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SIGNALLING DEVICE INVOLVING PHYSICALLY MOVABLE COMPONENTS

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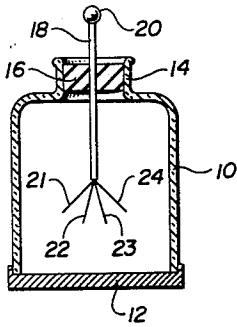


Fig. 1

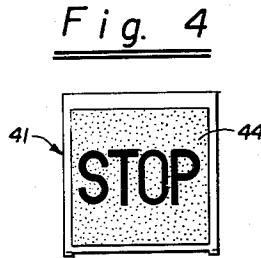


Fig. 4

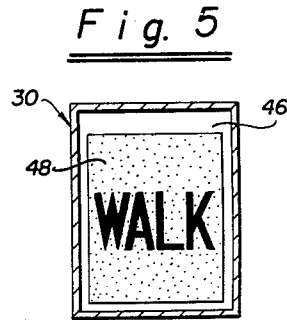


Fig. 5

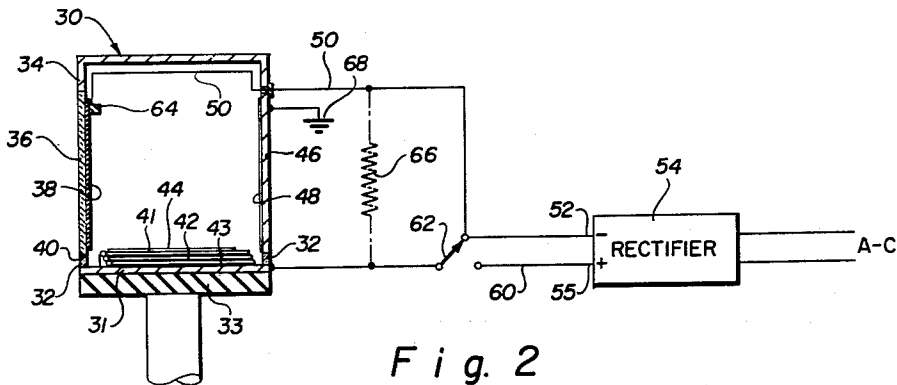


Fig. 2

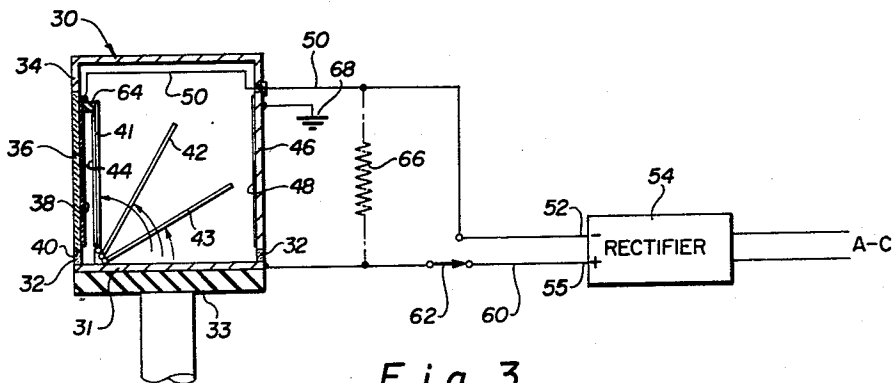


Fig. 3

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4 Claims. (Cl. 340—44)

The present invention relates to signalling devices of the type employing relatively movable components to display, expose or conceal an identifying mark, such as numbers, warning inscriptions, and the like. More particularly the present invention relates to adjustable signalling devices of the type referred to, wherein the relative movement of the sign-displaying and concealing components is accomplished by the repelling and attracting effect of electrostatic charges rather than by the conventional cam-controlled actuating linkages.

