June 12, 1923.

1,458,840

J. N. MONTGOMERY ET AL

SIGNAL

Filed Jan. 23, 1922

3 Sheets-Sheet 1

Fig. 1.

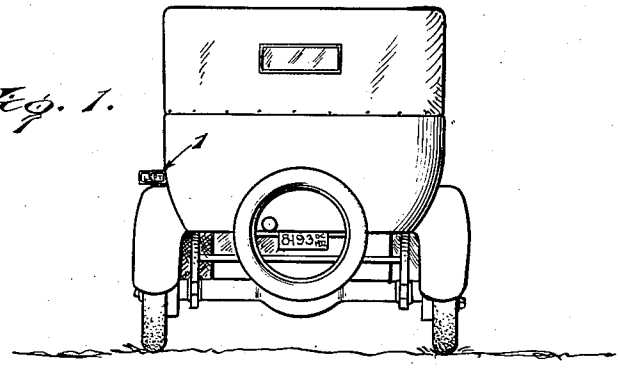


Fig. 2.

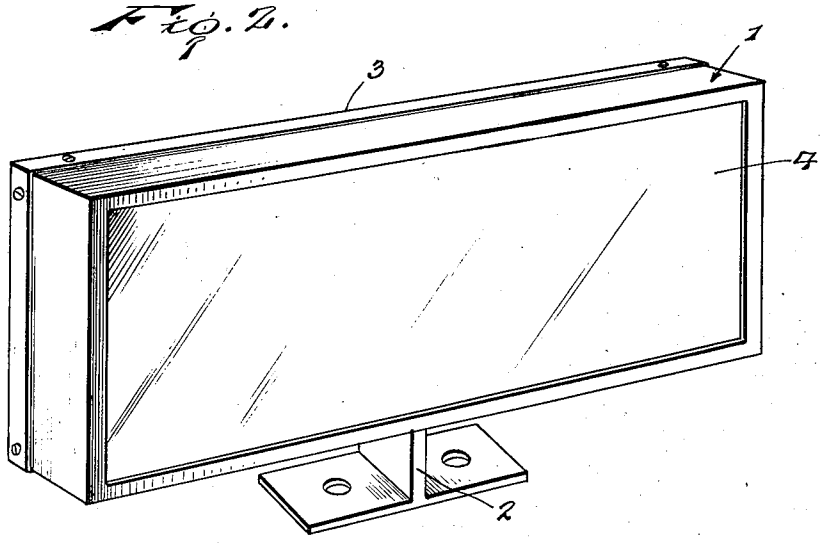
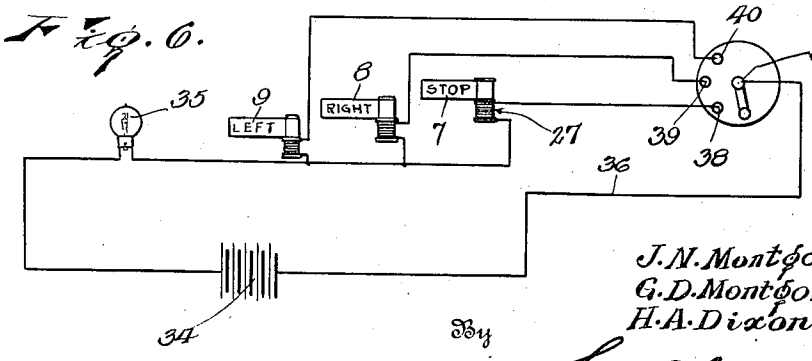


Fig. 6.



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Filed Jan. 23, 1922 3 Sheets-Sheet 2

Fig. 3.

