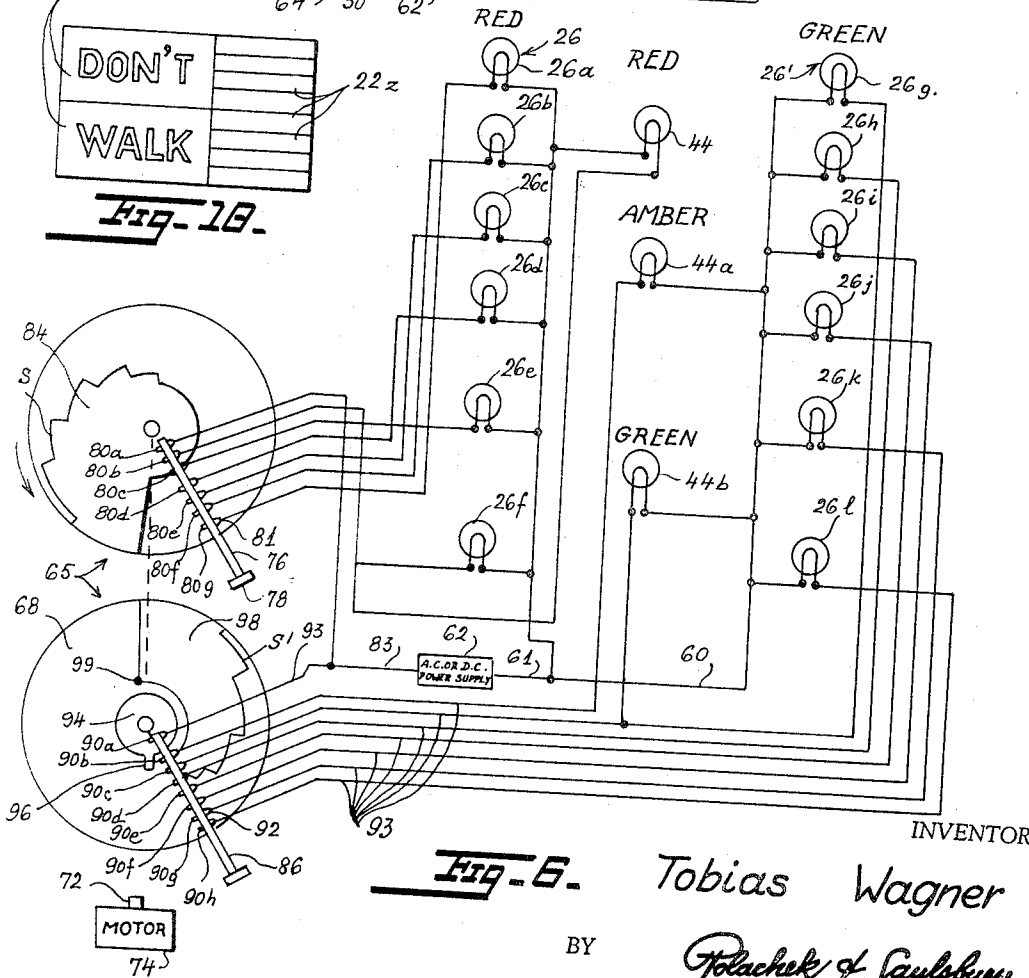


Fig. 6.

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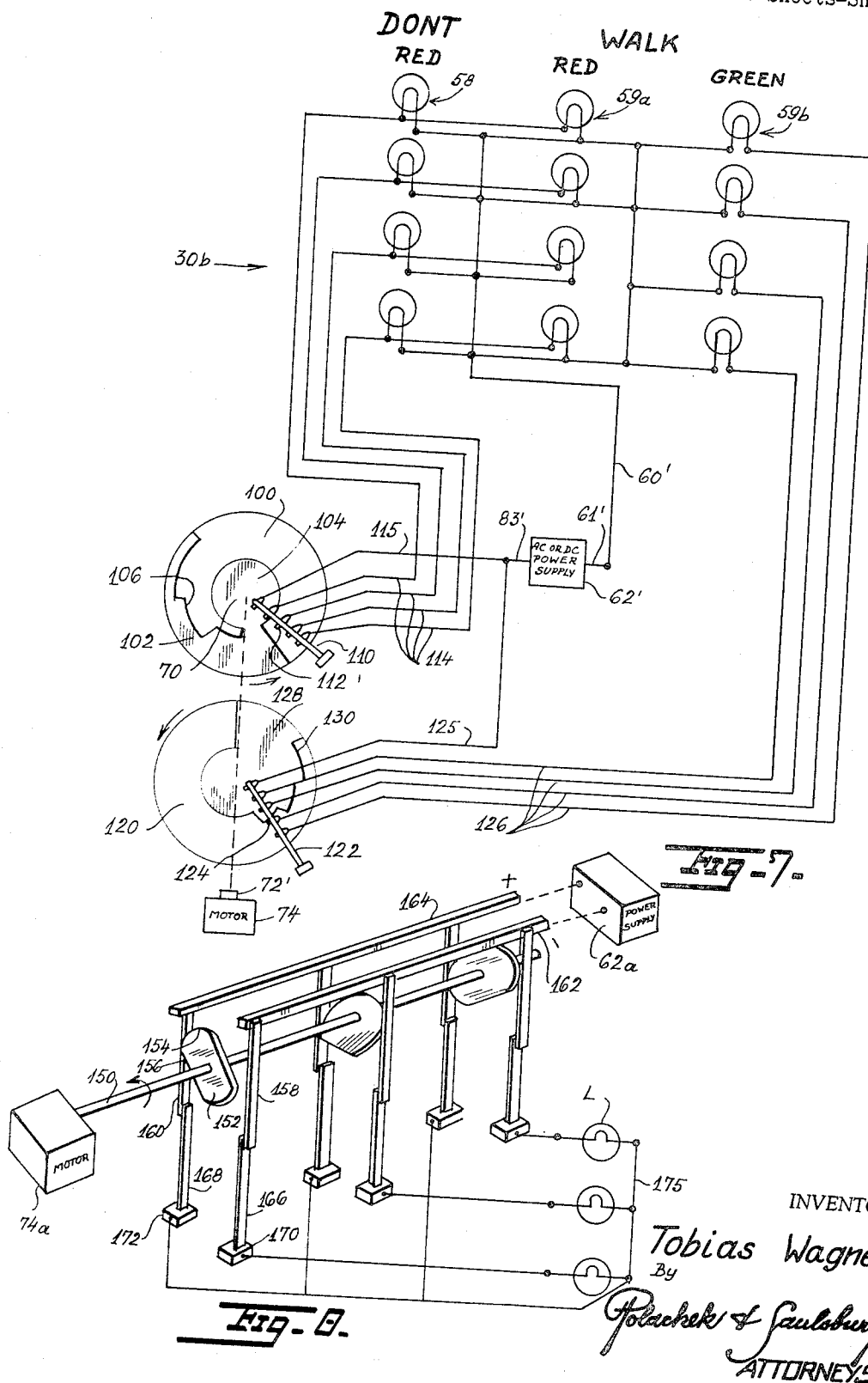
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5 Sheets-Sheet 3



