Oct. 28, 1930. W. W. SHOEMAKER 1,779,919

TRAFFIC SIGNAL CONTROL

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Fig. 1.

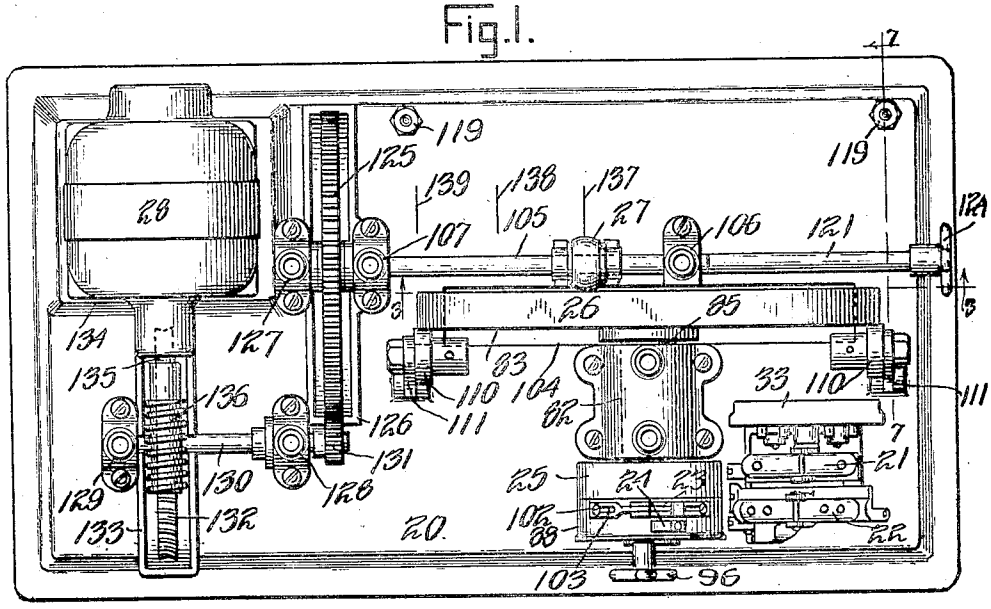


Fig. 2.

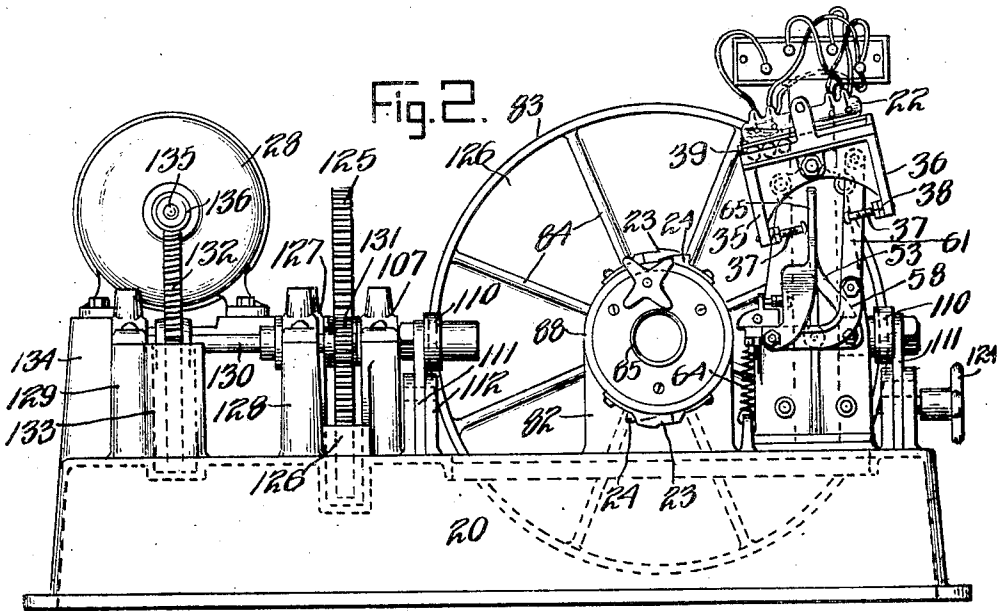
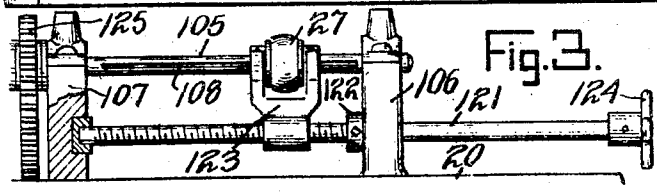


Fig. 3.



