Dec. 16, 1958 C. A. HEIKES 2,865,017

TRAFFIC SIGNAL

Filed March 25, 1957 3 Sheets-Sheet 1

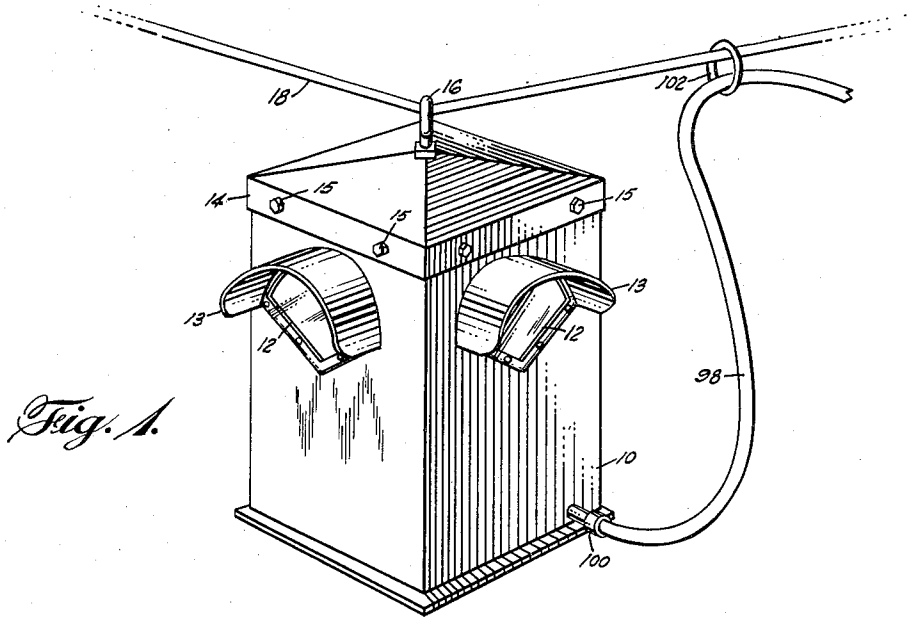


Fig. 1.

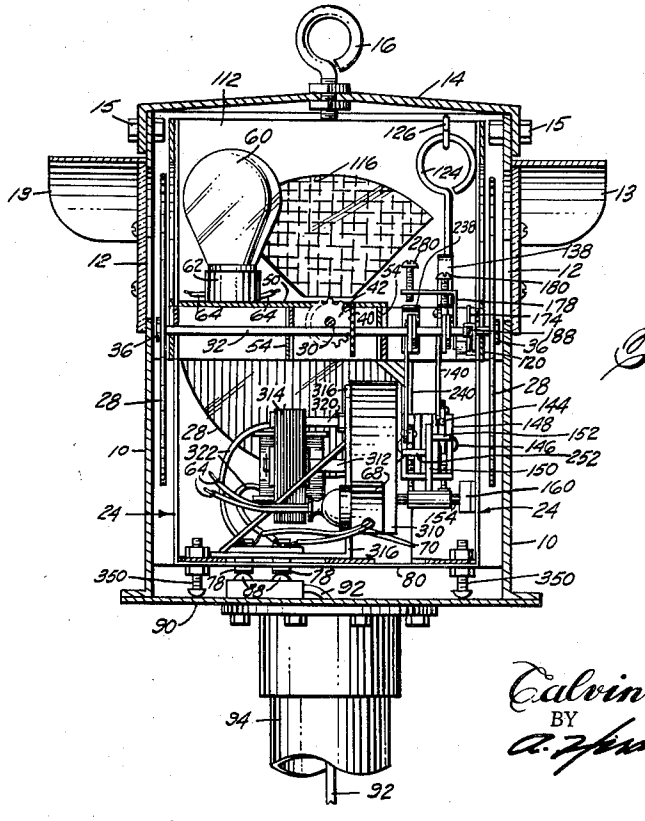


Fig. 2.