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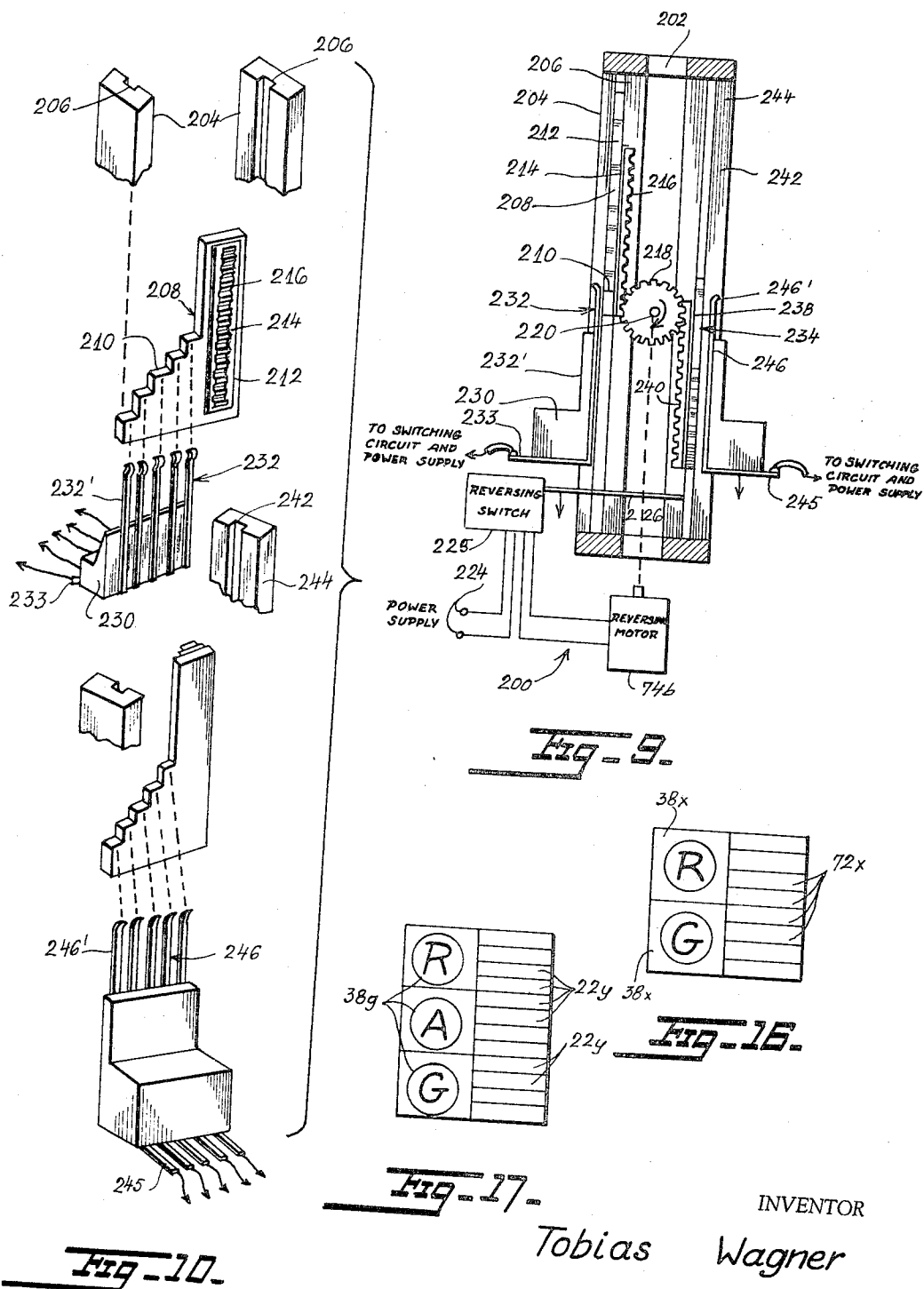
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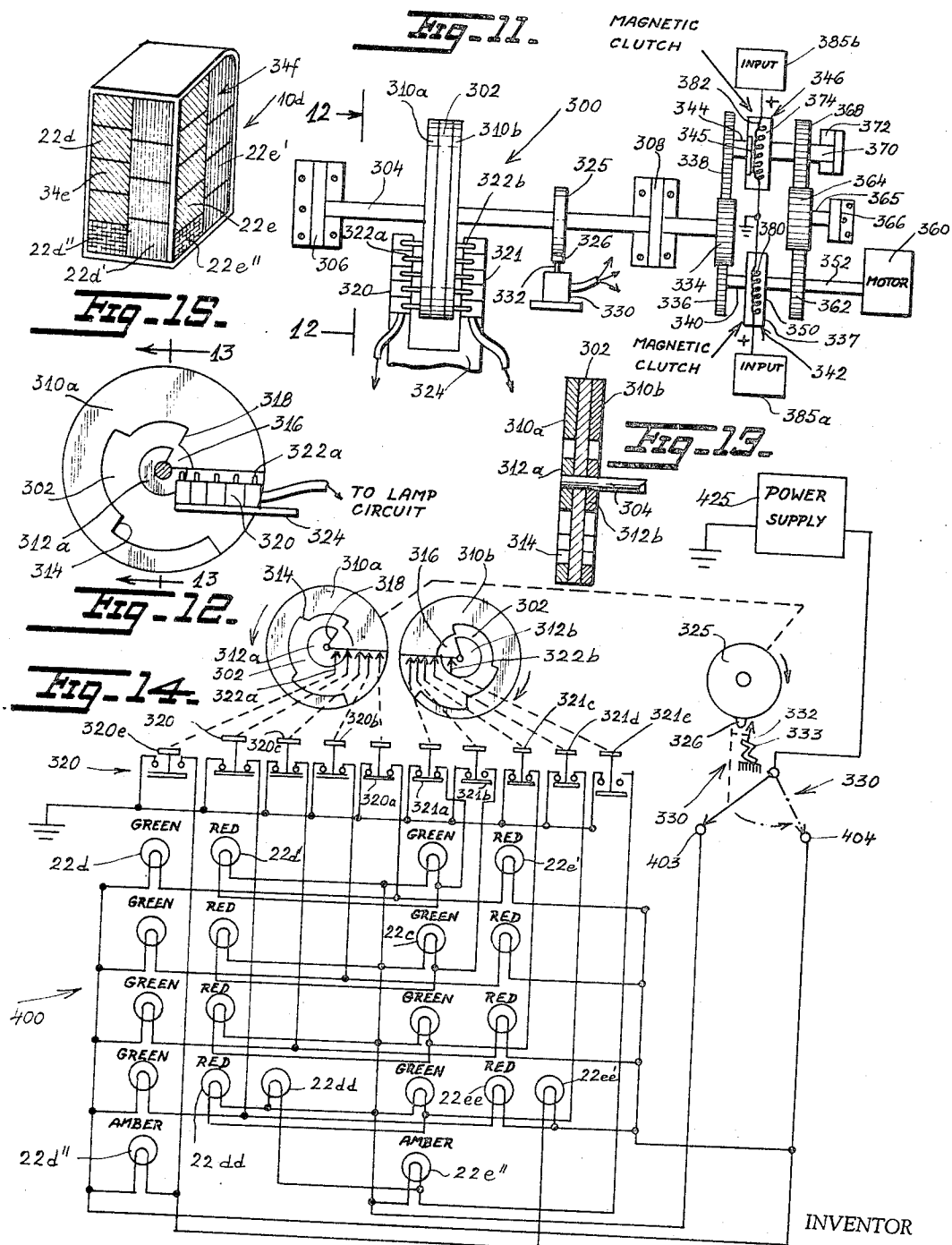
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5 Sheets-Sheet 5