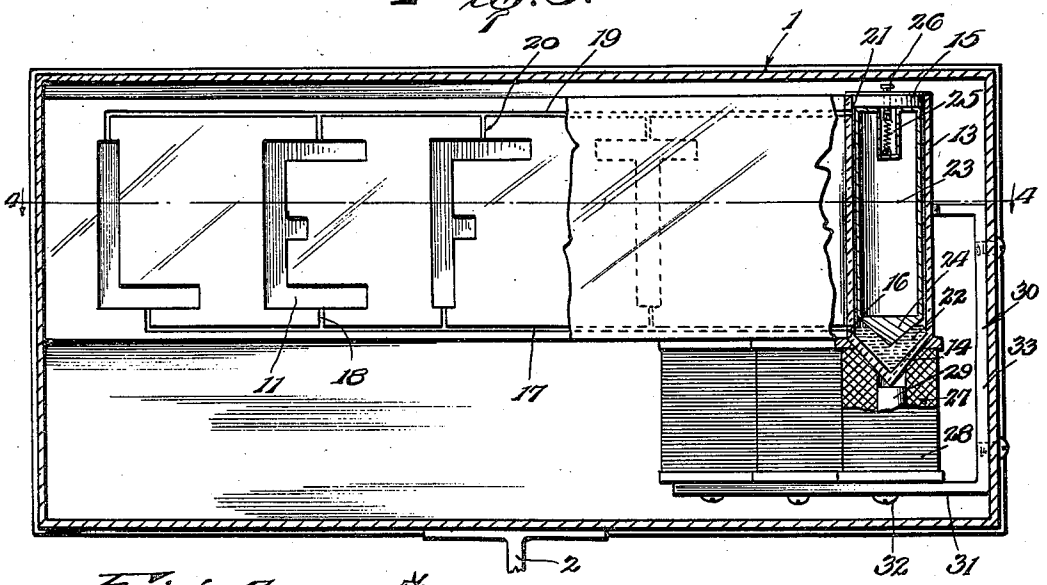


Fig. 4.

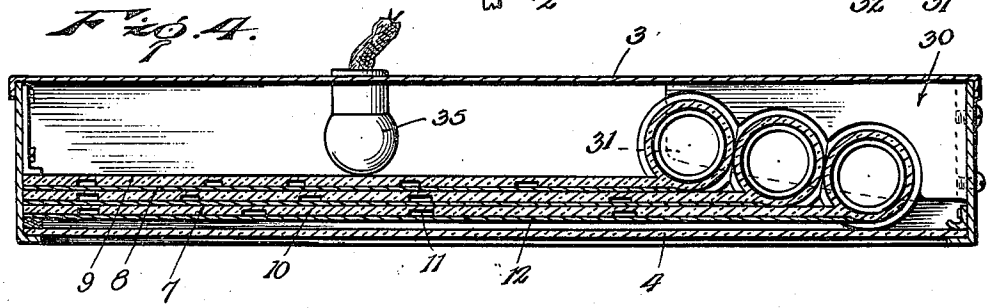
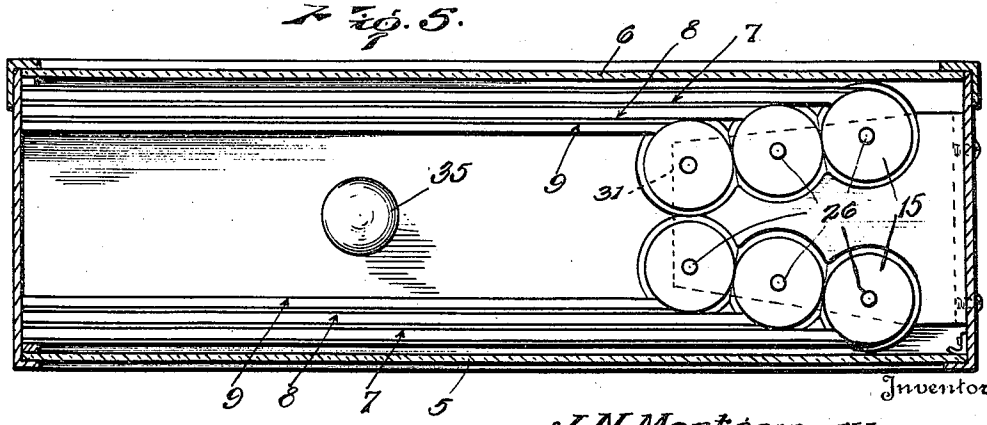


Fig. 5.



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Filed Jan. 23, 1922 3 Sheets-Sheet 3

Fig. 7.