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Fig. 4

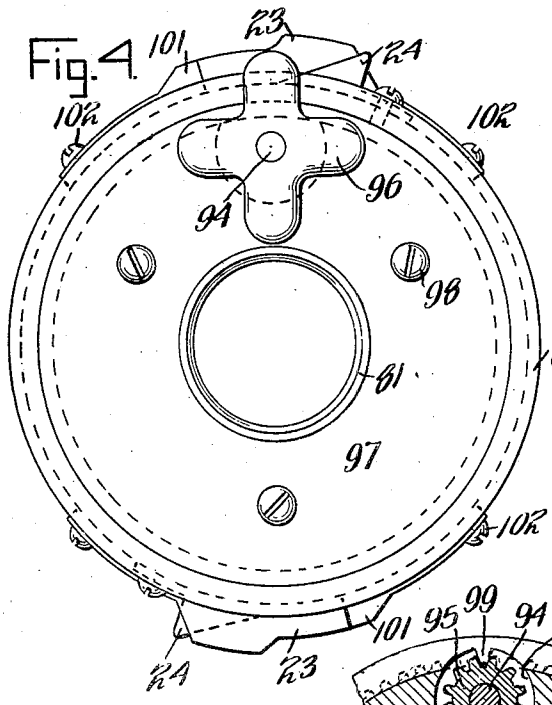


Fig. 5

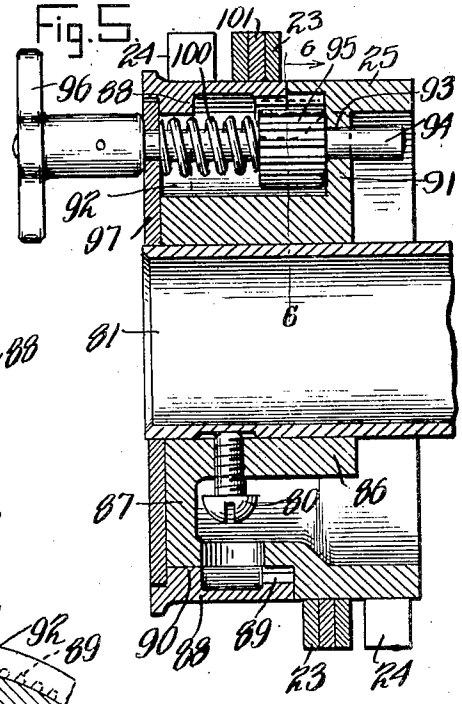


Fig. 6.

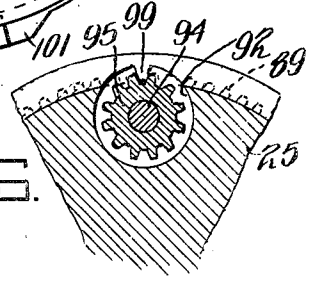
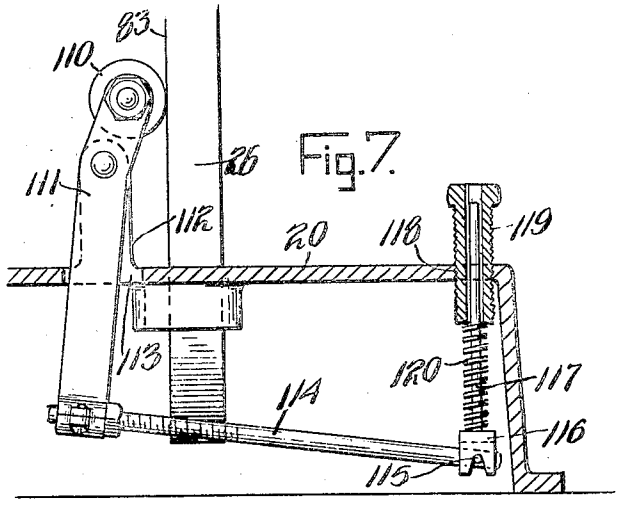


Fig. 7.