INVENTOR.
Calvin A. Heikes
BY
A. Yeoman Sturges
Agent

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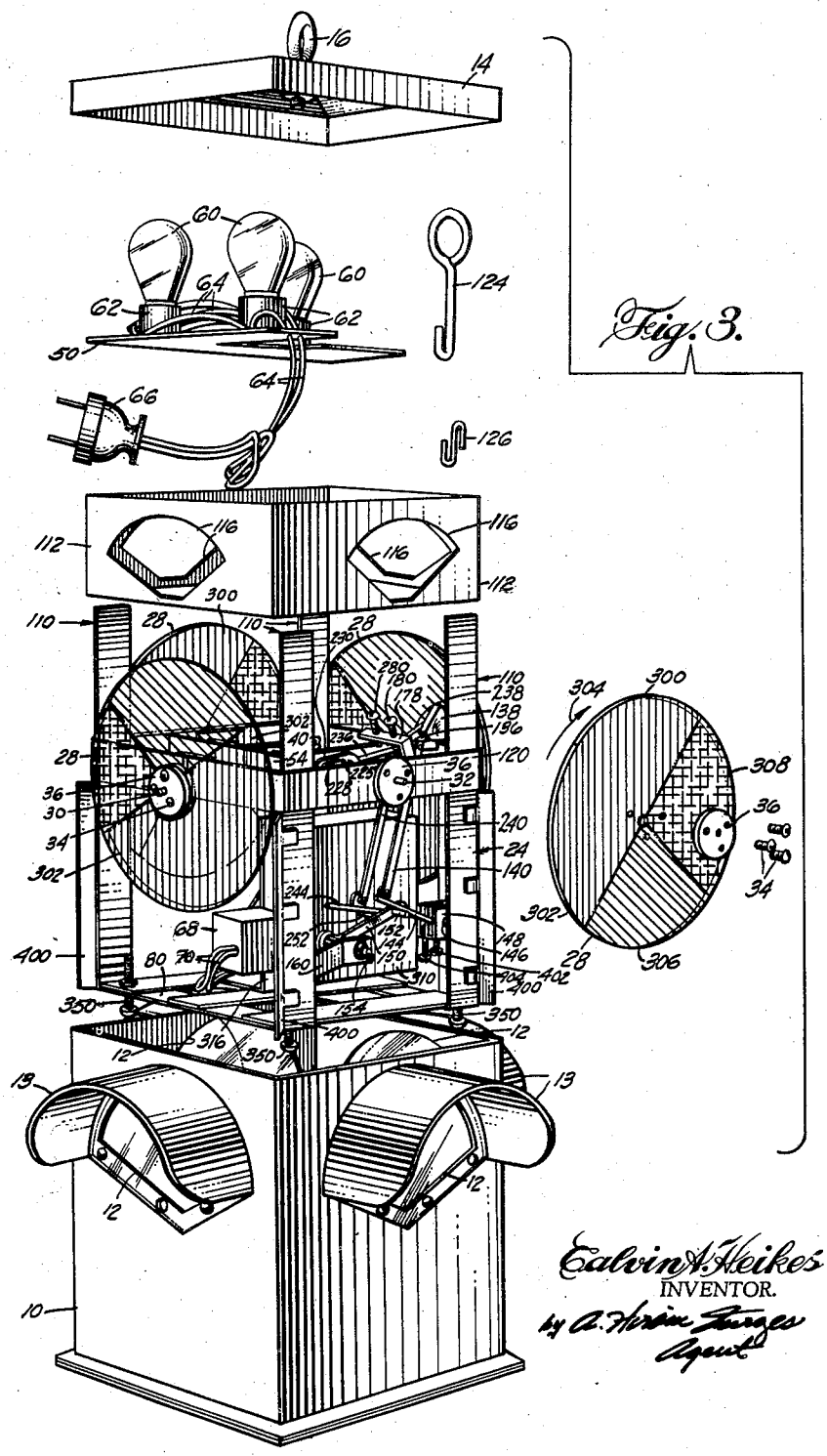


Fig. 3.

