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E. T. R. MURRAY ET AL

ILLUMINATED INDICATING DEVICE

Filed May 5, 1923

Fig. 1.

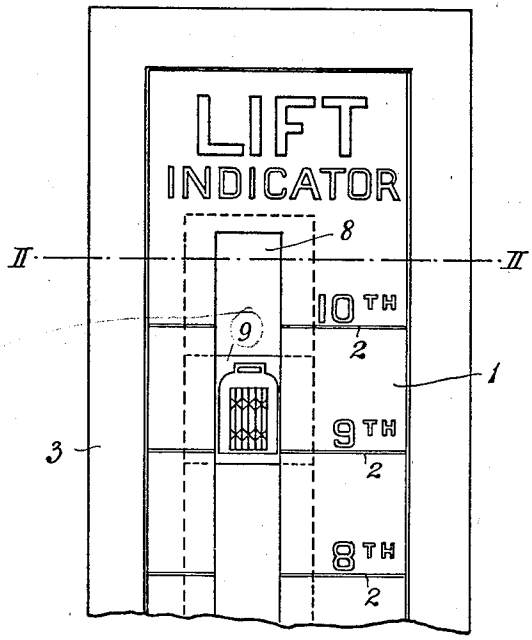


Fig. 3.

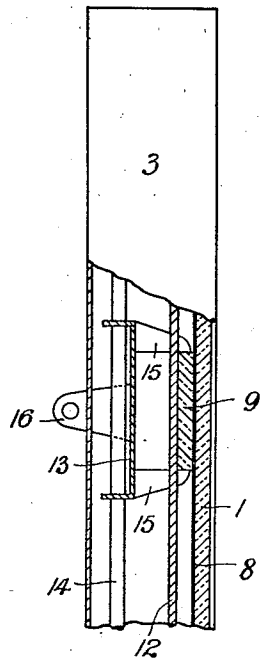


Fig. 2.

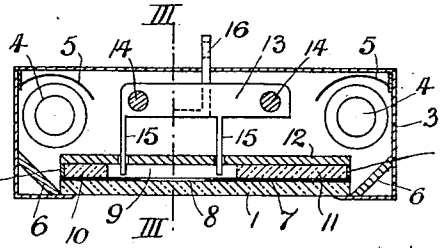


Fig. 4.

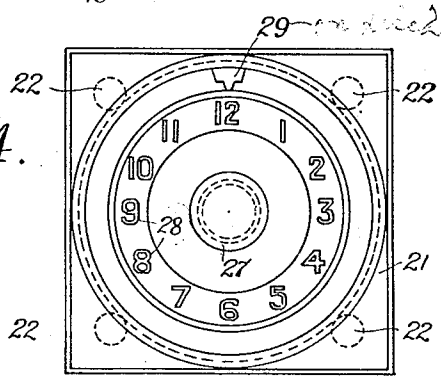
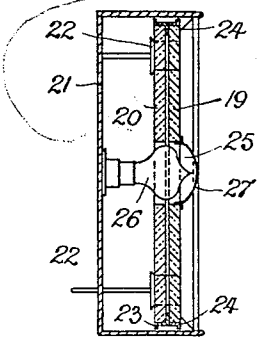


Fig. 5.



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UNITED STATES PATENT OFFICE.

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ILLUMINATED INDICATING DEVICE.

Application filed May 5, 1923, Serial No. 636,801, and in Great Britain May 19, 1922.

This invention relates to illuminated indicating devices of the kind comprising a fixed scale and a relatively movable indicator or pointer and has for its object to provide an improved device of this character which shall be simple in construction and efficient in operation.

The invention utilizes the principle of illumination by internal reflection, the scale and indicator or pointer elements each comprising a curved or plane sheet of glass or other transparent material upon the surface of which the desired marks, graduations, symbols or other cooperating indications are etched or cut in such a manner as to be illuminated by internal reflection within the glass, the light for this purpose being caused to enter the glass at or adjacent to one or more of the edges thereof.

The invention can be carried into practice in a variety of different forms of construction according to the particular conditions to be met, and is illustrated by way of example in the accompanying drawings, Figure 1 of which is a view in front elevation of a portion of an indicating device embodying the invention and adapted to be employed in connection with lifts for the purpose of indicating at each of the different floors or levels served by the lift the position of the lift cage and its direction of movement; Figure 2 is a sectional plan view of the indicating device on the line II—II of Figure 1; Figure 3 being a view in sectional elevation on the line III—III of Figure 2; Figures 4 and 5 are views in front elevation and sectional side elevation respectively of a circular form of indicating device embodying the invention which may be employed as a clock dial or for other purposes as will be hereinafter described.