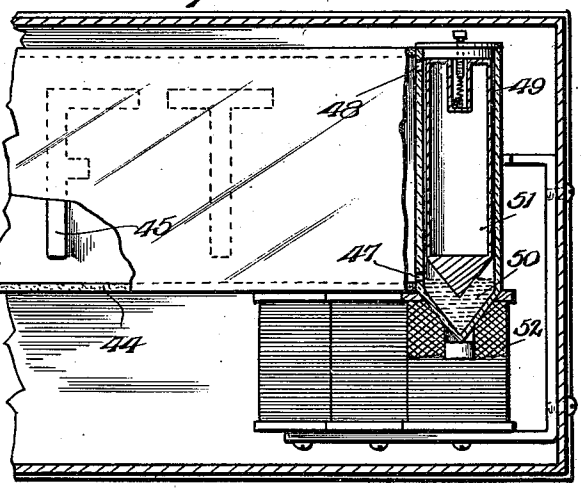


Fig. 8.

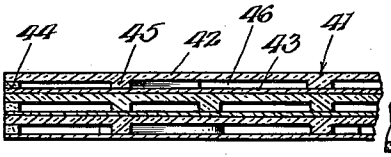
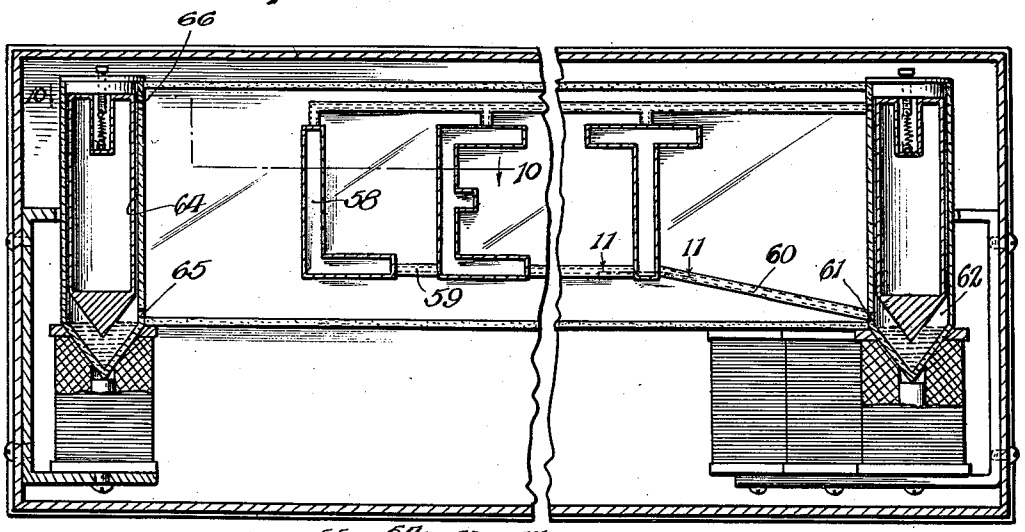


Fig. 9.



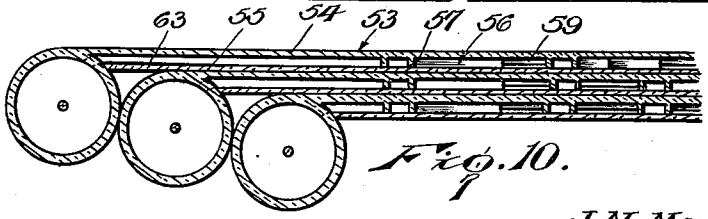
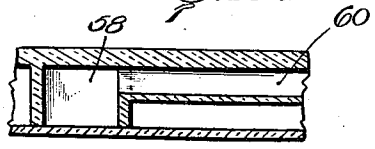


Fig. 10.

Fig. 11.



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UNITED STATES PATENT OFFICE.

JOHN N. MONTGOMERY, GEORGE D. MONTGOMERY, AND HERBERT A. DIXON, OF WASHINGTON, DISTRICT OF COLUMBIA.

SIGNAL.

Application filed January 23, 1922. Serial No. 531,250.

To all whom it may concern:

Be it known that we, JOHN N. MONTGOMERY, GEORGE D. MONTGOMERY, and HERBERT A. DIXON, citizens of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Signals, of which the following is a specification.

This invention relates to improvements in signs, and while the invention is capable of general application and the principles thereof may find embodiment in signs of various characters, the invention is designed primarily for use as a warning signal for automobiles to indicate to others when the driver of the machine intends to stop, or to turn to the right or to the left.

One of the primary objects of the invention is to provide a sign or signal in which a plurality of sign plates may be arranged in overlapped relation and their related sign characters selectively displayed without any likelihood of confusion of the characters upon the several plates notwithstanding the overlapped relation of the plates.