Calvin A. Heikes
INVENTOR.
by A. Hirsch Stringer
Agent

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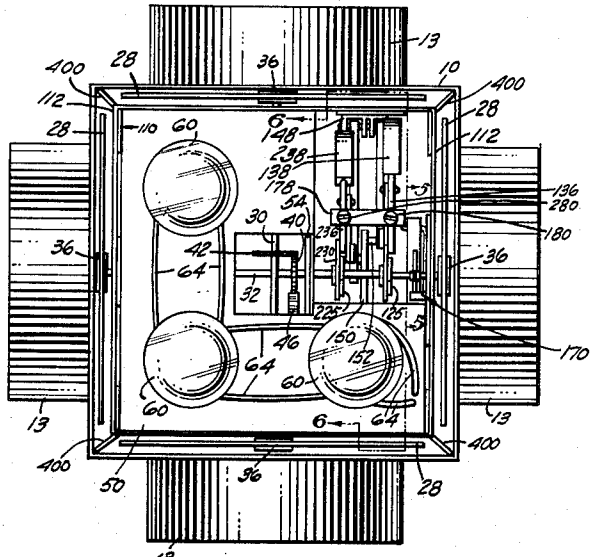


Fig. 4.

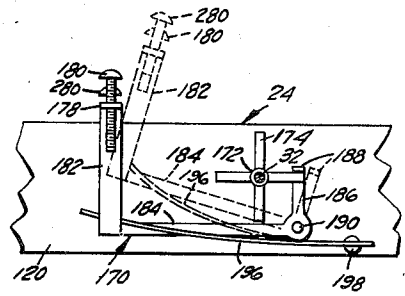


Fig. 5.

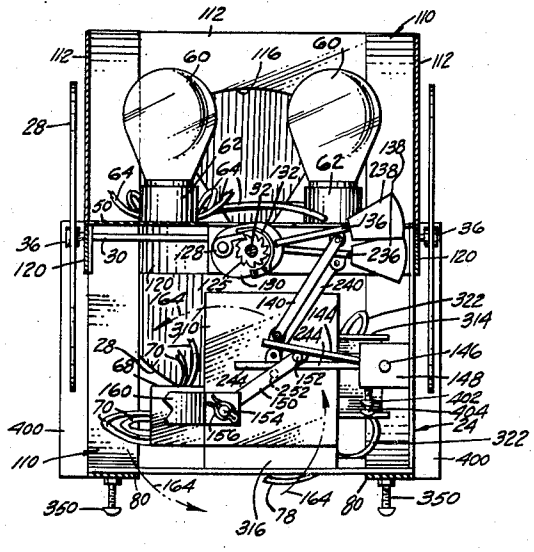


Fig. 6.

Calvin A. Heikes
INVENTOR.

BY A. Julian Staples
Agent

United States Patent Office 2,865,017
Patented Dec. 16, 1958

2,865,017

TRAFFIC SIGNAL

Calvin A. Heikes, Omaha, Nebr.

Application March 25, 1957, Serial No. 648,311
4 Claims. (Cl. 340—41)

This invention relates to traffic signals and more particularly it is an object of this invention to provide a traffic signal of lower cost of manufacture, lower cost of operation, and of greater dependability than heretofore.

The most commonly used traffic signals of the type which are employed in the center of the intersections use red, yellow and green lenses on all four sides of the signal. Customarily separate lights have been used in such signals behind each lens to the end that twelve lamps have been necessary for each unit.

It is an object of this invention to provide a unit which is operable with much fewer lamps to substantially reduce the likelihood of a signal becoming inoperable because of a failure of a lamp.

A further object of the invention is to provide a signal in which multiple lamps are used in such a way that if one or more of the lamps fail the remaining lamp or lamps continue to maintain signalling in all four direc-

A further object of the invention is to provide a signal adapted to eliminate the necessity for a large and expensive housing such as is necessary when there are twelve signal windows in a unit, thereby achieving economy of construction.

A further object of the invention is to provide a signalling unit, the lamps of which are constantly in operation rather than frequently turning off and on as is common in units of the prior art. This provides much longer lamp life because of the constant operation rather than the changing of a lamp from off to on frequently, as is known to be a factor greatly reducing the life of incandescent lamps.

A more particular object is to provide a signal, the colors of which are changed through the use of multicolored discs.

A further object of my invention is to provide a new signalling system in which the signal changes from red directly to green without an amber inbetween, and in which the signal changes from green to red with an amber inbetween.

A further object of the invention is to provide a unit as described, the central portion of which containing all moving parts is mounted on its own frame for ready removability.

A further object of the invention is to provide in a disc signal center frame and an outer cover and having means to prevent the outer cover from undesirably contacting the moving discs.

A further object of the invention is to provide a signalling system in which the signal for cars going in one direction changes from green to amber and remains on amber a short length of time during which time the signal for a car going in the transverse direction is on red whereby collisions are avoided that heretofore came because signals for traffic traveling on each street were on amber at the same time.

