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June 4, 1935. G. BROWN ET AL 2,003,735

DISPLAY WINDOW

Filed March 29, 1934 3 Sheets-Sheet 1

Fig. 1.

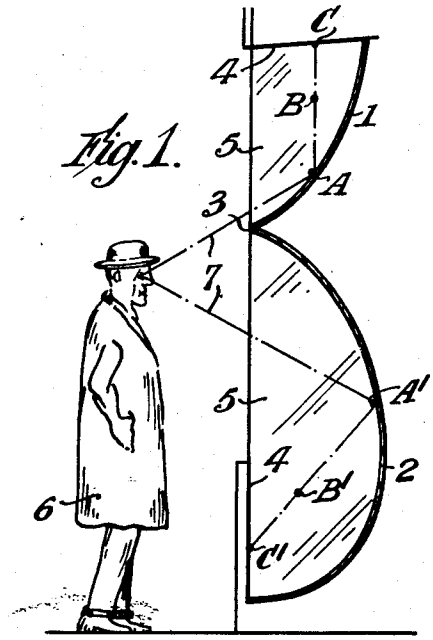
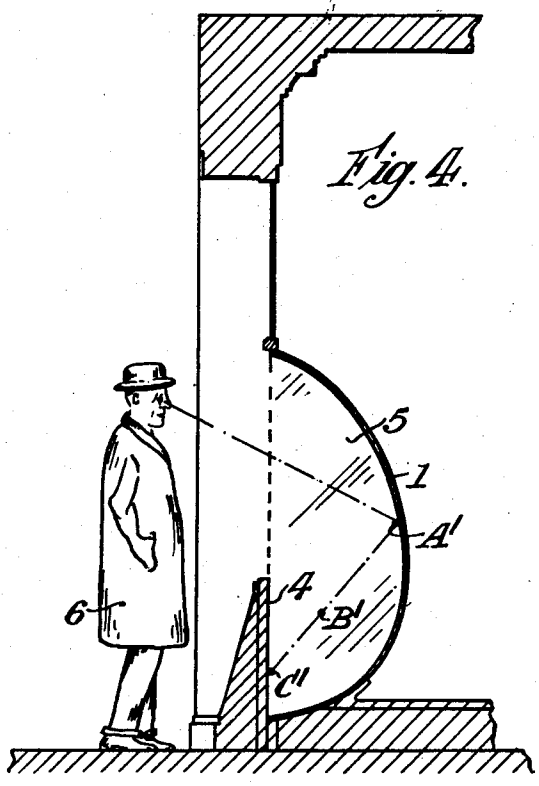


Fig. 4.



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DISPLAY WINDOW

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Fig. 2.

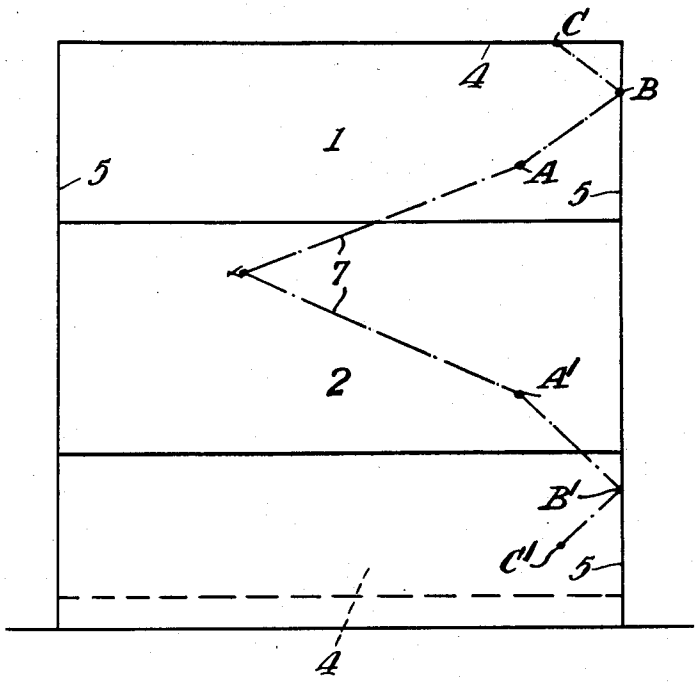
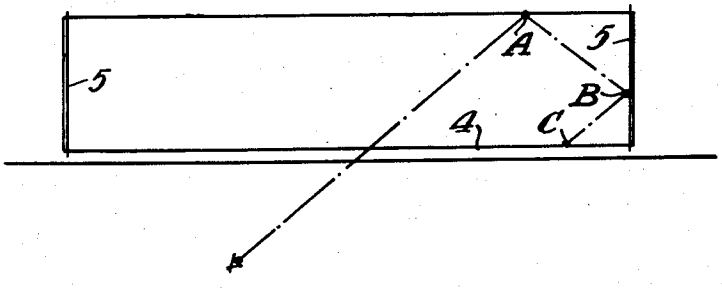


Fig. 3.



