Sept. 2, 1958 G. A. WISWELL 2,850,717

TRAFFIC CONTROL SIGN

Filed Aug. 19, 1955 4 Sheets-Sheet 1

Fig. 1.

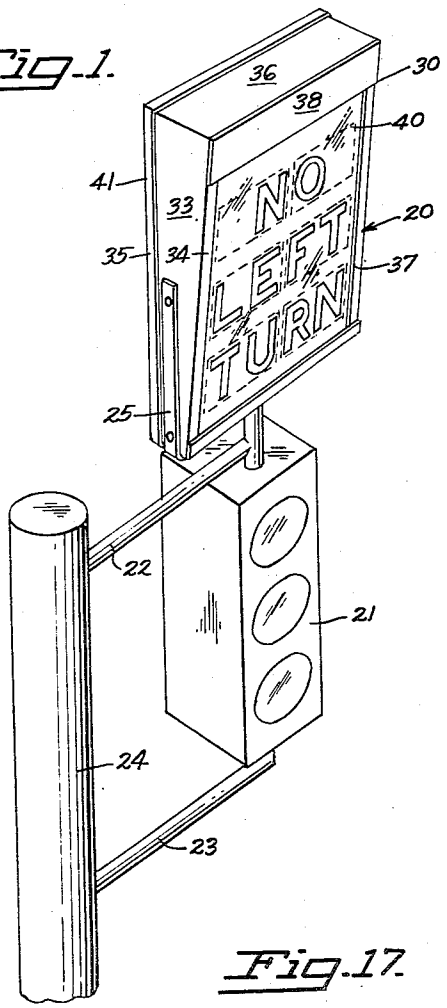


Fig. 2.

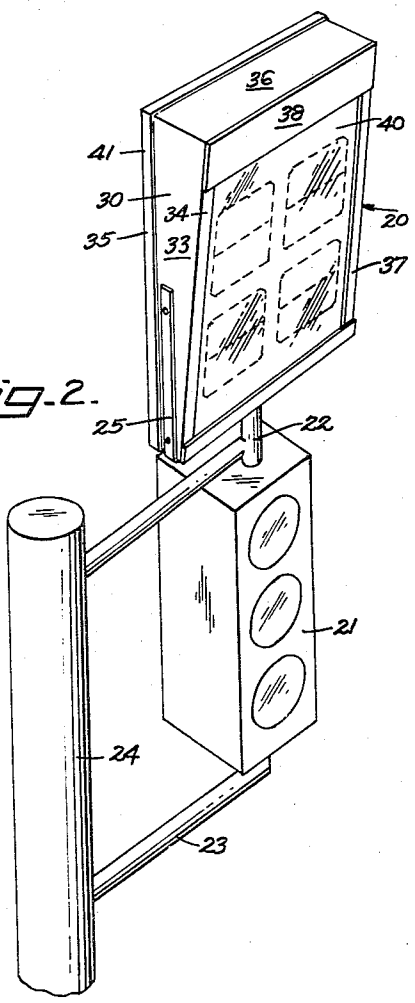
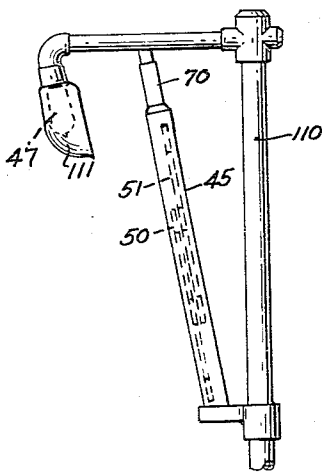


Fig. 17.



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TRAFFIC CONTROL SIGN

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Fig. 3.