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3,408,623

SAFETY TRAFFIC SIGNAL LIGHT
Tobias Wagner, Bronx, N.Y.; Adelaide Wagner, administratrix of Tobias Wagner, deceased, assignor to Mary T. Hanner, New York, N.Y.
Continuation-in-part of application Ser. No. 217,356, Aug. 16, 1962. This application Aug. 9, 1965, Ser. No. 478,190

3 Claims. (Cl. 340—43)

ABSTRACT OF THE DISCLOSURE

A traffic signal system is disclosed in which a plurality of lamps in a fixture are extinguished in succession to indicate to a motorist the amount of time remaining before the end of a timed period. The lamps are controlled by a switching apparatus including reciprocable stepped contact plates. A rotatable disk having stepped contact plates is also disclosed. The speed of disk rotation is controlled selectively by two gear trains of different gear ratios connected alternately to a motor via two selectively operated magnetic clutches.

This application is a continuation-in-part of my co-pending application 217,356, filed Aug. 16, 1962, now Patent Number 3,200,218.

This invention relates to traffic light signals designed to indicate at all times the duration of time remaining before a signal cycle changes or terminates.

Considerable difficulty is experienced by motorists in bringing their automobiles to a stop when a green light suddenly changes to red. Although in many jurisdictions an amber caution light is included, this does not represent a full solution to the problem, since the amber light remains on, usually, only for a very few seconds. Thus, the motorist may be approaching an intersection, maintaining a normal rate of speed sufficient in his judgment to permit him to pass the intersection while he still has a green light, and may be suddenly confronted with an imminent light change when he is almost at the intersection. Under these circumstances, it is necessary that he either bring his vehicle to a sharp stop or alternatively, continue on through the intersection despite the fact that the signal may have completely changed before he is fully through the intersection.

It will be seen from the above that it is highly desirable that a motorist be provided with a visual indication, from the time the signal changes until the next change thereof, that will provide him with full knowledge as to the amount of time remaining before the next change. In this way, he can prepare himself further in advance, either for bringing his vehicle to a halt at an intersection, or alternatively, for preparing the vehicle to leave the intersection after it has been stopped thereat by a red light.

The difficulty experienced by motorists is experienced also by pedestrians, who oftentimes, in endeavoring to cross an intersection at which controls exist in the form of traffic lights, find themselves stranded in the middle of the intersection, thereby incurring considerable risk of injury as traffic begins to flow in a different direction.