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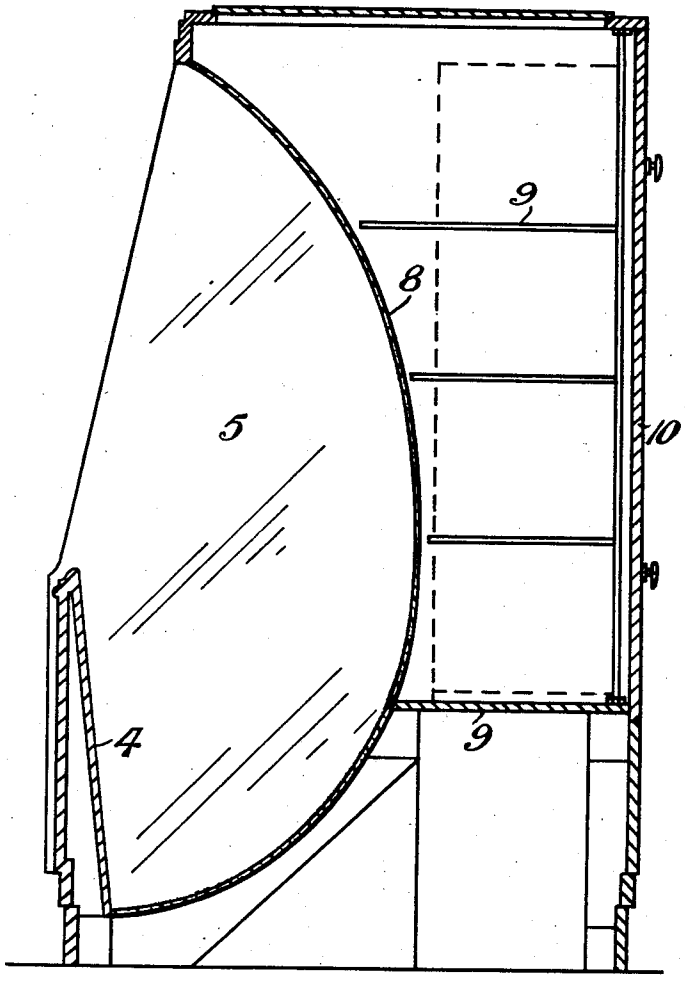
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DISPLAY WINDOW

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Fig. 5.



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UNITED STATES PATENT OFFICE

2,003,735

DISPLAY WINDOW

Gerald Brown, Barnes, London, and Edward Pollard, London, England

Application March 29, 1934, Serial No. 718,013
In Great Britain December 11, 1933

4 Claims. (Cl. 88—74)

This invention relates to display windows of the so-called non-reflecting kind and which employ a curved sheet or sheets of glass or like transparent material in conjunction with a light absorbing surface or surfaces or a surface or surfaces of uniformly low reflectivity for reducing or nullifying undesired reflections. Such non-reflecting devices are shown and described in Patent No. 1,911,881.

In Patent No. 1,911,881 there is described a shop front window comprising two curved panes of glass or like transparent material converging together at or about the normal eye level of an observer at approximately a cusp and so arranged as to take the field or reflected view away from the ordinary outside objects to light absorbing surfaces or surfaces of uniformly low reflectivity providing no objectionable reflections, said light absorbing surfaces or surfaces of uniformly low reflectivity being incorporated in the window structure and positioned in front of the window at the top and at the bottom.

In such devices it has, up to the present, been the practice, in order to complete the construction of the non-reflecting device so as to fill the intervening spaces between the ends of the curved panes and the inner edge of the vertical line of the light absorbing surface or structure, to provide at each end thereof an end or side screen or panel positioned in a vertical plane at right angles to the general plane of the shop front window the end or side screens or panels being composed of a light absorbing material or a material of uniformly low reflectivity so that any rays which may strike said screens or panels are absorbed thereby thus preventing undesired reflections from the ends or sides of the device. In this connection we would point out that it has been considered so essential to have end or side panels whose light absorbing properties are as nearly perfect as possible that it has been found to be necessary in practice to go to great trouble and even expense to remove from said panels existing paint or surface material or unevennesses which might have the effect of reducing the light absorbing properties of the panels.

It has now been found, however, that more complete immunity from interfering reflections as well as a better and very much more pleasing appearance of the non-reflecting device is obtained by giving the end or side screens or panels a light reflecting surface and in particular if said reflecting surface is constituted as an image reflecting surface.

According to the present invention therefore one or both end or side panels consist of an image reflecting surface in contradistinction to a light absorbing surface or surface of uniformly low reflectivity. These panels may be planar and may be so arranged as to take the field of reflected view therefrom away from the ordinary outside objects to the light absorbing surface or surfaces of uniformly low reflectivity employed in conjunction with the curved pane or panes of glass or like transparent material forming the main portion of the non-reflecting device.

The image reflecting surfaces may be arranged in a vertical plane at right angles to the plane of the curved pane or panes of glass or like transparent material constituting the shop front window or other non-reflecting device, (hereinafter referred to as the main curves of the non-reflecting device): the said surfaces may, if desired, be curved.