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Fig. 8.

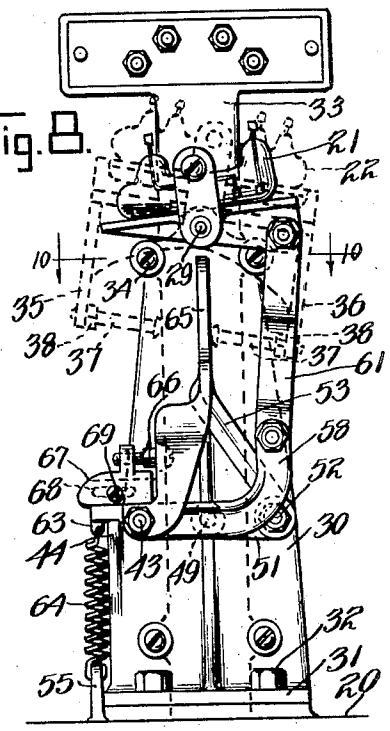


Fig. 9.

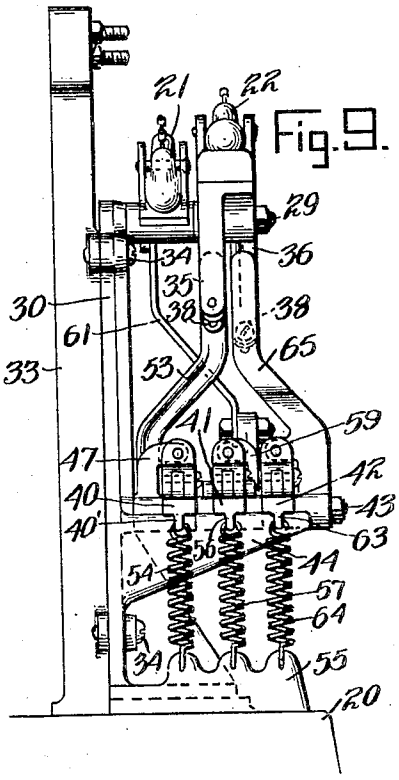


Fig. 10.

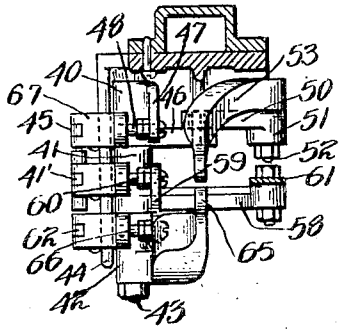
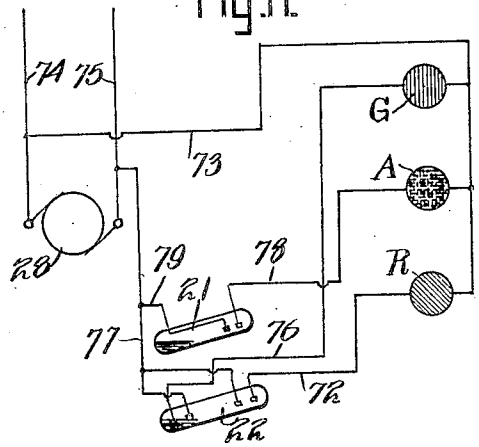


Fig. 11.



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Patented Oct. 28, 1930

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UNITED STATES PATENT OFFICE

WILLIAM W. SHOEMAKER, OF WAYNESBORO, PENNSYLVANIA

TRAFFIC-SIGNAL CONTROL

Application filed May 12, 1927. Serial No. 190,877.