It has been heretofore proposed to provide a visual indication on a traffic light signal whereby one can determine, generally, the extent of time remaining before the next light change. However, the main object of the present invention is to provide an improved type of device, which will be particularly adapted to provide a visual indication that can be seen at a substantial distance, so that an oncoming motorist can readily perceive the extent of time in a signal cycle remaining before he

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reaches an intersection and so that pedestrians can perceive the extent of time in the signal cycle remaining during which they can safely cross the intersection or during which they must wait before they can safely cross the intersection.

Another object is to provide a traffic signal with cycled red and green lights with or without an accompanying amber light and having associated signal units divided into illuminated sections which progressively are extinguished during the timing cycles.

A further object is to provide a traffic signal wherein progressively extinguished illuminated sections provide "WALK" and "DON'T WALK" indications to pedestrians.

A further object is to provide novel switching means for turning the successive illuminated sections of the traffic signal on and off.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

FIGS. 1 and 1A are perspective views of traffic signal devices embodying the invention.

FIG. 2 is a sectional view on an enlarged scale taken on line 2—2 of FIG. 1, with an associated switching circuit and power supply shown diagrammatically.

FIGS. 3, 4 and 5 are front elevational views of other traffic signal devices according to the invention.

FIGS. 6 and 7 are diagrams of switching and power supply circuits of the signal devices of FIGS. 3 and 5, respectively.

FIG. 8 is a perspective view of a switching device which may be employed in the traffic signal, certain components being shown schematically.

FIG. 9 is a vertical sectional view of another switching device, with certain components shown schematically.

FIG. 10 is an exploded perspective view of parts of the device of FIG. 9.

FIG. 11 is a plan view partially diagrammatic in form showing another switching device for a traffic signal system.

FIG. 12 is a vertical sectional view taken on line 12—12 of FIG. 11 showing parts of a switch and camming disk assembly.

FIG. 13 is a sectional view taken on line 13—13 of FIG. 12.

FIG. 14 is a diagram of a traffic signal circuit including parts of the device of FIGS. 11—13.

FIG. 15 is a perspective view of a traffic signal display device which may be employed in conjunction with the device and circuit of FIGS. 11—15.

FIGS. 16, 17 and 18 are front elevational views of still other traffic signal devices.

Referring to the drawings, there is shown in FIGS. 1 and 2, a traffic signal device 10 in which five units 11—15 are stacked one above the other and secured in a housing 16. Unit 11 at the top of the assembly includes a front frame 18 in which are a plurality of rectangular openings 20. Behind each opening is a transparent clear or colored lens plate 22, preferably colored red. A lamp socket 24 is mounted behind each plate 22 on floor plate 25 and carries an electric bulb 26. Each socket is connected via an electric cable 28 to a switching circuit and power supply 30 shown diagrammatically in FIG. 1. This circuit arrangement is explained below in connection with FIG. 6. A tapered rectangularly U-shaped hood 32 extends forwardly from frame 18.

Below unit 11 is unit 12 which has a front panel 34 provided with an opening 36. A transparent clear or colored lens plate 38 is located behind panel 34. Plate 38 is preferably colored red. A lamp socket 40 is mounted on floor plate 42 behind lens plate 38. The socket carries a lamp bulb 44 and is connected by cable 46 to the switching circuit and power supply 30. A curved hood 45 extends forwardly of panel 34.

Unit 13, which is below unit 12, has the same construction as unit 12 except that lens plate 38a is preferably colored yellow or amber.

Unit 14, which is below unit 13, has the same construction as unit 11 except that lens plates 22a are preferably colored green.

Unit 15, which is below unit 14, has the same construction as units 12 and 13 except that lens plate 38b is preferably colored green.

In signal device 10' of FIG. 1A, the same units are employed as in signal device 10 except that units 12, 13 and 15 are disposed in a horizontal array. Unit 11 is placed on top of unit 12 and unit 14 is placed on top of unit 15 as in device 10. Other parts of the device 10' corresponding to those of device 10 are identically numbered.

In FIG. 3 is shown another traffic signal device 10a. Three units 12a, 13a, and 15a are mounted one below the other. The construction of these units is similar to units 12, 13 and 15, respectively, except that hoods 45a are shown as rectangular, although they could have other shapes. The lens plates 38, 38a, and 38b of the several units are respectively colored red, amber and green. At one side of the three units is a unit 11a having a plurality of sections in which are exposed lens plates 22' preferably colored red. The internal construction of unit 11a is similar to that already described for unit 11, except that the unit 11a may have a greater number of compartments containing the lamp bulbs. At the other side of units 12a, 13a, and 15a, is another multiple section unit 14a similar to unit 14 except that a greater number of compartments and lens plates 22" are provided and these lens plates are preferably colored green. The device 10a employs a circuit as shown in detail in FIG. 6.

In FIG. 4, traffic signal device 10b is similar to device 10a, except that unit 13a which contains an amber lens plate is omitted. The laterally disposed units 11b and 14b are substantially identical with units 11 and 14 with red lens plates 22' in unit 11b and green lens plates 22" in unit 14b. Also the same number of compartments are provided for the lamp bulbs in units 11b and 14b as are provided in units 11 and 14. Device 10b employs a circuit which is explained below in connection with FIG. 6.

In FIG. 5 is shown another traffic signal device 10c. This device has two units 11c and 11d. Unit 11c includes a cabinet 50 having front panels 52 provided with cutouts or apertures 54 spelling out the word "DON'T." Behind the panels are translucent or transparent lens plates 56 preferably colored red. A single lamp bulb 58 is located behind each of the front panels. If desired, bulbs 58 can be colored red. Unit 11c has four compartments divided by horizontal floor plates or panels 60. It is to be understood that one or more lamp bulbs may be provided instead of the single bulb shown at 58.