The present invention contemplates the employment of a sign plate in which the sign characters are defined by closed channels into which a liquid may be caused to flow so as to display the said characters, and it is another important object of the invention to provide a novel and highly efficient means for causing the liquid employed to flow into the channels to display the sign characters, and after they have been displayed for the desired period of time, exhausted therefrom.

A further object of the invention is to provide electro-magnetic means for actuating the plungers which are to displace the liquid and cause the same to flow into the sign character channels, so that the supplying of liquid to the said channels may be controlled through the medium of a gang switch or some other simple, inexpensive, and readily operable circuit closing device thus eliminating the necessity of employing mechanical contrivances for controlling the liquid flow.

In the accompanying drawings:

Figure 1 is a view illustrating the application of the invention to an automobile;

Figure 2 is a perspective view of the device removed from the machine;

Figure 3 is a vertical longitudinal sectional view through the device;

Figure 4 is a horizontal sectional view taken substantially on the line 4—4 of Figure 3;

Figure 5 is a similar view illustrating a modification of the invention;

Figure 6 is a diagrammatic view illustrating the wiring;

Figure 7 is a view similar to Figure 3 illustrating a modified form of sign plate;

Figure 8 is a horizontal sectional view through the sign plate shown in Figure 7;

Figure 9 is a view similar to Figure 3 illustrating a further modification of the invention;

Figure 10 is a longitudinal sectional view taken substantially on the line 10—10 of Figure 9; and

Figure 11 is a detail sectional view taken substantially on the line 11—11 of Figure 9.

The component parts of the sign or signal embodying the invention may be arranged within any suitable form of casing which is indicated in general by the numeral 1 and may be of the rectangular form illustrated in the drawings or of any other desired shape. This casing is preferably provided with a bracket 2 whereby it may be attached to some convenient part of the automobile upon which the sign is to be used, as for example upon the left rear fender. Also the casing may be arranged to display the sign plates in one direction only as for example toward the rear of the machine as shown in Figure 4 or it may be arranged to simultaneously display two similar sign plates both toward the front and rear. In the former instance the casing 1 will be provided with a back 3 and in its front with a pane 4 of transparent or translucent glass or other suitable material. In the latter instance panes 5 and 6, corresponding in function to the pane 4, will be arranged respectively within the front and back of the casing as shown in Figure 5.

In carrying out the invention and in the particular embodiment illustrated in Figures 1 to 4 inclusive, three component sign plates are provided and are indicated in general by the numerals 7, 8 and 9. Each of these plates comprises a pane 10 of glass, celluloid, or any other material found suitable for the purpose and either transparent,

frosted, or translucent. This plate has pressed or moulded in one of its faces channels 11 defining the sign characters, and each plate further includes a pane 12 also of glass, celluloid, or other suitable material and either transparent or translucent, which is disposed over the said face of the pane 10 and cemented or otherwise united thereto in a fluid-tight manner thus closing the channels 11 and adapting them to retain a liquid introduced into them. Associated with one end of each of the sign plates 7, 8 and 9 is a cylinder 13 which is provided preferably with a conical closed lower end 14 and with a removable closure 15 at its upper end. A port 16 is formed in the cylinder near the lower end thereof and communicates with a passageway or duct 17 which extends longitudinally beneath the sign characters 11 and is provided with branches 18 communicating with the channels defining these characters as best shown in Figure 3 of the drawings. A similar passageway or duct 19 extends longitudinally above the sign characters and is provided with branches 20 communicating with the channels defining the characters, and this passageway or duct communicates by way of a port 21 with the upper end of the respective cylinder 13. A suitable volume of a liquid 22 is contained within each of the cylinders 13 and may be mercury, or a colored solution of any suitable composition. However mercury is preferable inasmuch as an extremely thin film thereof is opaque, its specific gravity is so high that it will readily exhaust itself from the sign character channels under conditions which will presently be explained, and when pure it will not occasion any deposits on the surfaces of the sign character channels which might occur if an aqueous or alcoholic colored solution were employed. Normally the liquid 22 will assume by gravity a level within each cylinder 13 not higher than the respective passageway 17 and its branches 18, and means is provided for ejecting or partly ejecting the liquid from the casings 13 selectively so as to cause the liquid to flow into the sign character channels 11 and fill the same thus displaying said characters when the sign plates are illuminated. At the time of this admission of the liquid into the sign character channels, the air will be displaced from the channels and will pass by way of the branches 20 and passage 19, into the upper end of the respective cylinder 13. When the liquid is permitted to return by gravity to the cylinder 13 after having been displaced therefrom, it will of course leave the sign character channels 11, and the air which has previously been displaced from these channels will be permitted to return thereto through the passage 19 and branches 20. At this point it may be remarked that if found expedient the air might be exhausted from the sign character channels 11 at the time of manufacture of the device thus avoiding the necessity of providing the passage 19 and branches 20.