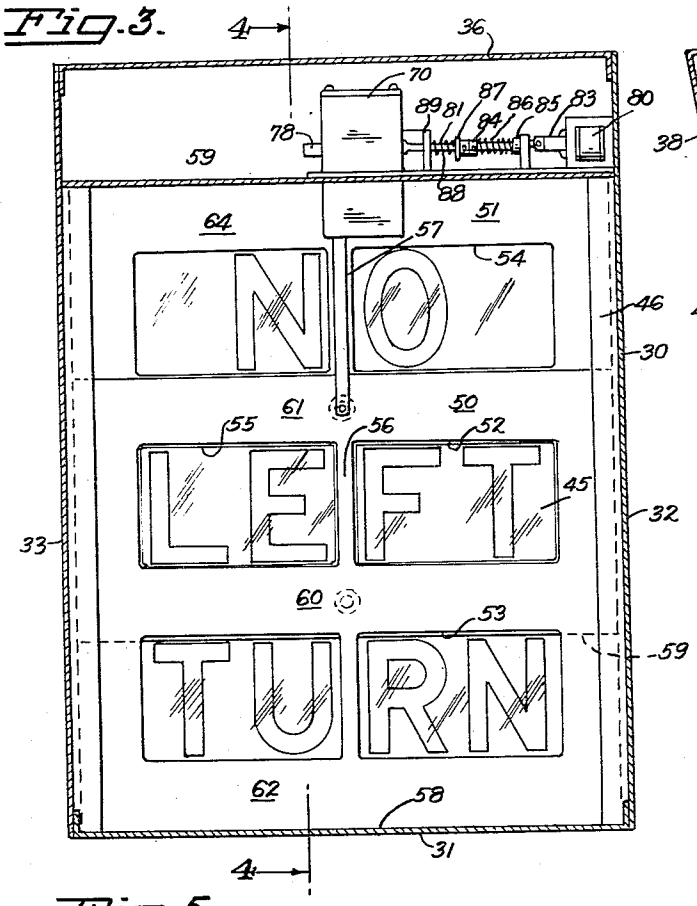


Fig. 4.

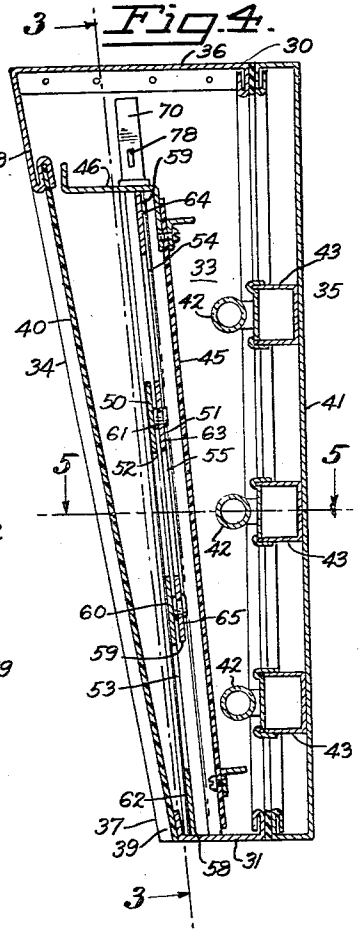


Fig. 5.

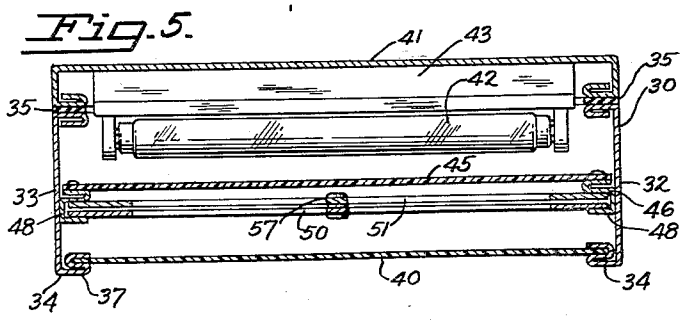
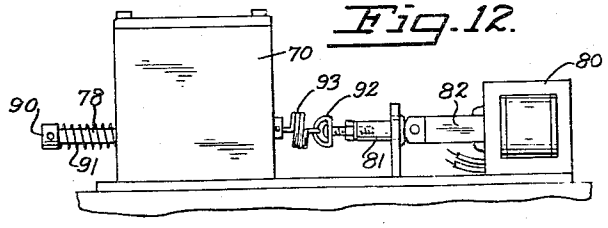


Fig. 12.



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TRAFFIC CONTROL SIGN

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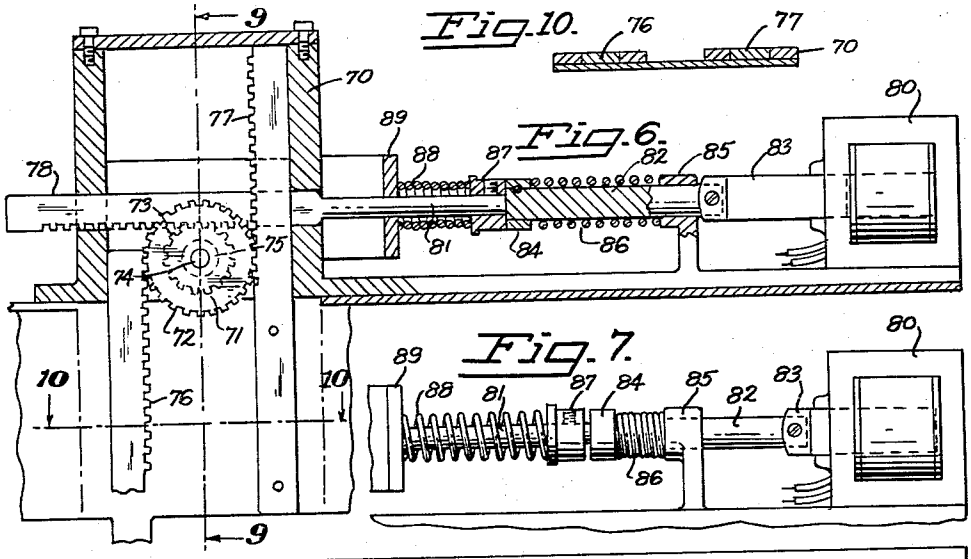

Fig. 10.