Attached to cabinet 50 by hinge 62 is a rear cabinet 64 which contains a switching circuit and power supply shown schematically in FIG. 7. Unit 11d is similar to unit 11c except that two lamp bulbs 59a and 59b are located in each compartment. The lens plates 56a may be colored red, green or white but are preferably transparent, translucent or any color or uncolored while the lamp bulbs 59a and 59b are respectively colored red, green, white or any other color. In operation of the device, only the green bulbs 59b will light during one part of the operating cycle as will be explained in connection with the circuit of FIG. 7. During another part of the operating cycle as each one red bulb 58 in each compartment of

unit 11c lights up a companion red bulb 59a will light up in a compartment on the same horizontal level of unit 11d. Thus, the device will display either "WALK" signs or red "DON'T WALK" signs.

Circuit 30a shown in FIG. 6 is arranged for operation of device 10a of FIG. 3. The circuit includes lamps 44, 44a and 44b which project red, amber and green lights, respectively, through the lenses of the compartments in which they are disposed. A first series of lamps 26 are designated 26A-26F and are disposed in compartments of unit 11a. A second series of lamps 26' designated 26G-26L are located in compartments of unit 14a. Each of the lamps has one terminal connected to common line 60 which terminates at one terminal 61 of a power supply 62. This power supply may be an alternating or direct current source and may be connected to an external source of electric power or to a self-contained battery pack.

A switching device 65 is provided for turning the various lamps on and off in a predetermined timed sequence or cycle. This device includes two rotatable insulated disks or plates 66, 68 mounted and rotated on a common insulated shaft 70 connected to and driven by drive shaft 72 of a continuously driven motor 74. A first insulated arm 76 is disposed radially adjacent disk 66. This arm is held stationary on a support 78. The arm 76 carries a series of spaced brushes or wiper contacts 80a-80g. Each contact has a lug 81 to which is connected a wire 82 terminating at a different one of the red lamps 26A-26F and a power supply terminal 83. A stepped switching plate 84 made of conductive material is secured to disk 66 and is contacted by brushes 80a, 80g as the disk 66 rotates.

Another stationary insulated arm 86 carries spaced brushes or wiper contacts 90a-90h. Each contact has a lug 92 to which is connected a wire 93 terminating at a different one of green lamps 26G-26L and at power supply terminal 83. Arm 86 is disposed radially of disk 68. On the disk is a circular central switch plate 94 with a short circumferential segment 96 extending radially thereof. An arcuate stepped switching plate 98 is disposed radially of the center plate 94 and makes electrical contact with segment 96 and plate 94 at point 99 where plate 98 is soldered or welded to segment 96.

Switching plate 84 has a series of six steps S which are spaced apart predetermined circumferential distances. The steps are uniformly radially spaced apart. Switching plate 98 has a series of six steps S' which are spaced apart predetermined circumferential distances and are uniformly radially spaced apart.

In operation of circuit 30a, brush 80a makes continuous contact with plate 84 as disk 66 rotates. This connects terminal 83 continuously to the contact plate 84. Brush 80b contacts plate 84 only during approximately 180 degrees of the cycle of rotation of the disk. Brushes 80c-80g in turn contact plate 84 for approximately 30 degree shorter intervals. Brush 90a contacts center plate 94 continuously as disk 88 rotates. Brush 90b contacts segment 96 for a short interval of a few angular degrees. Brush 90c contacts plate 98 for an interval slightly less than 180 degrees. Brushes 90d-90g contact plate 98 for successively shorter intervals, each about 30 degrees or shorter than the next. While brush 90b contacts segment 96 no other brush contacts either of plates 84 or 98. While brushes 90a-90c are contacting plate 98 none of brushes 80b-80g contact plate 84 and vice versa.

Due to the arrangement described it will be apparent that green lamp 44b will be lighted along with all of lamps 26'. Then each lamps 26G-26L will go out in succession and when lamp 26L goes out, lamp 44b will also go out. Then only the amber lamp 44a will be lighted. When this lamp goes out, all the red lamps 26 will go on along with red lamp 44, then each red lamp 26A-26F will go out in turn. When lamp 26F goes out, lamp 44

goes out also and a new cycle starts with the lighting of green lamp 44b and lamps 26'.

The device 10a as viewed in FIG. 3, will show all the green lights in unit 13a and unit 15a coming on together. The green lights 26 will go out one at a time from top to bottom, and when the viewer sees the last light on at the bottom of unit 14a he knows that the amber light 44a is about to come on. After the amber light goes out all the red lights in unit 11b come on along with red light in unit 12a. The red lights 26 go out one at a time from top to bottom of the unit and when only the bottom red light remains the viewer knows that the green lights are about to come on and the red light 44 is about to go out, vice versa.

The circuit 30a can be used in the devices 10 and 10' of FIGS. 1, 1A, if six compartments are provided in each of units 11 and 14. If only four compartments are provided in each of units 11 and 14 as illustrated in FIGS. 1, 1A and 2, then contact plates 84 and 98 will be modified by omission of two of each of steps S and S' and spreading out circumferentially the remaining steps.

The circuit 30a can be modified for use in the device 10b of FIG. 4 by omitting the segment 96 and the amber light 44a, leaving only the red and green lights 44 and 44b. In addition, two each of steps S and S' will be omitted from the plates 84 and 98 and the remaining steps will be elongated circumferentially so that the steps of each plate occupy about 180 degrees.

FIG. 7 shows circuit 30b adapted for operating the pedestrian traffic signal 10c of FIG. 5. Each of lamps 58, 59a and 59b has one terminal connected to the common line 60' terminating at terminal 61' of power supply 62'. Terminal 83' is connected via wire 115 to the radially inner one of brushes 112 on stationary arm 110. Arm 110 extends radially inner one of brushes 112 on stationary arm 110. Arm 110 extends radially of rotating insulation disk 100 carrying conductive switch plate 102. This plate has circumferentially spaced steps 106 and a circular portion 104. The disk 100 rotates on insulated shaft 70' driven by shaft 72' of motor 74'. Wires 114 are connected between the other brushes on arm 110 and the respective red lamps 58.