Other and further objects and advantages of the present invention will be apparent from the following detailed

description, drawings and claims, the scope of the invention not being limited to the drawings themselves as the drawings are only for the purpose of illustrating a way in which the principles of this invention can be applied.

Other embodiments of the invention utilizing the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

Figure 1 is a perspective view of the signal of this invention as it would be seen in use;

Figure 2 is a vertical cross section taken through the center of the signal of Figure 1 with the exception that in Figure 2 the signal is mounted on a post rather than suspended from a cable;

Figure 3 is an exploded view of the signal of Figure 1 as seen in perspective;

Figure 4 is a top plan view of the signal of Figure 1 with the cover removed;

Figure 5 is a detail of a shaft lock and release mechanism; and

Figure 6 is a view-in-section taken along the line 6—6 of Figure 4.

The signal light of this invention comprises a housing 10 having four windows 12 extending outwardly therefrom on four different sides of the housing 10. The housing 10 is preferably square in top plan view as best seen in Figure 4.

The windows 12 are preferably of clear glass or other clear material and have hoods 13 disposed above them. The housing 10 has a top 14 removably attached thereto by means of bolts 15. The top 14 has an eyelet 16 suitably attached thereto for receiving a suspension cable 18 for suspending the signal in the center of and above the intersection between two streets.

In the housing 10 is an inner support frame 24 which latter supports all later described moving parts. The support frame 24 is preferably of a box shape although it can have large openings in its sides to reduce its weight and the cost of construction.

Four colored discs 28 are disposed outwardly of the housing 24 and are adapted to rotate across the windows 12 on shafts 30 and 32 which are disposed beneath the windows 12.

The shaft 30 interconnects two opposite ones of the discs 28 and the shaft 32 interconnects the other two discs 28, the discs being mounted by screws 34 on a hub 36 which latter is attached to and rotates with the respective shaft 30 or 32.

The shafts 30 and 32 are drivably synchronized by two gears 40 and 42 which are attached to the shafts 30 and 32 respectively and which are disposed in mesh with each other.

A spring pawl 46 is provided, as best seen in Figure 4, and the pawl 46 is suitably attached to the frame 24 to make it impossible for the gear 40 to rotate in any direction other than clockwise as seen from the right in Figure 4.

As best seen in Figure 4 there are many parts which will be later described for causing the shafts 31 and 32 to rotate as desired.

Referring now to Figure 3 it will be seen that a lamp shelf 50 is provided and is disposed horizontally above and is supported on certain transverse members 54 of the frame 24. The transverse members 54 extend horizontally and have upper edges in a position to support the shelf 50 such that a plurality of lamps, preferably three in number and best seen at 60 in Figure 3, are supported above their bases 62 directly opposite the windows 12.

Suitable cords 64 interconnect the bases 62 and a plug 66 which latter is adapted to plug into a receptacle 68,

best seen in Figure 2, and disposed at the bottom of the frame **24**.

The receptacle **68** is self-connected by suitable wires **70** to contact members **78**, best seen in Figures 2 and 6, which latter extend downwardly from a bottom **80** which is horizontally disposed across and attached to the frame **24**. The contact members **78** are preferably elongated and resilient and preferably extend partially horizontally for contacting contact buttons **88** which are mounted above the bottom **90** of the housing **10** and are suitably attached thereto.

A cord **92** extends downwardly from the contact buttons **88** which are mounted above a bottom **90** of the housing **10** and are suitably attached thereto.

A cord **92** extends downwardly from the contact buttons **88** through a pipe **94** seen in Figure 2. The pipe **94** is adapted to serve as a vertical standard and support the housing **10** when the cable **18** is not used. In this way the pipe **94** forms a modification of the invention although it be understood that, referring to Figure 1, the wire **92** is suitably attached to a cord **98** leading out from the housing **10** through a pipe **100**, the cord **98** being adapted to extend to a suitable source of electric current, being supported, if desired, from the cable **18** on a ring **102** or a plurality of such rings.

Referring to Figure 3 it will be seen that the frame **24** has a plurality of upright posts **110** disposed one at each corner. The posts **110** are for receiving a rectangular member **112** thereon which latter has flat surfaces on four sides which are provided with openings **116** which are adapted to be disposed directly opposite, and are shaped similarly to, the openings of the windows **12**.