Fig. 6.

Fig. 7.

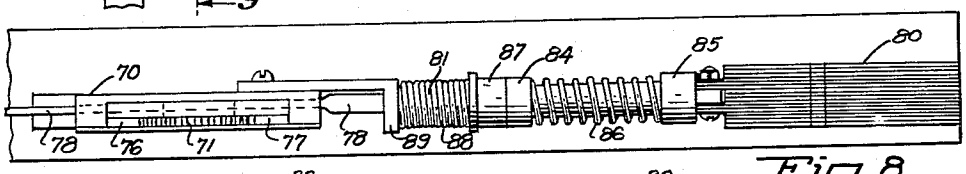

Fig. 8.

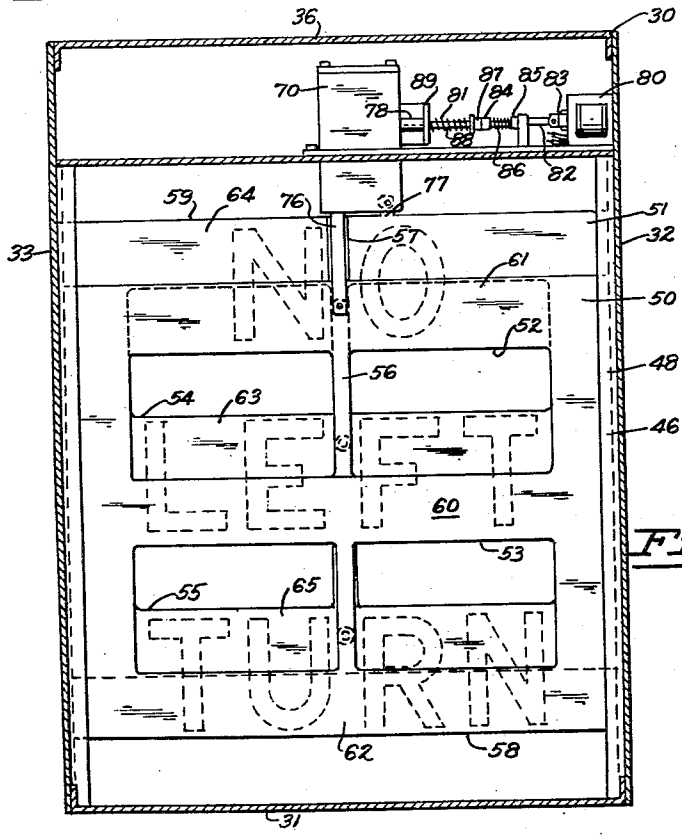

Fig. 11.

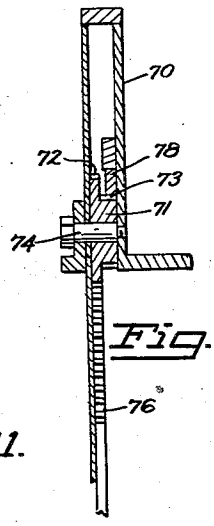

Fig. 9.

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Fig. 13.

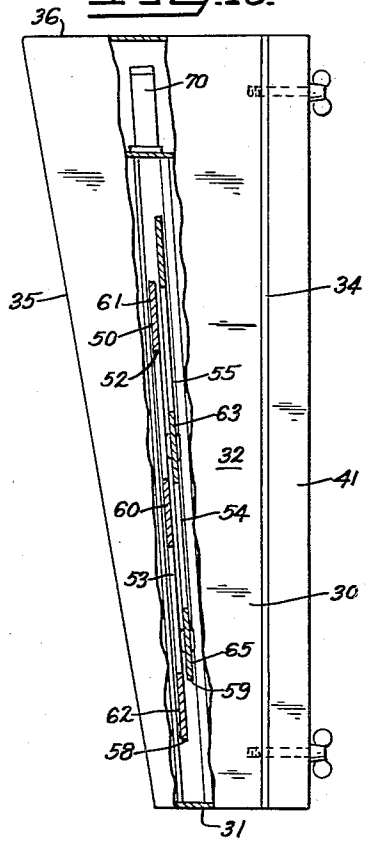


Fig. 14.

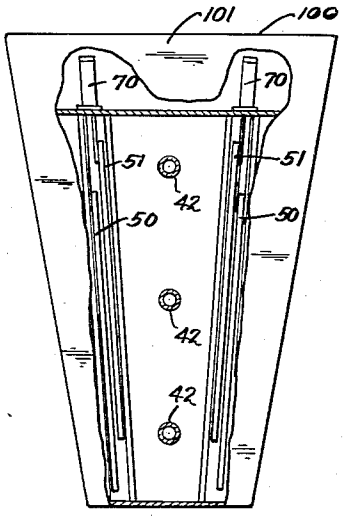


Fig. 15.