In order to provide for the ejection of the liquid from the cylinders 13 selectively, a plunger 23 is slidably and relatively snugly fitted into each cylinder and is preferably provided with a weighted conical lower end 24 the taper of which corresponds substantially to the taper of the bottom 14 of the cylinder. This plunger normally floats upon the body of liquid within the cylinder and is sustained thereby. It will now be evident that downward movement of the plunger 23 of any one of the cylinders will serve to displace the liquid in said cylinder causing it to flow through the respective passage 17 and branches 18 into the sign character channels 11, and while each plunger may be sustained solely by the liquid within the respective cylinder, it may be found desirable to suspend the plungers from springs 25 in turn suspended from adjusting screws 26 fitted through the closures 15 of the respective cylinders so that there will be no tendency for the plungers to work up and down in the cylinders because of jarring of the device, and the action of the plunger will be more positive.

The plunger 23 or at least the weighted lower end 24 thereof is preferably of soft iron and consequently capable of being attracted by an electro-magnet, and in connection with each cylinder 13, at the lower end thereof, there is provided an electro-magnet 27 having the usual winding 28 and core 29 the end of of the core being close to or in contact with the conical bottom 14 of the cylinder and consequently immediately below the lower end of the plunger 23. It will now be evident that when the winding 28 is energized, the plunger 23 will be attracted toward the core 29 of the magnet and in its downward movement within the respective cylinder 13, will displace the liquid 22 contained therein thus forcing this liquid to flow into the sign character channels 11 and fill the same and opaquely defining the said characters.

In supporting the magnets 27, we prefer to make use of soft iron brackets 30 having supporting lower ends 31 to which the lower ends of the magnet cores are secured by screws or other fastening elements 32, and an upstanding portion 33 which extends upwardly beside and substantially parallel to the respective cylinder 13. We have found that by employing a soft iron bracket 30 of the form shown and described, magnetic lines of force will be established therein flowing in a downward direction thus assisting the core 29 of the magnet in attracting

and downwardly moving the plunger 23. Also this enables us to use magnets smaller than would otherwise be required thereby economizing in the consumption of current.

The wiring for the sign is clearly shown in Figure 6 of the drawings and in this Figure the numeral 34 indicates a source of supply which may be the battery of the machine, the numeral 35 a light which is arranged within the sign casing and is in circuit with one terminal of the battery 34. A common return wire 36 leads from the other terminal of the battery to one pole of a switch 37 of any suitable type and embodying contacts 38, 39 and 40 respectively in circuit with the magnets 27 for the sign plates 7, 8 and 9.

From the foregoing description of the invention it will be seen that when the switch is operated to close the circuit through the magnet associated with one or another of the sign plates 7, 8 and 9, that particular magnet will be energized, and the respective plunger 23 will be moved downwardly to displace the liquid contained in the respective cylinder 13 and cause this liquid to flow into and fill the sign character channels thus displaying the sign characters opaquely. Simultaneously the circuit will be closed through the lamp 35 so as to illuminate the sign plates. Inasmuch as the light rays are not intercepted in passing through the sign character channels in two of the plates but are intercepted by the opaque liquid filling the said channels in the third plate, the characters defined by these latter channels will alone be displayed.

In the form of the invention above specifically described the light 35 is preferably arranged upon the back 3 of the casing but in the modified form shown in Figure 5 wherein two sets of the sign plates are employed respectively in back of the panes 5 and 6, the said source of illumination 35 is located within the casing between the two sets of plates.