The member **112** is adapted to be received on the posts **110** and to be upheld by transverse members **120** of the frame **24** which extend around the frame **24** adjacent the shafts **30** and **32**.

It is the transverse frame members **120** which support the shafts **30** and **32** rotatably.

Referring to Figure 3 a suitable hook **124** can be kept at all times in the housing supported from a hanger **126** which latter hooks over the top of the member **112**.

Means are provided for rotating the shaft **32** and as best seen in Figure 6 this comprises a ratchet wheel **125** fixed to the shaft **32**. A pawl **128** is pivotally attached to a pawl supporting member **130** in a position for engaging the ratchet wheel **125**. A spring **132**, mounted on the supporting member **130**, holds the pawl in place against the ratchet wheel **125**. A lever **136** is attached to the pawl supporting member **130** and extends radially outwardly with respect to the shaft **32** having a weight **138** on its outer end.

The lever **136** has a toggle or linkage **140** attached pivotally to the underside thereof and the linkage **140** extends downwardly to a strike-bar **144** which latter has an outer end pivotally attached by means of a pin **146** and ears **148** to the frame **24**.

The pin **146** is disposed a substantial distance beneath the shaft **32** whereby when the lever **136** is in a rest position it is disposed substantially vertically and its lower end is pivoted at a point approximately beneath the shaft **32**.

As best seen in Figure 6 a jogging arm **150** is disposed beneath the strike-bar **144** and the arm **150** has a horizontally extending nib **152** thereon which is adapted to strike the strike-bar **144** as the jogging arm **150** rotates about its other end which is fixed to a shaft **154** by suitable means. The outer end of the shaft **154** extends through an opening in a brace **160** which latter, as best seen in Figure 3, extends to and is attached to the frame **24**, although in Figure 6 it has been broken away for clarity of illustration, and is held in place by a clip **156**.

The jogging arm **150** rotates in the direction of the arrow **164** and rotates counter-clockwise as best seen in Figure 6. This rotation causes the lever **136** to raise upwardly a sufficient distance to set the pawl **128** in a new position whereby when the jogging arm **150** has passed the strike-bar **144** and the lever **136** is free to fall, the weight **138** on the lever **136** will cause the lever **136** to fall, thus rotating the shaft **32**.

It is desirable to prevent the shaft **32** from rotating any more than one-quarter turn and so for this reason a shaft lock and release mechanism, generally indicated at **170** in Figure 5, is provided. This mechanism includes a wheel **172** having four outwardly protruding arms **174** extending outwardly from its hub, each arm **174** being spaced apart from the next arm ninety degrees. The wheel **172** is fixed to the shaft **32** supporting the hub.

As the lever **136** approaches the upper end of its upper swing it strikes a receiving bar **178** which extends transversely across the top of the lever **136**.

As the lever **136** moves upwardly, at the upper end of the swing, it strikes the lower end of a screw **180** which is mounted through the end of the bar **178** thereby moving the member **178** upwardly. The member **178** extends horizontally and is attached at one end to a vertically extending member **182** which is attached to a long horizontal lever **184** of a bell-crank assembly which has a shorter lever **186** disposed at a right angle to the longer arm **184**, the lever **186** extending vertically and having a horizontal dog **188** on its upper end which is adapted to extend over and arrest movement of the wheel **172** at times when the bell-crank is not disposed in the upper dotted line position shown in Figure 5. However, when the bell-crank is in the dotted line position shown in Figure 5, by rotating about its shaft **190** fixed to a frame member of the frame **24**, the dog **188** is to one side of the path of the wheel **172** whereby the wheel is free to rotate.

The bell-crank is urged into the downward pull line position shown in Figure 5 by an elongated spring **196** fixed by member **198** to a part of the frame **24** whereby the bell-crank and the screws **180** return to the downward pull line position best shown in Figure 5 whenever the lever **136** retreats downwardly again.

As thus described the mechanism shown in Figure 5 permits a rotation of exactly ninety degrees upon each upward movement of the lever **136**. This is important as the discs **28** must be rotated ninety degrees each time as will be later described.