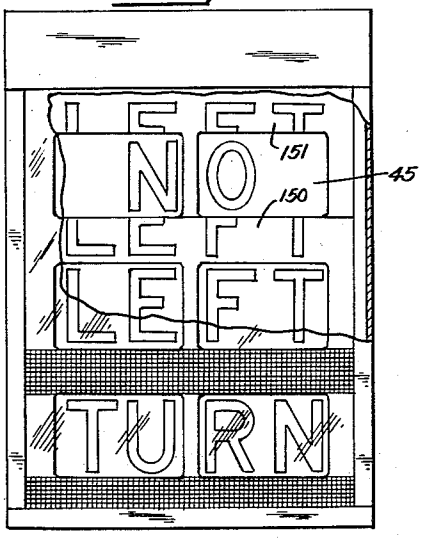
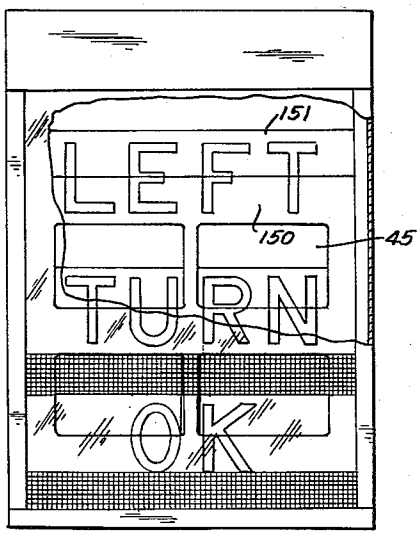


Fig. 16.



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TRAFFIC CONTROL SIGN

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Application August 19, 1955, Serial No. 529,515

9 Claims. (Cl. 340—84)

This invention relates to an improved traffic control sign.

At rush hours when traffic is at a peak, it is often desirable to impose traffic regulations that are different from those obtaining when there is less traffic. For example, on some streets, usually at intersections, it is necessary to forbid left turns during peak hours; yet, during off-peak hours it may be desirable to permit left turns. Obviously, it requires considerable personnel to change the left-turn rule by setting up and removing a series of signs each time the change is made, which may be several times a day; so there has long been a need for a special type of traffic-control sign that can be changed by remote control.

No sign structure heretofore known has given satisfactory results as a traffic changeover sign. For example, some cities have used neon signs with the glass tubing positioned in front of a dark background. During the peak hours the lighted signs display the legend "No Left Turn" (or whatever specal rule is to be in force); when the peak hours have passed, the signs are turned off. When the sign was lighted, the legend was easily read, provided that it was equipped with visors to reduce sun wash-out. The trouble was that when the sign was not lighted, the glass tubing or its shadow was still visible, and the legend stood out clearly under certain light conditions; so motorists became confused and doubtful whether they could turn left or not. This doubt caused hesitation and has led to accidents. In other words, one trouble with prior art signs has been that the legend was not fully obscured during off-peak hours. The present invention solves this problem by providing a sign in which the legend is fully obscured when the rule is not in force.

Another problem common to prior art signs was that the peak-hour legend was always off during power or circuit failures. Referring for example to the neon signs, which represented the most advanced state of the prior art, the neon sign would not be lighted during a power failure; so, where a neon sign said "No Left Turn" at peak hours and was unlighted at other times, a power failure during rush hours caused the traffic to become snarled, and it sometimes took a great deal of effort by many policemen to straighten out the result of a few minutes of power failure. The present invention has solved this problem by displaying the peak-hour legend if the power fails. Thus, under the conditions related above, the present invention would indicate "No Left Turn" during a power failure or local circuit interruption.

This is the correct legend for peak-hour traffic, and if it happens to be displayed during off-peak hours (due to a power failure), the traffic is subjected to only a minor annoyance, while the disappearance of "No Left Turn" during peak traffic can cause a major problem.

In cities where power failures are a negligible hazard, power can be saved by reversing the wiring of the sign of the present invention and using it in the opposite manner.

Traffic control signs heretofore in use have also suffered from poor visibility. In many signs the legend has been partly obscured by reflected light on the sign or on a front panel of glass or plastic sheet that protects the sign. Also, signs placed high above the road have been awkward to read because the automobile drivers are well below the sign. The present invention has solved these problems by positioning the sign at a downward tilt and by tilting the window which keeps the sign dust-proof at a different angle. Not only is the maximum visibility assured, but reflection is eliminated, and the sign and window are protected to a great extent from the obscuring effects of rain and dust.

Other problems have been solved by this invention. It provides a very dependable operating mechanism, characterized by its simplicity and by the fool-proof nature of its construction, by its ability to operate over long periods of time without maintenance, and by a structure which eliminates disruptive forces that would tend to damage the apparatus.