In the previously described form of the invention the sign characters are defined by channels formed in the face of one of the sign plate sections, all portions of the plate being pervious to light rays so that when an opaque or semiopaque liquid is caused to flow into and fill the channels, the said characters will be more or less opaquely defined upon an illuminated background. However it may be found preferable to display the characters in transparent and illuminated form upon an opaque or substantially opaque background and in such case the structure shown in Figures 7 and 8 is employed. In this form of the invention each sign plate, which is indicated in general by the numeral 41, comprises a transparent or translucent pane 42 and a transparent or translucent pane 43, these panes being disposed face to face and connected at their margins by a sealing medium 44. In this structure the pane 42 has sign characters 45 molded or otherwise provided upon its face which confronts the pane 43, and the faces of these raised characters contact the face of the pane 43 in a fluid-tight manner. Hence except throughout the areas defined by the raised characters 45, the confronting faces of the panes 42 and 43 are held mutually separated so as to provide a closed space 46 placed in communication by ports 47 and 48 respectively with the lower and upper ends of a cylinder 49 which corresponds in every way with the cylinder 13 previously described and which contains a suitable quantity of an opaque or semi-opaque liquid 50 and has working in it a plunger 51 corresponding to the plunger 23 and adapted to be attracted by an electro-magnet 52. In this structure, when the plunger 51 is moved downwardly within the cylinder 49 upon energization of the magnet 52, the liquid 50 will be displaced from the cylinder and passing through the port 47 will enter the closed space 46 in the respective sign plate thus filling said space and rendering the plate opaque or substantially opaque throughout all portions of its area except the portions defined by the sign characters 45. In this case, as in the previously described form, the selection of the liquid or liquids to be employed is a matter of choice. Some opaque liquid such as mercury may be employed in connection with each sign plate, or variously colored liquids or solutions may be employed in connection with said plates. Thus if the signal is to be employed upon an automobile it will preferably embody three sign plates one bearing the word "Stop," another the word "Right," and the third "Left." As red is usually accepted as a danger color, a red liquid or solution may be employed in the cylinder which is associated with the sign plate bearing the word "Stop," and an opaque liquid or liquids or arbitrarily colored liquids or solutions may be employed in the cylinders associated with the two other plates.

In carrying out the invention it might even be desirable to display the sign characters in a distinctive color upon an opaque or substantially opaque background or display these characters opaquely upon a colored background, and where this is desired the modification illustrated in Figures 9, 10, and 11 is employed. In this form of the invention each sign plate which is indicated in general by the numeral 53 comprises a transparent or translucent pane 54 and a transparent or translucent pane 55. The sign characters which are indicated in general by the numeral 56 are defined by outlining flanges 57 formed upon the face of the pane 54 and at their edges contacting the pane 55 in a fluid-tight manner. Thus each sign

character 56 is defined by a closed space 58 bounded by the flanges 57 outlining the respective character. The several characters of each sign plate are placed in communication by small ducts 59, and a similar duct 60 leads from one of the characters to a port 61 in the lower end of the respective liquid cylinder which is indicated by the numeral 62 and which corresponds in every respect and in function to the cylinders previously described, it being understood that when liquid is displaced from any one of the cylinders 62, it will be caused to flow through the duct 60 and the ducts 59 into the closed spaces 58 defining the sign characters of the respective sign plate. Not only do the flanges 57 outline the sign character spaces, but they also serve to mutually space the confronting faces of the panes 54 and 55 so that a closed space 63 is provided within the bounds of which the sign characters are located. Cylinders 64 corresponding to the cylinders 62 are associated with the other ends of the sign plates 53 and have ports 65 and 66 in their lower and upper end portions, these ports communicating with the said closed space 63. When liquid is displaced from any one of the cylinders 64, it will pass through the port 65 into the said closed space 63, and the displaced air will pass into the cylinder from said space through the port 66. In this form of the invention colored liquids or solutions may be selectively employed in the cylinders 64 so as to establish a background of a distinctive color for any one or another of the sign plates, the magnets which are associated with the cylinders 64 being designed to be energized simultaneously with the magnets associated with the cylinders 62. Therefore upon closing of the circuit through the magnets associated with any one or another of the sign plates, a liquid of one color may be discharged into the space 63 to form the background of the sign, and an opaque or semi-opaque liquid or a liquid of another color may be discharged into the sign character spaces 58; or, if desired, an opaque or semi-opaque liquid may be employed in the cylinders 64 so as to establish an opaque or substantially opaque background for each sign plate, and differently colored liquids or solutions capable of permitting the passage of light rays, may be employed in the cylinders 62.