Terminal 83' is also connected via wire 125 to the radially inner one of brushes 124 on stationary arm 122. The other brushes 124 are connected by wires 126 to green lamps 59b. Red lamps 59a are connected in parallel with red lamps 58. Disk 120 carries stepped contact plate 128 having four circumferentially spaced steps 130. When brushes 112 are on the outer stepped portions of plate 102, brushes 124 are off of the outer stepped portions of plate 128.

In operation of 30b and device 10c all the red lights projected by lamps 58 and 59b through their lenses come on together to present red "DON'T WALK" signs. Then the pairs of lamps 58, 59a go out in turn. When the lowermost red lamps 58, 59a go out, the green "WALK" lamps 59b all go on together. These lamps go out one by one as the several brushes 124 pass the several steps 130. When the last green lamp at the bottom of the device goes out, all the red "DON'T WALK" lamps go on together to repeat the cycle. The last one or two green or red lights may be made to flash on and off.

FIG. 8 shows diagrammatically a switching device which can be used in place of the switching devices employing stepped contact plates and brushes of circuits 30a and 30b. Motor 74a drives a cam shaft 150 carrying insulated cam plates or disks 152 spaced axially along the shaft. The cam plates have certain circularly edge portions 154 and other straight edge portions 156 chordal to the curved portions. The cam plates rotate between pairs of spring contacts 158, 160 supported by stationary bus bars 162, 164. The bus bars terminate at a power supply unit 62a. Stationary contact elements or strips 166, 168 are supported on stationary conductive bases 170, 172 and are normally closed with or in contact with con-

tacts 158, 160, respectively. Each of bases 170 is connected to a different lamp L which may be any one of a series of lamps shown in any of devices 10, 10a-10c. Each of bases 172 is connected to a common line 175 connected to one terminal of each lamp.

As the cam shaft 150 rotates, each cam plate will separate a pair of spring contacts 158, 160 when the arcuate edge portions of the cam plate pushes the contacts outwardly to open the circuit normally closed through associated contact strips 166, 168. This opens the power supply circuit of the lamp associated with the open contacts and the lamp goes out. The arcuate and flat edges of the cam plates are arranged so that the lamps go out in turn as their power supply circuits are opened. This is the same function accomplished by the switching plates in circuits 30a and 30b.

FIGS. 9 and 10 illustrate another switching device which can be used in place of the switching devices employing stepped contact plates and brushes of circuits 30a and 30b. The switching device 200 includes a frame 202 having a first pair of vertical rails 204 provided with opposing grooves 206 in which is slidable a first flat electrical contact plate 208. Plate 208 has a series of steps 210 formed in its upper edge. A lateral portion 212 of the plate carries an insulation strip 214 on which is a rack gear 216 extending longitudinally of the plate.

Gear 216 is engaged by a spur gear 218 mounted on a shaft 220 and driven by a motor 74b. The motor is of reversing type. It is connected in circuit with power supply terminals 224 and a reversing switch 225 which may be a double-pole double-throw switch. The switch has an operating arm 226 which is contacted by bottom edge of plate 208 at the lower end of travel of the plate so that the switch is thrown and the motor is reversed.

An insulation block 230 carrying spaced vertical contact elements or strips 232 is located so that the elements will contact plate 208 for different lengths of time as the plate moves vertically while being driven by gear 218.

Another contact plate 234 has steps 236 formed on its upper edge. Plate 234 faces plate 208 and carries an insulation strip 238 on which is another rack gear 240 facing rack gear 216. Rack gear 240 is also engaged by gear 216 which drives the plate 234 vertically in opposite directions to plate 208, so that when plate 208 is descending plate 234 is rising and vice versa. Plate 234 is guided in grooves 242 between two other rails 244 forming part of frame 202. Contact strips or elements 246 are vertically disposed to contact plate 234 for different periods of time as the plate moves vertically. Elements 246 are mounted on insulation block 250. Contact elements 232 and 246 have lugs 233, 245 which will be connected in circuit with the lamps, in place of the brushes of circuits 30a and 30b while the contact plates 208 and 234 will replace the contact elements carried by the rotating disks in those circuits.

It will be apparent from an inspection of FIGS. 9 and 10, that the left contact elements 232' and 246' will contact plates 208 and 240 for the shortest periods of time while motor 74b rotates at uniform speed. When plate 234 reaches the bottom of its travel between rails 244 it contacts operating arm 226 of the reversing switch and again reverses the motor. Thus, each time a plate 208 or 234 reaches the bottom of its travel it reverses the motor at the same time that the other plate reaches the upper end of its travel. In FIG. 9, plate 234 is just about to contact arm 226 to effect reversing of the direction of motor travel. When elements 232 are contacting plate 208 elements 246 are out of contact with plate 234 and vice versa.

The construction of the switching device 200 is preferred for some installations where reciprocating rather than rotating contacts are desired.

The invention may employ any one of several different switching devices for automatically and cyclically turning off the green and red lights in a traffic signal for motorists and pedestrians. The traffic signal device may

include time lapse signals in association with red and green signals with or without an amber warning signal; or the device may consist only of time lapse pedestrian signals. The several time lapse signals can be disposed in vertical arrays in a vertical assembly with the red and green lights with or without an amber light; or the time lapse signals can be disposed in vertical arrays alongside of vertical arrays of the red and green lights with or without an amber light.

The signal lights can be disposed in horizontal or vertical arrays, or in any other formation. And the differently colored lights may be interchanged from the positions shown in the drawing.

FIGS. 11-15 illustrate a traffic signal system for automatically and cyclically turning off and on green, amber and red lights at street or road intersection. The system may employ signal device 10d shown in FIG. 15 in which two mutually perpendicular panels 34e, 34f are shown. On each panel is a vertical column of green lamps or windows 22d or 22e and an adjacent column of red lamps or windows 22d' and 22e'. An additional amber lamp or window 22d'' and 22e'' may be provided on each panel preferably below the vertical column of green lamps or windows.