As has been implied, the objects of the invention are the solution of the problems discussed above, and it has solved them by providing a new type of shutter-controlled sign. In the preferred form, when the power is on, the shutter is closed and completely covers the sign, the shutter being moved by a solenoid operating through a novel rack-and-pinion system. Whenever the power is off, the solenoid is de-energized and the shutter is open.

Other objects and advantages of my new device will appear from the following description of a preferred embodiment thereof, presented in accordance with 35 U. S. C. 112.

In the drawings:

Fig. 1 is a view in perspective of a traffic control sign embodying the principles of my invention, shown installed above a traffic signal. The shutter is in open position, disclosing a legend.

Fig. 2 is a view similar to Fig. 1 showing the shutter in closed position with the legend obscured.

Fig. 3 is a view in front elevation and partly in section taken along the line 3—3 in Fig. 4, the shutters being open.

Fig. 4 is a view in side elevation and in section taken along the line 4—4 in Fig. 3.

Fig. 5 is a view in section taken along the line 5—5 in Fig. 4.

Fig. 6 is a fragmentary view in front elevation and partly in section of the shutter-operating mechanism, shown in its normal, unenergized, shutter-open position.

Fig. 7 is a view in elevation of the right-hand portion of Fig. 6, shown in its energized, shutter-closed position.

Fig. 8 is a plan view of the portions shown in Fig. 6.

Fig. 9 is a view in section taken along the line 9—9 in Fig. 6.

Fig. 10 is a view in section taken along the line 10—10 in Fig. 6.

Fig. 11 is a view similar to Fig. 3, but with the shutters closed.

Fig. 12 is a view in elevation of a modified form of shutter-operating mechanism.

Fig. 13 is a view similar to Fig. 4, but showing the device in its shutters-closed position, as in Fig. 11.

Fig. 14 is a view in side elevation and partly in section of a modified form of device in which two devices like the one of Fig. 1 are disposed back to back in the same housing.

Fig. 15 is a view in front elevation, partly cut away, of a modified form of the invention in which there are two alternative legends, one of which shows when the shutters are closed, the other of which shows when the shutters are open. The device is here shown in its shutters-open position.

Fig. 16 is a view in front elevation of the device shown in Fig. 15, with the shutters open.

Fig. 17 is a view in side elevation of another modified form of invention having a different type of lighting arrangement.

Fig. 1 shows how a traffic control sign 20, embodying the present invention may be mounted atop a traffic signal 21 so as to show its legend during peak hours, and Fig. 2 shows how the sign appears with the legend obscured at other times. By way of example, the legend shown is "No Left Turn," although any other legend may be used. In these drawings the sign 20 is mounted on a T-bracket 22 which helps to support the traffic signal 21, along with another bracket 23, both brackets 22 and 23 being secured to a vertical standard 24. Increased stability is given the sign by a U-bracket 25 which is secured to the T-bracket 22 and is riveted or bolted to the sign 20. Other arrangements may, of course, be employed; for example, where the traffic signal 21 is suspended in the center of a street over an intersection, the sign 20 may be placed beside the signal 21 instead of above it. The sign 20 may, of course, also be used where there is no traffic signal and may be used for other purposes than traffic control.

The sign 20 includes a case 30, preferably made out of aluminum or other rigid material. As shown in Figs. 1 to 5, the case 30 is boxlike but is generally trapezoidal as seen in vertical section. It has a relatively narrow imperforate base 31 with closed trapezoidal side plates 32 and 33 which inclined front edges 34 and vertical rear edges 35. The case 30 has an imperforate top plate 36, and its front face 37 comprises an open four-margined frame with a depending flange 38 at its upper end, which serves to cover the shutter-operating mechanism inside the case 30.

The metal frame 37 holds a window 40, preferably of clear plastic, in a tilted position, as shown, at an angle of about 10° from the vertical. This mounting angle eliminates reflection of light into the motorists' eyes. It also helps to protect the window 40 from accumulation of dust and protects it from rain.

The vertical rear end of the case 30 is preferably closed by a hinged closed door 41, through which access may be had to the interior of the case. The sign may be illuminated from behind by fluorescent bulbs 42 supported in the door 41 on brackets 43 or on a unitary rack for easy replacement, or the sign may be front-lighted, as in Fig. 17, depending on the location and use of the sign. Any type of lamp may be used, including the cold-cathode type, and the lamps may be tubular or scrolled.

The legend (e. g., "No Left Turn") is borne on a panel 45, which preferably is of translucent plastic, such as Lucite, with the background blacked out by paint or otherwise. The panel 45 is supported in a stationary position by an interior frame 46, which is supported in the case 30, as by suitable brackets. The sign 45 may be either back-lighted by the bulbs 42, or front-lighted by ambient light or exteriorly mounted bulbs 47 as in Fig. 17. In this latter arrangement an interior light base is not required. It will be clearly visible because the Lucite will pick up light, and the legend will therefore stand out clearly against the dark background. The frame 46 is provided with channeled sides 48, to the back of which the panel 45 may be bolted and within which are mounted a pair of shutters 50 and 51, in front of the sign panel 45.