As best seen in Figure 4, a shaft rotating mechanism similar to that previously described is shown disposed along the shaft **32** inwardly of the part described. This second set of mechanisms include a ratchet wheel **225** which is similar to the ratchet wheel **125**; a pawl **228** similar to the pawl **128**, a pawl supporting member **230** similar to the pawl supporting member **130**, a lever **236** similar to the lever **136**, and a spring **232** similar to the spring **132**. All these parts serve similar purposes and the further link **240**, similar to the link **140**, extends downwardly from the lever **236** to a second and inwardly disposed strike-bar **244** similar to the strike-bar **144** and also mounted on the pin **146**. The second strike-bar **244** is caused to jog upwardly by a second nib **252** similar to the nib **152** for extending outwardly and horizontally from the opposite side of the jogging arm **150** from the nib **152**. The nib **252** can best be seen in Figure 3 and it will be a short distance inwardly along the jogging arm **150** from the nib **252** whereby the striking-bar **244** tends to move upwardly simultaneously with the striking-bar **144** but the striking-bar **144** will start its movement eariler than the bar **244** as will complete its movement sooner than the bar **244** inasmuch as the nib **152** will pass by and release the striking bar **144** before the nib **252** will release the longer striking-bar **244**. The striking-bar **244** is longer for a purpose later described so that the levers **136** and **236** have different actions.

As the lever **236** reaches the upper end of its stroke it will strike a screw **280** disposed through the member **178** of the mechanism best seen in Figure 5 whereby the part shown in dotted lines in Figure 5 will move upwardly to the dotted line position causing the dog **188**

to release the wheel **172** for permitting the shaft **132** to rotate further.

There is a difference in action between the levers **136** and **236** of preferably two and one-half seconds.

As the jogging arm **150** rotates counter-clockwise in the direction of the arrows **164**, as best seen in Figure 6. The nib **252** will strike the inner striking-bar **244** before the nib **152** will strike the outer striking-bar **144**. After both of the striking-bars **144** and **244** have been engaged then both levers **136** and **236** move upwardly simultaneously.

It is the outer lever **136** which engages the respective screw **180** of the receiving bar **178** before the other lever **236** engages the other screw **280** of the receiving bar **178**.

The time interval between the time when the lever **136** strikes its screw **180** and the lever **236** strikes its screw **280** is sufficient for the receiving bar **178** to move upwardly into the dotted line position shown in Figure 5 and fall downwardly into the full line position shown in Figure 5 again whereby as the second lever **236** moves the receiving bar **178** upwardly into the dotted line position shown in Figure 5 and downwardly again the wheel **172** makes a ninety degree rotation. In other words the wheel **172** and shaft **32** rotates ninety degrees as a result of the lever **136** moving upwardly and then falling downwardly again and also the wheel **172** and shaft **32** rotates a second ninety degrees as a result of the second lever **236** moving upwardly and downwardly again.

The difference in timing between the levers **136** and **236** is two and one-half seconds as is the desired length of time for the amber colored light signal to operate.

Referring now to Figure 3 it will be seen that the disc **28** which is shown separate from the machine has a ninety degree segment **300** which is uppermost and which is red in color, a second ninety degree segment **302** which is downwardly and to the left of the section **300** and which is also red in color, the segment **302** being disposed directly behind the segment **300** in rotational position inasmuch as rotation of the disc at the right hand in Figure 3 is in a clockwise direction as indicated by the arrow **304**.

A third ninety degree segment is shown at **306** and is of green color and follows the section **302** and the segment **306** is disposed at the bottom of the disc as shown in Figure 3.

A fourth segment **308** is shown at the right in Figure 3 and this segment is amber in color and is of a quarter portion of the circle.

As thus described it will be seen that as the discs are shown in Figure 3 the red color is showing on two sides and the green is showing on two sides, the red showings being opposite each other for giving the same signal to the same street while the greens are opposite each other for giving the green signal on both sides of the indicator to the street that is disposed at ninety degrees to the street receiving the red signal.

At the next ninety degree rotation the discs shown separate in Figure 3 will have red uppermost for two and one-half seconds, the earlier red segment **300** having been in place forty-seven and one-half seconds.

Next the green segment **306** will replace the red segment **302** in the uppermost position, the green segment remaining in place forty-seven and one-half seconds. Thereafter the amber segment **308** will replace the green segment **306** in the uppermost position. The amber segment will remain in place two and one-half seconds. During these same periods the same colors are showing on the opposite side of the signal from the disc which has been removed in Figure 3.