My invention relates to a control for traffic signals and it is an object of the invention to provide a device of this character by means of which traffic or other signals may be continuously intermittently displayed with variable regularity and for variable periods of time, all as will hereinafter be more fully described and claimed.

Referring to the accompanying drawings which are made a part hereof and on which similar reference characters indicate similar parts,

Figure 1 is a top plan view of a control illustrating one application of my invention,

Figure 2, a side elevation,

Figure 3, a section on line 3—3 of Figure 1,

Figure 4, an enlarged end elevation of the operating drum shown in Figure 2,

Figure 5, a central vertical section through Figure 4,

Figure 6, a section on line 6—6 of Figure 5,

Figure 7, a fragmentary transverse section illustrating the manner of supporting the disk,

Figure 8, an enlarged side elevation of the switch-operating mechanism,

Figure 9, a similar view taken at right-angles to Figure 8,

Figure 10, a section on line 10—10 of Figure 8, and

Figure 11, a diagrammatic view of the wiring.

In the drawings reference character 20 indicates a base formed of a single casting having mounted thereon adjacent its forward end switches 21 and 22 for making and breaking electrical circuits by means of which signalling devices, either visible, audible, or the like, such as for example, lights G, A and R may be energized. The switches 21 and 22 are operated by cams 23 and 24 mounted on a rotatable drum 25 operatively connected with a friction disk 26 and driven from a friction roller 27 connected by a chain of gears with a motor 28.

The switches 21 and 22 are pivoted on a shaft 29 disposed transversely of the base 20 and adjacent one end of the same on the upper end of an adjustably mounted bracket 30, such bracket having a laterally extending foot 31 provided with slots (not shown) through which bolts 32 extend for attaching the bracket to the base 20 in a manner which permits lateral adjustment. A hollow casing or standard 33 is attached to the rear side of the bracket 30 by means of screws 34 and such hollow standard forms a casing for the wires which connect the switches and the signals which are controlled.

The switches 21 and 22 may be of any desired construction, however, I preferably use mercury switches in order to insure absolute contacts and each switch is provided with a depending portion by means of which the same is supported on its shaft 29, the switch 21 being provided with a depending perforated ear adjacent one end by means of which the same may be operated and the switch 22 being provided with axially spaced depending arms 35 and 36 for the same purpose. Each of the arms 35 and 36 is provided with an adjustable screw 37 arranged to be secured in fixed position by means of a locknut 38. The mercury switch 22 is provided with balls 39 adapted to cause the same to operate with a positive snap action. For operating the mercury switches 21 and 22 I provide levers 40, 41 and 42 which are pivotally supported on a shaft 43 mounted on the bracket 30 adjacent its rear edge in substantially parallel relation to the shaft 29 upon which the mercury switches are mounted. An arm 44 is mounted beside the shaft 43 and forms a rest or stop for the levers mounted on such shaft.

Lever 40 which is nearest the bracket 30 comprises an upstanding horizontally disposed and rearwardly extending tongue 45 and a forwardly and horizontally extending arm 46. Said lever is also provided with an upstanding arm 47 which curves transversely over the arm 46 and forms a support for an adjusting screw 48. To the outer end of the forwardly extending arm 46 is pivoted at 49 the outer end of a rearwardly extending arm 50 of a lever 51 mounted upon a shaft 52 disposed in substantially the same horizontal plane as the shaft 43 adjacent the front edge of the bracket 30, said lever 51 being provided with an upstanding arm 53

which is normally disposed beneath the shaft 29 upon which the mercury switches are pivoted and which is adapted to engage the adjustable screw 37 carried by the depending arm 35 of the mercury switch 22 for tilting the switch to cause the mercury to flow to its right-hand end. The rearwardly extending portion of the lever 40 is provided with a depending perforated ear 40′ to which is connected the upper end of a helical spring 54, the lower end of the spring being connected to an upstanding ear of a transversely extending web or flange 55 formed integrally with the base 20, said spring being adapted to maintain the parts in the position shown in Figure 8.