The lower end of the frame 46 lies adjacent the front window 40 and the frame 46 is tilted so that the panel 45 is held at about the angle of 5° to the vertical, being thereby spaced away from the window 40 at its upper end. This has many advantages. It gives the proper angle of vision, eliminates secondary reflection from the Lucite, and prevents the outer window 40, if made from plastic, from being forced in by wind against the shutters 50, 51.

Each shutter 50 or 51 may comprise a light-weight sheet of plastic or aluminum cut out to provide a plurality of openings, or may be assembled from strips spaced to provide the openings, the number of openings depending on the number of lines taken up by the legend. Where a three-line legend is employed, as shown in the drawings, the front shutter 50 has two openings 52 and 53, and the rear shutter 51 likewise has two openings 54 and 55. Each opening 52, 53, 54, and 55 may be divided by one or more vertical stabilizing members 56, 57 preferably integral with the shutter sheet.

One shutter (in this instance, by way of example, the front shutter 50) is normally positioned so that its lower edge 58 rests on or adjacent the bottom edge of the frame channel 48 when the shutter 50 is in its normal, open position. The other shutter 51 is positioned so that in its open position its upper edge 59 lies against or adjacent the upper edge of the frame channel 48.

The front shutter openings 52 and 53 are separated by a horizontal opaque strip 60 approximately half as high as either opening 52 or 53. Its upper and lower margins 61 and 62 are the same height as the strip 60. Similarly the rear shutter openings 54 and 55 are separated by an opaque strip 63 the same height as the strip 60 and are bounded by upper and lower margins 64 and 65 of the same height. All these strips and margins may be integral portions of the shutter sheets or may be assembled from strips fastened together. The legend on the panel 45 is spaced on lines that properly register with these shutters.

When the shutters 50 and 51 are in open position (see Figs. 3 and 4) the upper margin 61 of the front shutter 50 overlies the center strip 63 of the rear shutter 51; and the center strip 60 of the front shutter 50 overlies the lower margin 65 of the rear shutter 51. Thus, the legend is visible; in the example, the word "No" in the illustrated sign is visible through the opening 54 in the rear shutter 51, between the upper margin 64 of the rear shutter 51 and the superimposed upper margin 61 of the front shutter 50 and the rear center strip 63. Similarly, the word "Left" is visible through the aligned openings 52 and 55; and the word "Turn" is visible through the opening 53 and the space below the lower edge of the rear shutter 51.

The panel 45 is obscured by raising the front shutter 50 an amount equal to the height of the margins 61 and 62 and strip 60 and by simultaneously lowering the rear shutter 51 the same amount. Then the legend "No" is covered (see Figs. 11 and 13) by the rear upper margin 64 and front upper margin 61; the legend "Left" is covered by the center strips 63 and 60; and the legend "Turn" is covered by the lower margins 65 and 62. Being completely obscured, the legend will not cause anyone to hesitate or otherwise affect traffic.

The shutter-operating mechanism is mounted on top of the frame 46 and may also be secured to the case 30. It comprises a novel, solenoid-operated, rack-and-pinion device. A stationary gear housing 70 may be secured to the upper face of the frame 46. Inside the housing 70 a pinion 71, having two substantially concentric pinion gear trains 72 and 73, is mounted for rotation on a stub shaft 74. A bearing washer 75 may be employed to give adequate clearance from the sides of the housing 70. The outer gear train 72 of the pinion 71 engages a pair of racks 76, 77, which are diametrically opposite each other and extend vertically down into the frame 46. One rack 76 is attached to the front shutter 50, while the other rack 77 is secured to the rear shutter. Rotation of the pinion 71 causes the two racks 76, 77 to move in directly opposite directions, so that when one rack 76 moves up, the other rack 77 moves down, and vice versa. Thus, when the front shutter 50 is raised, the pre-determined

distance, the rear shutter **51** is lowered precisely the same distance and vice versa.

The inner gear train **73** of the pinion **71** is mounted for engagement with a horizontally moving rack **78**, whose back and forth movement causes the vertical racks **76, 77** to move up and down. The rack **78** is moved by a solenoid **80**, through a novel spring-cushioning arrangement. When the solenoid **80** is energized, the rack **78** moves to the right, from its Figs. 6 and 8 position to its Fig. 7 position, and when the solenoid **80** is de-energized, the rack **78** moves tothe left from its Fig. 7 position to its Figs. 6 and 8 position. When the rack **78** moves to the right (solenoid **80** energized) the shutters are closed, because the vertical racks **76** and **77** move the front shutter **50** up and moves the rear shutter **51** down. When the rack **78** moves to the left (because of the de-energization of the solenoid **80**) the vertical racks **76** and **77** move in the opposite direction and open the shutters **50, 51**. Thus the shutters will normally be in open position, and if the power fails, they will move to that position.