However it will be interesting to note that while the disc which is removed in Figure 3 rotates in a clockwise direction to a person facing the disc, the opposite disc rotates in a counterclockwise direction to a person facing that disc, inasmuch as both discs are on the same shaft.

As thus described the signal changes from red to green without an amber color inbetween. However it changes from green to amber before it changes again to red. In this way the cars that are in motion have a chance to stop before the red signal comes. But the cars that are stopped at a red light receive no amber signal before the light changes to green. This has the effect of tending to prevent motorists from starting on an amber light.

The signal can be operated by any suitable mechanism part of which is contained in a housing **310** best seen in Figures 2 and 6. The shaft **154** is driven by the mechanism in the housing **310** and it will be understood that such mechanism includes a gear train for attaining a porper speed reduction, the gear train being driven by a shaft **312** of a motor **314**. The motor **314** in the housing **310** are both suitably secured to a mounting bracket **316** which is itself attached to the frame **24** at the bottom of the frame, suitable bolts **320** being used to mount the motor on the bracket **316**.

The motor **314** receives power through wires **322** which are attached respectively to the contact members **78** earlier described.

The frame **24** is removably disposed in the outer housings **10** and it has leg-screws **350** which hold the bottom of the frame **24** spaced upwardly from the bottom **90** of the outer housing **10**.

The screws **280** and **180** of the receiving bar **178** are for adjustment of the lock and release mechanism **170**. Other adjustment screws are provided which arrest the downward travel of the strike-bars **144** and **244** and in particular, screws **402** and **404** which are disposed extending upwardly through the bottom of the bracket **148**. The screw **402** is adapted to contact the strike-bar **144** and the screw **404** contacts the strike-bar **244** upon release of the levers **136** and **236** by the release mechanism.

Further, it will be seen that vertically disposed runners **400** attached to each of the upright frame members **110**. These runners **400** extend diagonally outward as best seen in top plan view of Figure 4 and serve as guides when placing the frame into the outer housing **10** and in so doing engage each of the corners of the housing **10**.

The runners **400** space the frame **24** away from the interior side walls of the housing **10** providing clearance for the operation and rotation of the signal discs **28**.

From the foregoing description, it is thought to be obvious that a traffic signal constructed in accordance with my invention is particularly well adapted for use, by reason of the convenience and facility with which it may be assembled and operated, and it will also be obvious that my invention is susceptible of some change and modification without departing from the principles and spirit thereof, and for this reason I do not wish to be understood as limiting myself to the precise arrangement and formation of the several parts herein shown in carrying out my invention in practice, except as claimed.

I claim:

1. A traffic signal adapted for long lamp life and operation with minimum lamp replacement servicing, comprising a frame, a housing enclosing said frame, said housing having openings on four sides thereof, windows of clear transparent material mounted on said housing and covering said openings, four discs each having a portion thereof disposed opposite a respective window, said discs being disposed between the frame and said housing, said discs each having a plurality of sections of different colors for signalling motorists, lamp means in said housing and disposed inwardly of said discs whereby the colored light from said discs shining through said windows signals motorists, means for mounting said discs rotatably on said frame and for causing intermittent rotation of said discs whereby said discs each remain motionless during a period in which one colored portion of a disc is opposite the respective window and whereby the disc then rotates until another colored portion is opposite the respective window, the disc remaining stationary

while the other colored portion is opposite the window until a further signalling period using the other color has been completed, said means for causing said intermittent rotation comprising a first and second means for jogging rotation of said discs and means for intermittently actuating said first and second means with a time lapse between the time the first means is actuated and the time the second means is actuated, said sections being in sequence of appearance at a window, a color indicating stop for a one hundred eighty degree section of said disc, a color indicating go ahead for a ninety degree section, and a color indicating the end of the go ahead period for a ninety degree section, said time lapse being synchronized with the position of said discs whereby said time lapse is equal to the time at which the section indicating the end of the go ahead period of a disc is opposite to its respective window, and whereby the time lapsing between the intermittent actuations of said first and second means is equal to and synchronized with the time that the stop and go colors in two opposite ones of said sections of said discs are opposite the respective window whereby said discs, intermittently rotating as described, make possible a sufficiency of light changes with a minimum of turning on and off of the lamp means for eliminating a major cause of lamp failure.