FIGS. 11-13 show parts of a switching device 300 which may be used in association with the signal device 10d. The device 300 includes a circular cam disk 302 mounted on rotatable shaft 304 journaled in bearing brackets 306, 308. On opposite sides of disk 302 are similar arcuate stepped cam plates 310a, 310b. Supplementary cam plates 312a, 312b are disposed within the arcuate cam plates as best shown in FIGS. 12 and 13. Each of cam plates 310a, 310b have four radial steps 314. Each of cam plates 312a, 312b have angular cutouts 316 defining spaced radial steps 318. At opposite sides of the cam disk are assemblies 320, 321 of switches. These switches have operating arms 322a or 322b spaced radially of the cam disk. The switches 320, 321 are mounted in stationary positions on mounting plate 324. The arms 322a, 322b are continuously in contact with the opposite sides of the cam disk 302 as this disk rotates. Each of the switch arms traces a circular path on a side of disk 302. As each arm encounters one of the radial, circumferentially spaced steps of the cam plates an associated switch in one of the switch assemblies is operated in a manner to be described in connection with FIG. 14.

Shaft 304 also carries a cam disk 325 having a projecting lobe 326 which actuates a stationary switch 330 each time the lobe comes around to the switch arm 332 urged by spring 333 to the periphery of disk 325.

On the right end of shaft 304 as viewed in FIG. 11 is a gear 334. This gear is engaged with two gears 336 and 338 of different sizes. Gear 336 is mounted on a shaft 340 connected to and driven by disk 337 of a magnetic clutch 342. Gear 338 is mounted on a shaft 344 connected to and driven by a disk 345 of a magnetic clutch 346. Clutch 342 has a drive disk 350 mounted on shaft 352 of motor 360. This shaft carries a drive gear 362. Gear 362 is engaged with an idler gear 364 supported by shaft 365 on bearing bracket 366. Idler gear 364 engages gear 368 on shaft 370 journaled in bearing bracket 372. Shaft 370 is connected to drive disk 374 of magnetic clutch 346. Driven disk 345 of clutch 346 supports shaft 344 on which gear 338 is mounted. Clutch 342 has an energizing coil 380. Clutch 346 has an energizing coil 382. The coils are connected between ground and respective input timing pulse sources 385a, 385b.

FIG. 14 shows electrical connections of lamps and switches in circuit 400. All the switches 320a-320e of switch assembly 320 and switches 321a-321e of switch assembly 321 are normally closed pushbutton type switches. These switches are closed except when their operating arms 322a or 322b encounter the cam plates on the sides of the cam disk 302. One contact 401 of

each of the switches is connected to a different one of the green lamps or amber lamps on one of the panels, shown in FIG. 15. Each of the green lamps 22d in one column on panel 34e is connected in parallel with a different red lamp 22e' in another column on panel 34f. Each of the green lamps 22e on panel 34f is connected in parallel with a different red lamp 22d' in a column on the other panel 22d. Switches 320e and 321e control only the amber lamps 22d'' and 22e'' on the respective panels.

Switch 330 is a single-pole double-throw switch. Each time the operating arm 332 is actuated by projecting lobe 326 of cam disk 325, the pole 402 is thrown from switch contact 403 to 404 or vice versa. Switch contact 403 is connected to green lamps 22e, amber lamp 22e' and red lamps 22d'. Switch contact 404 is connected to green lamps 22d, amber lamp 22d' and red lamps 22e'. Pole 402 of switch 330 is connected to power supply 425.

It will be understood that during the time cam disk 325 rotates once, power is applied to one set of lamps or the other. The switches in both switch assemblies 320 and 321 are actuated in the same manner during each rotation of disk but only those switches are effective to pass or cut off electric current from their associated lamps when their associated switch contact 403 or 404 is closed with pole 402.

In operation of the system illustrated by FIGS. 11-15, the cam plates on disk 302 are shown at the start of a signal cycle. It will be assumed that an enabling and energizing pulse is applied to only one of clutch coils 380 or 382. If coil 380 is energized then the smaller gear 336 is driven and shaft 304 with the cam disks 302, 325 turns slower than if coil 382 is energized. If coil 382 is energized then coil 380 is deenergized and the clutch disks of clutch 342 are open while the clutch disks of clutch 346 are closed, then the larger gear 338 drives gear 334 and shaft 304 at a higher speed. Thus the timing cycle is shorter when large gear 338 drives shaft 304 than when smaller gear 336 drives shaft 304 even though motor 360 has a constant speed. The inputs at signal sources 385a, 385b are set manually or automatically so that either one or the other signal source is operative to energize one of the clutches.

Referring now to FIG. 14, it will be noted that only lamps 22e, 22e' and 22d' will be lighted during the succeeding rotation of disk 302. Switches 320a-320e are operated but are deactivated. Switches 321a-321e are operated and activated. At the start of this cycle with cam plates as shown in FIG. 14 all the green lamps 22e, 22d light up simultaneously on panel 34f and all red lamps 22d' light up simultaneously on panel 34d. The amber lamp 22e'' is extinguished because the arm of its switch 321e is riding on the cam plate 312b so that this switch is open. Switches 321a-321d are closed. As disk 302 rotates the cam plates, steps 314 are encountered in turn by the switch arms 322b and the associated switches open in turn to extinguish the connected red and green lamps in turn. As the last green lamp 22e is extinguished, the amber lamp 22e'' is lighted. The red lamps 22d' also go out in succession.