Solenoids move too quickly for a direct connection to be practicable. For the protection of the apparatus, and to make it foolproof, an indirect connection is employed. Integral with the rack **78** is a rod **81** which in its Fig. 6 position extends into abutment against a rod **82** that is part of the solenoid core **83**. The solenoid rod **82** has a collar **84** at its outer end and there is a stationary collar **85** on a bracket adjacent the inner end of the rod **82**, between which collars **84** and **85** a spring **86** is compressed by movement of the core **83** when the solenoid **80** is energized. This spring **86** thus always tends to urge the solenoid core **83** out of the solenoid **80** and pulls the core **83** out from the solenoid when the solenoid **80** is de-energized, from whatever cause, thereby moving the rod **82** and impelling the rack **78** to the left.

The rack rod **81** is also provided with a collar **87** at its outer end, and compresses a spring **88** between it and a bearing member **89**. If there were no spring **88**, the rod **81** would simply remain in its outer position, and the rack **78** would not move. However, the spring **88** forces the rod **81** to follow the solenoid rod **82** when it is pulled in, the structure constituting a lost motion connection. Thus the solenoid core **83** is pulled sharply in, against the pressure of the spring **86**, while the spring **88** causes the rod **81** and rack **78** to move less abruptly and catch up with the solenoid rod **82**.

In operation, the energization of the solenoid **80** pulls the core **83** in, compressing the primary spring **86**. The secondary spring **88** being previously compressed, pushes the rack **78** to the right until the rod **81** catches up with the solenoid rod **82**. In doing this, the spring **88** causes the rack **78** to move across the small gear train **73** of the pinion **71**, rotating the pinion **71** so that the racks **76** and **77** are moved, one up and the other down, thereby closing the shutters **50, 51**. When the solenoid **80** is de-energized, the two springs **86** and **88** act together to move the rack **78** into the position where the shutters **50** and **51** are in open position.

An alternative form of shutter-actuating mechanism is shown in Fig. 12. The primary difference over the form discussed before is the provision of a collar **90** on the rack **78** on the opposite side of the housing **70** from the solenoid **80**. Between the housing **70** and the collar **90** a spring **91** is compressed. The opposite side of the rack **78** extends through the housing **70** and is connected to an anchor member **92**, through a spring **93**, under tension. Actuation of the solenoid **80** pulls in its core **82**, which stretches out the spring **93**. The spring **93** is more powerful than the spring **91**, so the rack **78** moves to the right causing simultaneous compression of the spring **91**. De-energization of the solenoid **80** permits the springs **93** and **91** to relax and thereby restore the rack **78** to the position shown in Fig. 12.

The invention is capable of many uses and of variations. For example, it may be desirable to have the shutters themselves serve as a sign to indicate an alternative action, so that when the shutter is open, the sign might read "No Left Turn" and when the shutter is closed, it might read "Left Turn OK." How this may be achieved is shown in Figs. 15 and 16 where the rear shutter **151** bears the upper half of the words on its margins and center strip, the front shutter **150** bears the remaining half, and the window **140** has blacked-out areas **141** between the space where the letters are to show. The areas **141** hide the words on the shutters **150, 151** when they are open. When the shutters **150, 151** come together in the closed position, the words appear.

Another modified form of the invention is shown in Fig. 14. The sign **100** in effect comprises two signs like the sign **20** placed back to back so that they can be read from both directions. Numbers placed on this drawing indicate parts corresponding to those in the sign **20**. The case **101** is like a combination of the two cases **30** back to back. The two sets of shutters **50, 51** require separate solenoids **80** and gear housing **70** for their operation, if direct action is to be obtained. By using gearing or other transfer means, a single solenoid could do the work, but the structure shown gives less wear and better results, and the solenoids and gear actuating mechanisms are relatively inexpensive. The sign of Fig. 14 can therefore be installed at the center of an intersection over the traffic and can be read by traffic in both directions. The two solenoids **80** may be operated separately to give different results, or they may be wired to a single remote control wire and thereby be actuated simultaneously at all times.

Another modification is shown in Fig. 17 where a bracket **110** supports the panel **45**, shutters **50** and **51**, and their actuating mechanism, including the solenoid **80** and gear housing **70** without using the case **30** or the panel **40** or any back lighting. The light is provided by a lamp bulb **47** mounted in a reflector **111** in front of the sign. This structure is relatively inexpensive and has wide application. However, for the most important intersections and other danger points, it is advisable to use the preferred construction already described.

To those skilled in the art to which this invention relates, many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the spirit and scope of the invention. The disclosures and the description herein are purely illustrative and are not intended to be in any sense limiting.

I claim:

1. A traffic control sign, including in combination a stationary panel having a legend thereon; a pair of shutters movable in opposite directions between two positions, in one of which said legend is obscured, in the other of which said legend is visible through said shutters; a pair of racks, one connected to each said shutter for moving it; a pinion having a first gear train in mesh with both said racks, said racks being on opposite sides of said pinion so that rotation of said pinion moves said racks in opposite directions, said pinion also having a second gear train coaxial with said first gear train; a third rack in engagement with said second gear train; a solenoid, having a movable core; and spring means connecting said solenoid core to said rack, for operation of said shutter by energization and de-energization of said solenoid.