Referring now first to the construction shown in Figures 1, 2 and 3, it will be seen that the lift indicator therein illustrated, which may be arranged in any suitable position relative to the lift cage at each floor, comprises a strip or sheet 1 of plate glass of suitable dimensions having etched or cut upon the surface thereof a vertical series of graduations or marks 2 indicating the several floor levels, each of these graduations bearing an appropriate number or lettering, as shown in Figure 1.

The sheet of glass 1 is enclosed in a suitable box or frame 3, the interior of which is provided with two tubular lamps 4 or sets of lamps having reflectors 5, the light from the lamps 4 being arranged to be projected by means of inclined mirrors 6 so as to enter the vertical edges of the glass sheet 1 and thus illuminate the cut or etched inscription thereon by internal reflection.

Immediately behind the glass sheet 1 is a thin opaque sheet 7 of cardboard, fibre, or other suitable material having a long rectangular opening 8 cut therein so as to form a window. Immediately behind the opaque sheet 7 and opposite the window 8 is a movable strip or sheet of glass 9, upon the surface of which is cut or etched a miniature representation of the lift cage, as shown in Figure 1.

The glass sheet 9 is adapted to be moved vertically upwards and downwards between a pair of glass strips 10, 11, which not only serve as guides for the movement of the sheet 9 but also effect the transmission of light from the lamps 4 to the sheet 9. At the back of the glass sheets 9, 10, 11 is arranged a metal sheet 12 serving to secure the sheets 10, 11 in position and as a guide for the movable sheet 9. The latter is arranged to be moved upwards and downwards by means of a slider 13 provided with vertical guide rods 14 and forwardly extending fingers 15 which engage with the upper and lower edges of the glass sheet 9 projecting through slots in the sheet 12, as clearly shown in Figures 2 and 3. The slider 13 is also provided with a lug or projection 16 which is so connected through suitable reducing mechanism to the lift cage itself that the movement of the slider 13 synchronizes with the movement and position of the lift cage. This action can be effected by any suitable form of reducing mechanism such, for instance, as is employed in the floor indicators now in use.

The circuits through which the lamps 4, 5, are supplied with operating current are also arranged to be controlled by the movement of the lift cage in such a manner that the left hand lamp, for instance, is illuminated when the lift cage is going up and the right hand lamp when the lift cage is going down.

The outer edges of the glass sheets 10, 11 are each provided with a differently coloured strip indicated at 17, 18, the strip 17, for instance, being coloured red and the strip 18 green. It will thus be seen that the colour

of the light transmitted to the movable sheet 9 will depend upon whether the left hand or right hand lamp 4 be illuminated.

The operation of the device is as follows: The movable sheet of glass 9 bearing the representation or indication of the lift cage will by the action of the reducing mechanism occupy a position relative to the fixed scale of graduations 2 vertically corresponding to the position of the lift cage relative to its movement throughout the floors served by the lift. These graduations and their associated number or lettering are continuously illuminated from one or other of the lamps 4 by reflection from the mirrors 6, the light rays entering the edge of the glass plate 1. Light rays from one or other of the lamps 4 are also transmitted through the glass plates 10, 11, to the movable glass sheet 9, so that the latter presents to the eye the appearance of a miniature illuminated lift cage moving from one floor level to another.

Owing to the provision of the colour strips 17, 18 the colour of the illumination of the miniature lift cage will be red or green according to whether the lift cage be moving up or down.

The opaque sheet 7 in addition to defining the apparent path of movement of the miniature lift cage serves to prevent physical contact between the glass sheets 1 and 9, and since these sheets are necessarily composed of plate glass having a highly polished surface such physical contact would interfere with the proper movement of the sheet 9, owing to the surfaces of the sheets 9 and 1 adhering closely together.

Various modifications in the arrangements above described may obviously be made; for instance, the graduations 2 representing the various floor levels may be duplicated, one set being arranged at either side of the movable sheet 9, or the device may be arranged to indicate the movement of two or more lifts by the provision of a corresponding number of movable sheets of glass and sets of fixed graduations. Again, by the provision of suitable colour strips similar to those indicated at 17, 18, but arranged at the edges of the glass sheet 1, the graduations and lettering cut or etched on this sheet may be arranged to vary in colour according to whether one or other of the sets of lamps 4 be illuminated.

A device constructed in a somewhat similar manner but preferably arranged horizontally instead of vertically may be employed for other analogous purposes such, for instance, as the indication of the score at billiards or other games, and by varying the colour strips 17, 18 interposed between the lamps 4 and different portions of the scale of graduations 2 the movable sheet 9 may obviously be arranged to be illuminated in different colours during its movement from one end of the scale to the other, thus indicating, for instance, the approaching conclusion of a game.