Signalling devices of the type to which the present invention relates are described in my U.S. Patent No. 2,912,674 issued November 10, 1959 for an Adjustable Sign. In devices of this type a sheet of conductive material is hingedly connected to and in conductive contact with a stationary plate of conductive material for movement from a position at rest parallel and adjacent to said plate, to an elevated position swung away from said sheet, and such movement is effected by applying an electrical charge jointly to said plate and said sheet, which repels the sheet from the stationary plate and thus swings it into its elevated position in the same manner in which the leaves of an electroscope repel each other and spread apart. In signalling devices of the type disclosed in my above mentioned co-pending application, the described movement of the sheet is employed either to display a sign marked upon the outer surface of the sheet, to expose a sign marked upon the plate and initially covered up by the sheet, or to conceal from view a sign marked on a separate plate located behind the sheet in its elevated position.

It is an object of my invention to provide an improved adjustable signalling device of the type referred to.

More particularly, it is an object of my invention to provide an electrostatically controlled adjustable signalling device, of the type referred to, wherein the swinging sheet is dependably pushed from a horizontal into an upright position by the application of the electrical charge.

Still another object of my invention is to provide a dependably operating, adjustable signalling device that is of the simplest construction and is simple and inexpensive to operate.

It is also an object of my invention to increase the sensitivity of an electroscope so that its leaves will spread farther apart upon application of an electrical charge than is the case with conventional electroscopes.

These and other objects of my invention will be apparent from the following description of the accompanying drawings which illustrate a preferred embodiment thereof and wherein

Figure 1 is a side elevation, partly in section, of an electroscope that has been rendered more sensitive in accordance with my invention.

Figure 2 is a vertical section through an adjustable signalling device embodying my invention.

Figure 3 is a vertical section similar to Figure 2,

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illustrating the signalling device of my invention in a different operational position.

Figure 4 is a plan view of a component of the device illustrated in Figures 2 and 3; and

5 Figure 5 is a front elevation of another component of the device illustrated in Figures 2 and 3.

In accordance with my invention I interpose between the two metal leaves of a conventional electroscope a number of additional metal leaves and, as the result thereof, the outer leaves will spread farther apart when a predetermined electric charge is applied to them than they would do in the absence of the intermediate leaf or leaves. Thus, I obtain an apparatus that indicates the presence of electricity in a more discernible manner than conventional electroscopes; and I apply this principle to electrostatically controlled signalling devices of the type referred to above, by interposing between the movable sheet and the stationary plate one or more additional sheets of an electrically conductive material, all of which are hingedly mounted adjacent the same edge of the stationary plate and in conductive contact with said plate. As a result thereof the uppermost sheet will swing away farther from the stationary plate than possible in the absence of the intermediate sheet or sheets. Thus, it can now easily be made to rise to almost vertical position upon application of a suitable electrical charge to the plate and the sheets.

Having first reference to Figure 1, said figure illustrates an electroscope such as employed to detect the presence of electricity. It comprises a glass enclosure 10 mounted upon a metal base 12 and forming a neck 14 at its upper end. Said neck is closed by a stopper 16 of an electrically insulating material, and through said stopper passes a metal rod 18 which terminates at its upper end in a ball or knob 20. Secured to the lower end of the rod 18 inside the glass enclosure 10 are four narrow strips of gold leaf identified by the reference numerals 21, 22, 23 and 24. The air inside the enclosure is thoroughly dried.

With no charge applied to the knob 20, the gold leaves 21, 22, 23 and 24 depend from the inner end of the rod 18 in a substantially parallel manner, but when an electrical charge is applied to said knob, they spread apart and assume the diverging positions illustrated in Figure 1, and due to the presence of the intermediate leaves 22 and 23, the outer leaves 21 and 24 spread substantially farther apart than they would otherwise do, giving thus a clearly visible indication of the presence of an electrical charge, even if the charge be very small.