2. A traffic control sign, including in combination a stationary panel having a legend thereon; a pair of shutters movable in opposite directions between two positions, in one of which said legend is obscured, in the other of which said legend is visible through said shutters; a pair of racks, one connected to each said shutter for moving it; a gear frame; a pinion rotatably supported by said gear frame and having a first gear train in mesh with both said racks, said racks being on opposite sides of said pinion so that rotation of said pinion moves said

racks in opposite directions, said pinion also having a second gear train coaxial with said first gear train; a third rack in engagement with said second gear train; a solenoid, having a movable core; a spring under compression between said third rack and said gear frame; and a spring under tension means connecting said solenoid core to said rack, for operation of said shutter by energization and de-energization of said solenoid.

3. A traffic control sign, including in combination a stationary panel having a legend thereon; a pair of shutters movable in opposite directions between two positions, in one of which said legend is obscured, in the other of which said legend is visible through said shutters; a pair of racks, one connected to each said shutter for moving it; a gear housing; a pinion supported by said housing having a first gear train in mesh with both said racks, said racks being on opposite sides of said pinion so that rotation of said pinion moves said racks in opposite directions, said pinion also having a second gear train coaxial with said first gear train; a third rack in engagement with said second gear train; a spring under compression between said third rack and said gear housing; a solenoid, having a movable core in line with and ordinarily abutting said rack; spring means urging said solenoid core out of said solenoid and into operative engagement with said rack, for operation of said shutter by energization and de-energization of said solenoid.

4. A traffic signal of the hidden message type, including in combination: a stationary panel bearing a traffic control sign with a message disposed on several lines thereof; a pair of shutters in front of said panel, generally parallel to it and to each other, each said shutter having a plurality of vertically disposed rectangular windows therethrough, each window extending substantially the width of said sign and each window being spaced vertically from the next adjacent window by an opaque portion, the top and bottom said windows of each shutter having marginal opaque portions respectively above and below them terminating with upper and lower edges, respectively. said pair of shutters being mounted for sliding movement between a sign-disclosing position and a sign-obscuring position, the upper edge of one shutter lying, in the sign-disclosing position, substantially level with the lower edge of the top window of the second shutter with the top line of said sign visible through said top window, and, in the sign-covering position, substantially level with the upper edge of said window, by virtue of the movements of said shutters in opposite directions so that the top marginal opaque portions of said two shutters cooperate to cover said top line, the lower edge of said second shutter similarly lying, in the sign-disclosing position, substantially level with the upper edge of said bottom window of said first shutter and, in sign-covering position, substantially flush with the lower edge of said bottom window, and the upper edges of each other said window of said first shutter lying substantially flush with the upper edge of a window of said second shutter, in sign-disclosing position, and flush with the lower edge of said last-named window in sign-covering position, so that said sign is completely obscured in the sign-covering position and is visible through the registering of said windows in said sign-disclosing position; and unitary means for moving said shutters in opposite directions at all times between their two positions.

5. The signal of claim 4 wherein said opaque portions between windows and said marginal opaque portions are each half the height of each said window.

6. The signal of claim 5 wherein said opaque portions bear a legend that covers said sign when said shutters are in sign-covering position.

7. A traffic signal, including in combination: a closed housing having a transparent front window tilted at an angle of about 10° to the vertical; a stationary panel supported in said housing behind said window at an angle of about 5° of the vertical and bearing a traffic control sign; a pair of shutters slidably supported in said housing between said window and said panel, generally parallel to said panel and to each other, said shutters each having generally rectangular openings therethrough bounded by and separated by opaque portions mounted for sliding movement in their own planes between a first position where the opaque portions of said shutters cover said openings so that said sign is completely obscured, and a second, sign-disclosing, position reached from said first position by both said shutters moving in opposite directions so that said openings register over said sign; and unitary means for simultaneously moving both said shutters in opposite directions between their two positions.

8. The signal of claim 7 wherein said transparent window has blacked-out portions covering the shutter opaque portions when said shutter is open and wherein said opaque portions bear a second legend, the words of which are split by a horizontal line with the upper half on one shutter and the lower half on another shutter, so that when said shutters are closed, said second legend shows.

9. The signal of claim 7 wherein there are: a pair of racks, one connected to each said shutter for moving it; a pinion having a first gear train in mesh with both said racks, said racks being on opposite sides of said pinion so that rotation of said pinion moves said racks in opposite directions, said pinion also having a second gear train coaxial with said first gear train; a third rack in engagement with said second gear train; a solenoid, having a movable core; and spring means connecting said solenoid core to said rack, for operation of said shutter by energization and de-energization of said solenoid.

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