The lever 41 is pivoted on the shaft outwardly of the lever 40 and also, like the lever 40, comprises a rearwardly extending portion having an upstanding horizontally disposed tongue 41′ and a depending perforated ear 56 for connection with a spring 57 attached to the flange 55 and said lever is also provided with a forwardly and upwardly curved arm 58 and a shorter upwardly and laterally extending curved arm 59, the reverse of the arm 47 of the lever 40, on which is supported an adjusting screw 60. A link 61 connects the extremity of the forwardly extending arm 58 and the ear beneath the forward end of the mercury switch 21 and by means of which connection when the lever is operated the mercury switch will be tilted but when released will be returned to its original position by the spring 57. The third or outer lever 42 is provided with a rearwardly extending portion having a horizontally disposed tongue 62 and a depending perforated ear 63 to which is connected a spring 64 attached to the web or flange 55 and said lever is also provided with an upstanding arm 65 which is disposed in the same transverse plane with the upstanding arm 53 of the lever 51 and closely adjacent thereto for engaging the adjusting screw 37 carried by the depending arm 36 of the mercury switch 22. Said upstanding arm 65 is also provided with an adjusting screw 66.

Each of the adjusting screws 48, 60 and 66 is connected to a horizontal movable dog or cam engaging element 67 adapted to slide longitudinally on the upstanding tongues 45, 41′ and 62 of the levers 40, 41 and 42. In order to hold said dogs or cam engaging elements on their supporting tongues I preferably provide said tongues with longitudinally disposed slots 68 in which are adapted to slide screws 69 carried by the dogs or cam engaging elements.

From the foregoing it will be understood that by tripping the lever 40 the mercury switch 22 will be tipped to the right and by tripping the lever 42 the said mercury switch will be tipped oppositely to the left. Further by tripping the lever 41 the mercury switch 21 will be tilted to the right but will be returned to the opposite position when released on account of the action of the spring 57.

It will be obvious that either of the switches may be used for controlling any desired signalling device, however, as shown in Figure 11, I have provided the mercury switch 22 with contacts at both ends by means of which connection may be made through conductors 72 and 73 from supply lines 74 and 75 with signal R or through conductors 76 and 77 with the signal G. The mercury switch 21 is provided with contacts at one end by means of which and conductors 78 and 79 the circuit may be completed through the signal A. With this arrangement it will be obvious that either signal G or R will be displayed at all times or a complete cycle includes the combined operation of both signals and by varying the interval of time between the operation of the switch 22 the signals may be operated in any desired ratio. I provide means for varying the time required for a complete cycle of operation of the signals and for additionally varying the length of time of operation of each signal. Also adjustable means for operating the switch 21 slightly before the switch 22 is moved from one position to another so that the signal A will be operated while the signal R or G is operating and at the time the change occurs. The drum 25 is disposed transversely of the base 20 parallel to the shaft 43 and is fixed by means of a set screw 80 on one end of a hollow pipe or shaft 81 disposed in an elongated upright bearing member or standard 82 and on the opposite end of the shaft 81 is provided a disk 26 having a smooth front face and a peripheral circumferential flange 83 on its rear face with radially extending strengthening ribs 84 connecting said face with a central hub 85.

The drum 25 is formed of a hollow cylindrical hub portion 86 adapted to fit snugly on the shaft 81 and with a spaced concentric sleeve or shell connected at one end by a radially extending transverse web 87 forming a strong yet comparatively light construction. The exterior surface of the outer shell is provided with cylindrical surfaces, one of which is slightly smaller in size and arranged to accommodate a band 88 having an annular rack 89 formed about its inner edge and an annular inwardly extending flange 90 at its opposite edge arranged to maintain the same in concentric relation on the drum. The hub 86 and concentric shell are joined at one side by means of an integral web 91 and said web is provided with a recess 92 which extends axially of the hub throughout the width of the smallest cylindrical portion of the drum and slightly beyond the same into the larger cylindrical portion, said recess having a reduced concentric opening 93 at its inner end

forming a bearing for the inner end of a shaft 94 upon which is supported a pinion 95 at its outer end. A face plate 97 is provided for the end of the drum 25 and said face plate is arranged to fit snugly within an annular recess in the band 88 for assisting in holding the band in proper position. Said face plate is preferably held in position by means of screws or other fastening means 98. The recess in the larger cylindrical portion of the drum is provided with an inwardly extending projection or tooth 99 which is arranged to be engaged by the pinion 95 and by means of which the drum 25 and band 88 are held against relative rotation. The pinion 95 being maintained in such position by means of a spring 100 which permits the knob or hand wheel 96 to be pulled outwardly so that the pinion may be rotated for rotating the band relative to the drum 25 for varying the positions of the respective cams.