2. A traffic signal adapted for long lamp life and operation with minimum lamp replacement servicing, comprising a frame, a housing enclosing said frame, said housing having openings on four sides thereof, windows of clear transparent material mounted on said housing and covering said openings, four discs each having a portion thereof disposed opposite a respective window, said discs being disposed between the frame and said housing, said discs each having a plurality of sections of different colors for signalling motorists, lamp means in said housing and disposed inwardly of said discs whereby the colored light from said discs shining through said windows signals motorists, means for mounting said discs rotatably on said frame and for causing intermittent rotation of said discs whereby said discs each remain motionless during a period in which one colored portion of a disc is opposite the respective window and whereby the disc then rotates until another colored portion is opposite the respective window, the disc remaining stationary while the other colored portion is opposite the window until a further signalling period using the other color has been completed whereby said discs, intermittently rotating as described, make possible a sufficiency of light changes with a minimum of turning on and off of the lamp means for eliminating a major cause of lamp failure, said colors comprising: a color indicating stop for a one hundred and eighty degree section of said disc, a color indicating go ahead for a ninety degree section, and a color indicating the end of the go ahead period for a ninety degree section.

3. A traffic signal adapted for long lamp life and operation with minimum lamp replacement servicing, comprising a frame, a housing enclosing said frame, said housing having openings on four sides thereof, windows of clear transparent material mounted on said housing and covering said openings, four discs each having a portion thereof disposed opposite a respective window, said discs being disposed between the frame and said housing, said discs each having a plurality of sections of different colors for signalling motorists, lamp means in said housing and disposed inwardly of said discs whereby the colored light from said discs shining through said windows signals motorists, means for mounting said discs rotatably on said frame and for causing intermittent rotation of said discs whereby said discs each remain motionless during a period in which one colored portion of the disc is opposite a respective window and whereby the disc then rotates until another colored portion is opposite the respective window, the disc remaining stationary while the other colored portion is opposite the window until a further signalling period using the other color has been completed, said means for causing said intermittent rotation comprising a first and second means for jogging rotation of said discs and means for intermittently actuating said first and second means with a time lapse between the time the first means is actuated and the time the second means is actuated whereby said discs, intermittently rotating as described, make possible a sufficiency of light changes with a minimum of turning on and off of the lamp means for eliminating a major cause of lamp failure, said colors comprising: a color indicating stop for a one hundred and eighty degree section of said disc, a color indicating go ahead for a ninety degree section, and a color indicating the end of the go ahead period for a ninety degree section.

4. A traffic signal adapted for long lamp life and operation with minimum lamp replacement servicing, comprising a frame, a housing enclosing said frame, said housing having openings on four sides thereof, windows of clear transparent material mounted on said housing and covering said openings, four discs each having a portion thereof disposed opposite a respective window, said discs being disposed between the frame and said housing, said discs each having a plurality of sections of different colors for signalling motorists, lamp means in said housing and disposed inwardly of said discs whereby the colored light from said discs shining through said windows signals motorists, means for mounting said discs rotatably on said frame and for causing intermittent rotation of said discs whereby said discs each remain motionless during a period in which one colored portion of a disc is opposite the respective window and whereby the disc then rotates until another colored portion is opposite the respective window, the disc remaining stationary while the other colored portion is opposite the window until a further signalling period using the other color has been completed, said means for causing said intermittent rotation comprising two shafts, said discs each being mounted on a shaft, gear means drivably interconnecting shafts for rotation of said shafts at equal speeds, ratchet wheel means on one of said shafts, pawl means engageable with said ratchet means, pawl mounting means attached to said pawl means and rotatably mounted on said shaft for the rotation of said pawl around said gear as said pawl supporting means is rotated around said shaft, means for causing said pawl mounting means to rotate a desired degree intermittently, means responsive to said pawl supporting means rotation for permitting said shaft to rotate ninety degrees with each movement of said pawl supporting means but arresting said shaft from further rotation whereby said discs, intermittently rotating as described, make possible a sufficiency of light changes with a minimum of turning on and off of the lamp means for eliminating a major cause of lamp failure, said colors comprising: a color indicating stop for a one hundred and eighty degree section of said disc, a color indicating go ahead for a ninety degree section, and a color indicating the end of the go ahead period for a ninety degree section.

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