Figures 2 and 3 illustrate a signalling device, such as may be used as a traffic sign. The reference numeral 30 identifies a housing of metal. Said housing has a floor or bottom in the form of a horizontally disposed metal plate 31 that is electrically insulated from the remaining portions thereof by a layer of a suitable insulating material indicated at 32 and which is mounted upon a base 33 of insulating material. The front wall 34 of the housing is provided with an opening which is closed by a window pane 36 that may be of an electrically conductive glass or may carry on its inner surface a thin coating of a transparent electrically conductive material, such as tin oxide, as shown with exaggerated thickness at 38. In the former case the window pane must be mounted in a frame of insulating material, and in the latter case the coat of transparent conductive material should be somewhat smaller in size than the window pane so that it is out of contact with the front wall of the metal housing. Hingedly connected to the floor 31 of the housing adjacent the bottom edge 40 of the window are three superposed metal sheets 41, 42 and 43, such as sheets of stiff aluminum foil. The upper or outer surface of the uppermost sheet 41 may be provided with a coat of red paint

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as shown at 44 with exaggerated thickness, and in addition may have printed thereon an identifying mark such as the warning "Stop" illustrated in Figure 4. The inner face of the rear wall 46 of housing 30 may be provided with a square field painted in green as indicated at 48, and printed upon said field may be the direction "Walk" as illustrated in Figure 5. As indicated by the line 50, the coating 38 of electrically conductive material on the inner face of the window pane 36 is permanently connected to the negative pole 52 of a source of direct current, such as the rectifier symbolically represented by the block 54, and the positive pole 55 of said source of direct current may be connected to the floor 31 of the housing by means of a line 60 including a switch 62. When the switch 62 is in the position illustrated in Figure 2, wherein the floor 31 is disconnected from the positive pole of the rectifier 54, the sheets 41, 42 and 43 lie in closely superposed relationship upon said floor. In this condition the green field 48 on the inner face of the rear wall 46 and the inscription "Walk" are visible through the window 36 and advise the pedestrian or motorist that he may proceed.

When the switch 62 is set to the position illustrated in Figure 3, however, connecting the positive pole 55 of the rectifier 54 to the insulated floor of housing 30 and through said floor to the superposed sheets 41, 42 and 43, the positive charge of the floor 31 of housing 30 repels the positively charged sheets and they in turn repel each other, while the negatively charged coating 38 on the inside of the window pane attracts said sheets. As a result of these forces the sheets assume the position illustrated in Figure 3, wherein the uppermost sheet 41 is practically vertically disposed adjacent the window pane, and the color of, and the identifying mark on, its outer surface may clearly be seen through the window, while the green field 48 and the identifying mark on the rear wall 46 of the housing are concealed from view. A suitable limit stop 64 of insulating material should be provided on the inner surface of the window pane to prevent conductive contact of the uppermost sheet 41 with the conductive coating 38, and also to maintain said uppermost sheet in the slightly backwardly tilted position necessary to cause it to drop backwardly under the force of gravity into its initial position above the floor 31 of the housing 30 and the intermediate sheets 42 and 43, as soon as the positive charge applied to said floor through switch 62 is abolished. To effect rapid dissipation of said charge, when the switch 62 is operated to interrupt the connection between the floor 31 and the positive pole 55 of the rectifier 54, said switch may be arranged to connect the floor to the negative line 50, as shown in Figure 2, or a leak resistor 66 may be arranged between the floor and the negative line as indicated in phantom lines in Figures 2 and 3. The metal housing 30 should be grounded as indicated at 68 in Figures 2 and 3, and the negative pole 52 of the rectifier may also be grounded.

By the interposition of the additional hingedly mounted sheets 41 and 42 between the horizontally disposed stationary plate as represented by the insulated floor 31 of the housing and the top sheet 41, it is now easily possible to swing said top sheet upwardly away from the floor of the housing through an angle approaching 90° so that the sheet may assume a practically upright position driven by no other means than the repelling and attracting forces of appropriate electric charges.

While I have explained my invention with the aid of a preferred embodiment thereof, it will be understood that the invention is not limited to the specific details shown and described by way of example, which may be departed from without departing from the spirit and scope of my invention.