When the last green lamp 22e goes out the last red lamp 22dd goes out. It may be desirable to keep a red lamp lighted on one panel while the amber light is lighted on an adjacent panel. This is accomplished by providing an additional red lamp 22dd' adjacent to lamp 22d and connected in parallel with amber lamp 22e''. Thus red lamp 22dd' will be lighted only when the amber lamp 22e'' is lighted. Similarly another red lamp 22ee' is provided on panel 34f adjacent to the last red lamp 22ee on panel 34f. Red lamp 22ee' is connected in parallel with amber lamp 22d'' on panel 34e. Amber lamp 22e'' is lighted only when the arm of its switch is located in the cut-out 316 of its cam plate 312b. This

occurs toward the end of the single rotation of the cam disks 302 and 325. Then lobe 326 encounters switch arm 332 and the switch 330 is operated to throw pole 402 to switch contact 404. Thereupon all green lamps 22d and associated red lamps 22e' light. These lamps go out in turn until the amber lamp 22d'' comes in. When the last red lamp 22ee goes out red lamp 22ee' will be lighted while amber lamp 22d'' is lighted. Then the lobe 326 encounters switch arm 332, the amber lamp 22d'' and red lamp 22ee' go out, and the cycle starts again with pole 402 being thrown to switch contact 403.

It will be understood that the amber, red and green lamps facing outwardly of panel 34e in one direction can also be arranged in the signal device 34e to project light in the opposite direction 90 degrees to panel 34e. Similarly the amber, red and green lamps facing outwardly of panel 34f can be arranged to project light in the opposite direction 90 degrees to panel 34f. If desired each red, green and amber lamp can have another red, green or amber lamp respectively, connected in parallel with it and facing in an opposite direction 180 degrees therefrom. This arrangement will enable the signal device 10d to control traffic approaching in four mutually perpendicular directions in the manner described by means of successively extinguishing signal lamps.

All of the various systems described above can be controlled remotely by means of well known radio control circuits. The remotely controlled devices can be made responsive to a fixed frequency or to a combination of frequencies or to coded signals. The traffic signals can be controlled by vehicle counter devices which register traffic loads and can be set to vary the timing of the traffic signals in response to traffic loads.

In FIG. 16 two round lenses plates 30x are shown on one side and the corresponding parallel plates 22x are shown on the other side. In FIG. 17 three sets of similarly arranged plates 30y and 22y are shown. In FIG. 18, the "DON'T WALK" plates 38z are shown on one side and the corresponding parallel plates 22z on the other side.

While I have illustrated and described the preferred embodiments of my invention, it is to be understood that I do not limit myself to the precise construction herein disclosed and that various changes and modifications may be made within the scope of the invention as defined in the appended claims.

Having thus described my invention, what I claim as new, and desire to secure by United States Letters Patent is:

1. In a traffic signal system having rotating cam disks for operating switches controlling signal lamps, motor means for rotating said cam disks, comprising a shaft supporting the cam disks, a pair of magnetic clutches, a first gear train having one gear ratio connected between one of said clutches and said shaft, a second gear train having a different gear ratio from said one gear ratio connected between the other one of said clutches and said shaft, a constant speed motor operatively connected to said clutches for driving the same, and two signal input sources connected to the clutches respectively for selectively energizing one of the clutches at a time whereby said motor operatively drives said shaft at one of two different speeds depending on which one of the two clutches is energized.
2. A traffic signal system for use at a street intersection comprising a first set of green lamps and a first set of red lamps adjacent to the green lamps arranged to face in one direction, and a second set of green lamps and a second set of red lamps adjacent to the second set of green lamps arranged to face in another direction, a first assembly of normally closed switches connected to the first set of green lamps and to the second set of red lamps, a second assembly of normally closed switches connected to the second set of green lamps and to the first set of red

lamps, a first rotatable flat cam disk having flat steppe cam plates on opposite sides thereof, said first assembly of switches being disposed at one side of said cam disk and having operating arms successively contacting step of one of the cam plates thereon to open the switches of the first assembly thereof in turn, said second assembly of switches being disposed at the other side of said cam disk and having other operating arms contacting steps of another cam plate on the cam disk to open the switches of the second assembly thereof in turn, a second cam disk rotatable with the first cam disk, another switch having contacts at two positions thereof connected in circuit with the switches of the two assemblies, respectively, and a power supply connected to said other switch, said other switch being operated by second cam disk to connect said power supply to each one of the assemblies of switches in turn, whereby the first set of green lamps and the second set of red lamps are lighted simultaneously at one position of said other switch and are extinguished in succession while the cam disks rotate one revolution and while the second set of green lamps and first set of red lamps are extinguished, and whereby the second set of green lamps and first set of red lamps are lighted simultaneously at the other position of said other switch and are extinguished in succession during the next revolution of the cam disks while the first set of green lamps and second set of red lamps are extinguished; motor means for rotating the cam assembly, comprising a shaft supporting the cam disks, a pair of magnetic clutches, a first gear train having one gear ratio connected between one of said clutches and said shaft, a second gear train having a different gear ratio from said one gear ratio connected between the other one of said clutches and said shaft, a second constant speed motor operatively connected to said clutches, for driving the same, and two signal input sources connected to the clutches respectively for selectively energizing one of the clutches at a time whereby said motor operatively drives said shaft at one of two different speeds depending on which of the two clutches is energized; an array of signal units, a first red light emitting device in a first one of the units, a plurality of other red light emitting devices in a second one of the units, a first green light emitting device in a third one of the units, a plurality of other green light emitting devices in a fourth one of the units, and switching circuit means connected to each of the red and green light emitting devices for cyclically and alternately turning the first red light and first green light on and off, for turning on all of the other red lights when the first red light is on and progressively turning the other red lights off, and for turning on all of the other green lights when the first green light is on and progressively turning the other green lights off.

3. A traffic signal system as defined by claim 2, further comprising a first amber lamp disposed adjacent to the first set of green lamps, a second amber lamp disposed adjacent to the second set of green lamps, each amber lamp being connected to certain switches respectively in the two assemblies of switches, and other flat cam plates on opposite sides of the first cam disk disposed to be contacted by operating arms of said certain switches respectively for lighting each one of the amber lamps immediately after the green lamps adjacent thereto are extinguished.

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