As shown in Figures 4 and 5 the cams 23 are disposed on opposite sides of the drum by means of which the second or middle lever 41 will operate the switch 21 at each half rotation of the drum 25; also the cams 24 are disposed on opposite sides of the drum or are equally spaced and such cams will operate the outer and inner levers 40 and 42 so that the switch 22 will remain in one position as long as in the other position to maintain the signal lights in operation for equal periods of time. In order to maintain the switch 21 in a position to close the circuit for a greater period of time I provide the cams 23 with means permitting them to be shortened or lengthened, such means comprising a bifurcated body portion between the bifurcations of which is disposed a tongue 101, such tongue and bifurcated cam being adapted to be secured in telescopic position by means of screws 102 which are disposed in slots 103 and permit the parts to be adjusted to the length desired. By this construction in order to vary the ratio of the operation it is only necessary to pull out the shaft 94 by means of the operating knob 96 and rotate the pinion 95 to turn the band 88 carrying a pair of cams 23 and 24 whereupon the operation of the outer and inner levers will be varied accordingly.

The base 20 is provided with a longitudinal slot 104 in which is disposed the lower portion of the friction disk 26 and a shaft 105 is mounted by means of upright bearing members 106 and 107 in parallel relation to the smooth face of the friction disk 26. The shaft 105 is provided with a longitudinal slot 108 in which a pin is mounted, said pin being carried by a friction roller 27 which engages the surface of the disk 26 and is longitudinally slidable on said shaft 105. The friction roller 27 is adapted to rotate the disk 26 for operating the drum and cam members thereon and a pair of reenforcing rollers 110 are mounted on levers 111 pivoted on upstanding brackets 112 and disposed adjacent openings 113 in the base 20, such levers 111 having their lower ends projecting beneath the base 20 and formed for the reception of horizontally disposed threaded rods 114. The outer ends of the rods 114 are provided with transverse pins 115 which seat in slots of saddle members 116, carried by upright rods 117 which extend upwardly through threaded openings 118 in the base 20. A hollow bolt 119 is threaded in each opening 118 and is arranged to be adjusted through the opening for varying the tension on a spring 120 for tensioning the rollers 110 against the peripheral rim 83 of the rotatable disk 26. The rollers serve to take up the thrust on the shaft 81 and prevent undue wear on said shaft and at the same time maintain the proper tension between the friction roller and the rotary disk.

Means is provided for sliding the friction roller longitudinally of its supporting shaft and such means comprises a threaded shaft 121 which is mounted in the upright bearing members 106 and 107 in parallel relation to the shaft 105 and such threaded shaft is secured against longitudinal movement in said bearing members by means of a collar 122. Upon the threaded part of said shaft is mounted a perforated yoke 123 the arms of which extend on opposite sides of the friction roller and serve, when the threaded shaft is rotated, for moving the yoke and friction roller longitudinally of their supports and radially of the rotary disk. In order to provide simple operating means for the threaded shaft I extend the end of the same forwardly to a point slightly in advance of the forward end of the base 20 and provide an operating knob 124 by means of which the same may be rotated. In order to provide means for rotating the shaft 105 upon which the friction roller is mounted I fix on the inner end of the shaft a gear 125 and such gear extends downwardly into a depression in the housing 20, such depression being provided with an upstanding surrounding wall or web 126 about the same which provides an oil or lubricant well by means of which the gear may be kept thoroughly lubricated. In order to firmly support the last-mentioned gear I provide an upright bearing member 127 integral with the base 20 and the web about the depression for the gear and in slightly spaced relation to the bearing member 107. An additional pair of spaced bearings 128 and 129 are provided in substantially parallel relation to the first-mentioned bearings in which is supported a shaft 130 and a pinion 131 is fixed on the end of said shaft in engagement with the gear 125. On the opposite end of said shaft 130 is a large gear 132 which is disposed in a transversely arranged upstanding casing or oil well 133