Furthermore, in the case of a device comprising two or more movable sheets 9 the light transmitted through one of these may be arranged to enter the edge of another when the two sheets are in line with one another during their movement over the fixed scale, special colour effects being obtained in this way which are different from those obtained when the two movable sheets are more remote from one another.

Referring now to the construction shown in Figures 4 and 5, a circular form of device is illustrated comprising two relatively movable discs of plate glass 19, 20 contained in a suitable casing 21. One of the discs 19, 20 may be arranged to be fixed in the casing, or as shown both discs may be arranged to be rotatable relative to the casing as well as to one another. In the latter case the discs 19, 20 are each carried upon a set of rollers 22, one or more of the rollers supporting each disc being preferably constituted by a pinion or gear wheel, the teeth of which are adapted to intermesh with the teeth of a bezel 23 surrounding the periphery of each of the discs 19, 20. It will thus be seen that the discs 19, 20 can be rotated in opposite directions or in the same direction at different speeds by suitably arranging the driving gear wheels 22, so that relative rotational movement between the discs 19, 20 can be effected.

In order to prevent adhesion of the polished adjacent surfaces of the discs 19, 20 a spacing ring 24 is provided which may be constituted by an annular projection on the bezel 23. Each of the discs 19, 20 is provided with a central aperture 25, the bulb of an incandescent electric lamp 26 being arranged to project within the aperture 25 as shown in Figure 5. The outer disc 19 is provided with an opaque dome or cover 27, the edge of which projects for a short distance within the aperture 25 in this disc, the purpose of the dome or cover 27 being to intercept the projection of light rays outwards from the lamp 26.

Cut or etched upon the disc 19 is a set of numerals or graduations 28, as shown in Figure 4, the disc 20 bearing similarly cut or etched upon its surface a pointer or indicator 29.

In operation it will be understood that by suitably arranging the gear wheels 22 transmitting rotation to the discs 19, 20 the pointer 29 will successively occupy various positions relative to the graduations 28 on the other disc, both the graduations 28 and the pointer 29 being illuminated by internal reflection from the lamp 26.

In a modification of the arrangement above described and applicable more partic-

ularly to clock dials the graduations 28 may be carried by a stationary plate of glass and illuminated by internal reflection from a centrally arranged lamp, the discs 19, 20 each carrying a pointer or indicator corresponding to the hour and minute hand of a clock, these discs being arranged to be rotated at suitable speeds so as to indicate the time.

Other applications of either form of the invention obviously include train or station indicators and devices for announcing an item of a programme or the like, as will be evident to those skilled in the art.

In applications of the invention involving colour effects, the arrangements described in the specification of co-pending application Serial No. 597,488 filed 28th October, 1922, may be employed, and in the actual construction of devices embodying the invention the illuminating lamps and their connections are preferably arranged in the manner described in the specification of Letters Patent No. 1,407,473, or in any other suitable manner.

In these and other respects the construction adopted may evidently be considerably modified without exceedng the scope of the invention.

Having now described our invention, what we claim as new and desire to secure by Letters Patent, is:

1. In an illuminated indicating device, the combination of a sheet of transparent material bearing indications thereon, a second sheet of transparent material movable relatively to said first sheet and bearing indications cooperating with the indications on said first sheet, and means for illuminating said indications from a fixed source of light by internal reflection within said sheets.

2. In an illuminated indicating device, the combination of a sheet of transparent material bearing indications thereon, a second sheet of transparent material movable relatively to said first sheet and bearing indications thereon cooperating with the indications on said first sheet and visible therethrough, and means for illuminating said indications from a fixed source of light by internal reflection within said sheets.

3. In an illuminated indicating device, the combination of a sheet of transparent material bearing indications thereon, a second sheet of transparent material relatively movable behind said first sheet and in a parallel adjacent plane thereto, said second sheet bearing indications visible through said first sheet and cooperating with the indications thereon, and means for illuminating said indications from a source of light by internal reflection within said sheets.

4. In an illuminated indicating device, the combination of a fixed sheet of transparent material bearing indications thereon, a relatively movable sheet of transparent material arranged behind said first sheet in a parallel adjacent plane, said second sheet bearing indications thereon visible through said first sheet and cooperating with the indications on said first sheet, means for illuminating the indications on said sheets from a common source of light by internal reflection within said sheets, and a color screen interposed between said source and said second sheet.

5. In an illuminated indicating device, the combination of a stationary sheet of transparent material bearing indications on its surface, a second sheet of transparent material bearing indications on its surface and arranged closely adjacent to said first sheet, means for moving said second sheet, means for guiding it during such movement, means separating the adjacent faces of said sheets, and a common source of light for illuminating said sheets by internal reflection.

In witness whereof we have hereunto set our hands.

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LESLIE ETHELBERT RUTHVEN MURRAY.