I claim:

1. In a signalling device a mechanism for selectively displaying and concealing an identifying mark comprising a stationary plate of an electrically conductive mate-

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rial, a plurality of sheets of electrically conductive material, means for mounting said sheets adjacent to and in electrically conductive contact with said plate for swinging movement from an initial position parallel and adjacent to said plate to elevated positions swung away from said plate, switch means settable from an ineffective position to an effective position wherein it applies an electrical charge to said plate and said sheets to cause said sheets to swing away from said plate and each other into elevated positions relative to said plate with the uppermost sheet assuming a position approximately at right angles to said plate, and means effective upon return of said switch means to its ineffective position to effect rapid dissipation of the electrical charge applied to said plate and said sheets and thus cause said sheets to return to their initial position parallel and adjacent to each other and to said plate under the force of gravity.

2. In a signalling device a mechanism for selectively displaying and concealing an identifying mark comprising a stationary plate of an electrically conductive material, a plurality of sheets of electrically conductive material, means for mounting said sheets adjacent to and in electrically conductive contact with said plate for swinging movement from a position parallel and adjacent to said plate to elevated position swung away from said plate, an identifying mark provided upon the outer surface of the outermost one of said sheets, switch means settable from an ineffective position to an effective position wherein it applies an electrical charge to said plate and said sheets to cause said sheets to swing away from said plate and each other into elevated positions relative to said plate with the outermost sheet assuming a position approximately at right angles to said plate so that the mark on the outer surface of said outermost sheet is displayed, and means effective upon return of said switch means to its ineffective position to effect rapid dissipation of the electrical charge applied to said plate and said sheets and thus cause said sheets to return to their initial position parallel and adjacent to each other and said plate under the force of gravity.

3. In a signalling device a mechanism for selectively displaying and concealing an identifying mark comprising a vertically disposed electrically conductive window pane, a horizontally disposed plate of electrically conductive material located adjacent the bottom edge of said window pane, a plurality of sheets of electrically conductive material, means for hingedly mounting said sheets in electrically conductive contact with said plate along the edge of said plate adjacent the bottom edge of said window pane for movement from an initial position parallel and adjacent to the upper surface of said plate to elevated positions swung away from said plate, an identifying mark provided upon the upper surface of the outermost one of said sheets, means for applying an electrical charge to said electrically conductive window pane, switch means for applying an electric charge of opposite polarity to said plate and said sheets to cause said sheets to be repelled from said plate and each other and to be attracted by said window pane and swing into elevated positions relative to said plate with the uppermost sheet assuming a position adjacent to said window pane wherein it displays the mark provided on its outer surface through said window pane, stop means effective to block electrical contact between said uppermost sheet and said window pane, and means effective when said switch means is disabled, to effect rapid dissipation of the electric charge applied to said plate and said sheets and thus cause said sheets to return to their initial positions parallel and adjacent to said plate under the force of gravity.

4. In a signalling device a mechanism for selectively displaying and concealing an identifying mark comprising a vertically disposed electrically conductive window pane, a horizontally disposed plate of electrically conductive material located adjacent the bottom edge of said

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window pane, an element bearing an identifying mark
 located adjacent the opposite edge of said plate in line
 with said window pane so as to be visible through said
 window pane, a plurality of sheets of electrically con-
 ductive material, means for hingedly mounting said sheets
 in electrically conductive contact with said plate along
 the edge of said plate adjacent the bottom edge of said
 window pane for movement from an initial position paral-
 lel and adjacent to the upper surface of said plate to
 elevated positions swung away from said plate, means
 for applying an electrical charge to said electrically con-
 ductive window pane, switch means for applying a charge
 of opposite polarity to said plate and said sheets to cause
 said sheets to be repelled from said plate and each other
 and to be attracted by said window pane and thus swing
 into elevated positions relative to said plate with the
 uppermost sheet assuming a position adjacent to said

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window pane, wherein it covers said window pane and
 conceals the identifying mark on said element from view,
 stop means effective to block electrical contact between
 said uppermost sheet and said window pane, and means
 effective when said switch means is disabled, to effect
 rapid dissipation of the electric charge applied to said
 plate and said sheets and cause said sheets to return to
 their initial positions parallel and adjacent to said plate
 under the force of gravity, thus exposing said identifying
 mark again to view through said window.

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