adapted to contain lubricant for maintaining the same thoroughly lubricated. Formed integral with the inner end of the upstanding casing or oil well the base 20 is provided with an elevated portion 134 upon the top of which is mounted a motor 28 having a shaft 135 upon which is mounted a worm 136 for engagement with the gear 132.

In operation the motor rotates the worm at a constant rate of speed and by means of the reduction gearing the friction roller will rotate at a slow speed and will rotate the friction roller at a corresponding speed. By operating the knob 124 to shift the yoke 123 along the shaft 105, the friction roller may be moved radially of the friction disk 26 from center to circumference and the speed of the disk will be varied accordingly. The drum 25 on account of its being mounted on the shaft 81 upon which the disk 26 is mounted will be rotated at the same rate of speed as the disk and will operate the levers for operating the mercury switches, as above described. I preferably provide indicia which in the present instance comprises spaced lines 137, 138 and 139. When the center of the roller 27 is at the line 137 nearest the center of the disk the disk is adapted to be rotated at the rate of one revolution per minute and similarly when the roller is at lines 138 and 139 the disk is arranged to rotate at the rate of one revolution in two or three minutes, respectively. I therefore have provided means for varying the time of the cycle of operation and for varying the complementary fractions in which each signal is operated, in other words all of the signals may be displayed over a period of time, which is variable from thirty seconds to three minutes and the signal G may be displayed for any fractional part of the cycle while the signal R will be displayed for the remaining fractional part of the cycle.

Likewise by retracting the operating knob 96 and rotating the pinion 95 for changing the relative positions of the band 88 and drum 25 upon which the same is mounted the cams which are shown in Figures 2 and 4 in diametrically opposite positions will be moved toward each other and accordingly lengthen the period of time over which one signal operated and shorten the time over which the complementary signal operates.

It will be ovious to those skilled in the art that various changes may be made in my device without departing from the spirit of the invention and therefore I do not limit myself to what is shown in the drawings and described in the specification, but only as indicated in the appended claims.

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

1. Means for operating electric switches at regular intervals comprising a plurality of levers, a shaft supported adjacent said levers, a two-part drum on said shaft, cams carried by the parts of the drum for operating the levers upon the rotation of the drum, and a rack and pinion for rotating one part of the drum relative to the other, substantially as set forth.

2. Means for operating electric switches at spaced intervals comprising a drum, a band mounted on said drum, cams carried by said drum and band, a rack carried by said band, a spring projected pinion associated with said drum and arranged to be retracted and rotated for rotating the band upon the drum, substantially as set forth.

3. Means for operating electric switches at spaced intervals comprising a drum, a band mounted on said drum, cams carried by said drum and band, a rack carried by said band, a spring projected pinion associated with said drum and arranged to be retracted and rotated for rotating the band upon the drum but adapted to engage the band and drum and hold them against relative rotation when released, substantially as set forth.

4. Means for operating electric switches at spaced intervals comprising a revolvable drum, a band revolvably mounted on said drum, variable cams carried by said drum and band, switch throwing levers mounted adjacent said drum and adapted to be operated by said cams, a shaft journalled in said drum and having a spring pressed pinion fixed thereon, an internal rack on said band meshing at all times with said pinion, a socket in said drum adjacent said journal to receive said pinion, and a tooth or projection in said socket adapted to engage said pinion when in its inoperative position to lock said band against rotation on said drum, substantially as set forth.

In witness whereof, I have hereunto set my hand at Waynesboro, Pennsylvania, this 25th day of February, A. D. nineteen hundred and twenty-seven.

WILLIAM W. SHOEMAKER.