Having thus described the invention what is claimed as new is:

1. In a sign, a sign plate pervious to light rays and having a closed space defining a sign character, a liquid reservoir in communication with said space, a liquid in said reservoir normally standing, by gravity, at a level below the space, a plunger in the reservoir movable to displace the liquid and cause the same to enter and fill the space, the plunger constituting an armature, and an electro-magnet disposed in position to attract said plunger and move the same within the reservoir in a direction to eject the liquid therefrom when the magnet is energized.

2. In a sign, a sign plate pervious to light rays and having a closed space defining a sign character, a liquid reservoir in communication with said space, a liquid in said reservoir normally standing, by gravity, at a level below the space, a plunger in the reservoir movable to displace the liquid and cause the same to enter and fill the space, the plunger constituting an armature, an electro-magnet disposed in position to attract said plunger and move the same within the reservoir in a direction to eject the liquid therefrom when the magnet is energized, and means yieldably resisting movement of the plunger in such direction.

3. In a sign, a sign plate pervious to light rays and having a closed space defining a sign character, a source of illumination in juxtaposition to the plate, a liquid reservoir in communication with the space, a liquid in said reservoir impervious to a degree to the passage of light rays and normally standing, by gravity, at a level below the space, and means for simultaneously effecting displacement of the liquid from the reservoir to cause the same to enter the space and to render the source of illumination active.

4. In a sign, a sign plate pervious to light rays and having a closed space defining a sign character, an electric lamp in juxtaposition to said plate, a liquid reservoir in communication with the space, a liquid in said reservoir impervious to a degree to the passage of light rays, a plunger in said reservoir movable in a direction to displace the liquid and cause the same to enter the space, and an electric controlling circuit embracing the said electric lamp, a circuit closing device, and an electro-magnet for which the plunger constitutes an armature and whereby upon energization of the magnet, the plunger will be moved in the direction stated.

5. In a sign, a plurality of sign plates pervious to light rays and each embodying a closed space defining a sign character, the plates being disposed in overlapping relation, liquid reservoirs individually in communication with the spaces of associated plates, a liquid in each reservoir impervious to a degree to the passage of light rays and normally standing at a level below the space of the respective plate, and means operable to selectively displace the liquid in the reservoirs to cause the same to pass into the space of the respective plates whereby the

sign characters borne by the several plates may be selectively and individually displayed.

6. In a sign, a plurality of sign plates pervious to light rays and each embodying a closed space defining a sign character, the plates being disposed in overlapping relation, liquid reservoirs individually in communication with the spaces of associated plates, a liquid in each reservoir impervious to a degress to the passage of light rays and normally standing at a level below the space of the respective plate, means operable to selectively displace the liquid in the reservoirs to cause the same to pass into the space of the respective plates whereby the sign characters borne by the several plates may be selectively and individually displayed, and a source of illumination in juxtaposition to the plates adapted to be rendered active simultaneously with the displacement of liquid in any of the reservoirs.

7. In a sign, a sign plate pervious to light rays and having a closed space defining a sign character, a reservoir in communication with said space, a liquid within the reservoir normally standing by gravity at a level lower than the space, a plunger in the reservoir movable in a direction to displace the liquid and cause the same to enter the space and define the sign character, the liquid being impervious to a degree to the passage of light rays, the plunger constituting an armature, an electro-magnet arranged in position to attract the plunger when energized and thus effect its movement in the direction stated, and a magnetizable support for the electro-magnet in contact with the core thereof and extending beside the reservoir in substantial parallelism to the plunger.

8. In a sign, a plurality of sign plates pervious to light rays and each embodying a closed space defining a sign character, the plates being disposed in overlapping relation, and means for selectively introducing a liquid into the said spaces.

9. In a sign, a sign plate comprising panes united face to face, one of said panes having sign characters thereon contacting the confronting face of the other pane and mutually separating the said panes whereby to define a closed space surrounding the said character, and means for supplying a liquid to said space impervious to a degree to the passage of light rays.

10. In a sign, a sign plate pervious to light rays and having a closed space defining a sign character and a closed space surrounding the first mentioned space, and means for supplying a liquid of one character to one of said spaces and a liquid of another character to the other space whereby to establish a distinction between the areas defined by the spaces.

In testimony whereof we affix our signatures.

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GEORGE D. MONTGOMERY. [L. S.]
HERBERT A. DIXON. [L. S.]