According to another feature of the invention the end or side panels having an image reflecting surface may be of double curvature, i. e. may be curved in horizontal and vertical section.

Preferably the said image reflecting surface consists of a mirror like surface or a highly polished surface, such for example as clear glass, mirror glass or metal.

Preferably also the said image reflecting surface is provided at both ends of the main window pane.

In the case where the image reflecting surfaces are of double curvature they preferably consist of clear glass, whilst the degree of curvature thereof in the vertical plane is preferably equal to the degree of curvature of the main curve, whilst at any horizontal section of the image reflecting surface, the shape thereof is that of a part of a circle or parabola, the radius, in the case of a circle, being equal to the horizontal distance at the same height between the light absorbing surface or surface of uniformly low reflectivity and the main curved pane; in other words, in the case of a circle, the image reflecting surface at each end of the main curve consists of a surface of revolution of the vertical section of the main curve about a vertical axis.

In a further modified form of the invention the main curved pane or panes may themselves be of double curvature and preferably such that at any horizontal section of the curved pane the shape thereof is that of a segment of a circle (e. g. a semi-circle) whose radius in the case of a semi-circle is equal to the horizontal distance at the same height between the mid point of the light

absorbing surface and the corresponding point of the curved pane.

The invention is illustrated in the accompanying drawings in which:

Figure 1 shows a vertical section through a shop front window of the non-reflecting kind described in Patent No. 1,911,881 and fitted with a plane image reflecting end or side panel according to the present invention;

Figure 2 shows a diagrammatic front view of Figure 1, and

Figure 3 a diagrammatic plan view thereof.

Figure 4 illustrates an arrangement similar to Figure 1, except that the non reflecting window comprises a single continuous curved transparent pane in place of two curved transparent panes meeting together at approximately a cusp.

Figure 5 is a view similar to that shown in Figure 1, but showing the invention applied to a show case window as distinct from a shop front window.

Referring to the construction shown in Figures 1, 2 and 3, the window of the shop front is formed of two curved panes of glass, 1, 2 i. e. the main curves, which converge in approximately a cusp at 3 about the normal eye level of an observer, the concave surfaces of the panes 1, 2, facing the observer. At both the upper and lower extremities of the panes of glass 1, 2 is a light absorbing surface 4 so arranged that the field of reflected view is directed from the panes of glass 1, 2, on to the said light absorbing surface 4. To complete the construction of the shop front window there is provided at each end a side panel 5 whose surface is provided with an image reflecting surface, such for example, as mirror glass, the side panels being arranged parallel with one another and in a vertical plane at right angles to the general plane of the shop front. 6 is an observer desirous of seeing through the shop front and 7 represents the light paths.

Taking the upper ray 7, this strikes the curved pane 1 at the point A and is reflected therefrom to the point B on the glass mirror 5 from whence it is again reflected to the point C on the upper light absorbing surface 4. Similarly, the lower ray, which strikes the curved pane 2 at A', is reflected to the point B' of the glass mirror 5 and from thence to the point C' on the lower light absorbing surface.

It will be clear that with such a construction the reflected field of view of the observer is wholly at the light absorbing surfaces 4 so that no objectionable reflections can be seen. It is therefore possible with such a construction for an observer to look straight through the window and see any goods displayed behind it without any annoyance caused by reflection.

It will be appreciated that owing to the provision and arrangement of glass mirrors any ray of light striking said surfaces 5 directly will be reflected therefrom to the light absorbing surfaces 4, either directly or through the intermediary of the main curved panes 1, 2. Furthermore, in view of the parallel arrangement of glass mirrors 5 there is imparted to an observer the impression that the area of the shop front window and hence the amount of goods displayed in said shop front window is considerably increased, whilst a very pleasing effect is given to an observer, since he can see reflected in said mirrors goods displayed behind the shop front window, so that an improved appearance as to the continuity of the shop front window and the goods therein displayed is obtained, and a continuous reflection of the window display free from all undesired reflections is also obtained.

In the arrangement shown in Figure 4 the shop front window comprises a single continuous curved transparent pane 1, at the lower extremity of which is provided a light absorbing surface 4, arranged in approximately a vertical plane and contiguous with the said curved transparent pane; the arrangement being similar to that described with reference to Figures 1–3, so that any ray of light striking the curved transparent pane 1 is reflected therefrom onto said light absorbing surface 4 thereby nullifying undesired reflections. Similarly to the arrangement described in Figures 1–3, in order to complete the construction of the shop front window, side panels 5 are provided having an image reflecting surface. It will of course be apparent that the same advantages as are obtained with the arrangement shown in Figures 1–3 are also obtained with the arrangement shown in Figure 4.

Referring now to Figure 5, there is herein shown a show case constructed in accordance with this invention. In this figure the front of the show case is formed of a single continuous curved pane of glass 8 at the lower extremity of which is provided a light absorbing surface 4 arranged in approximately a vertical plane, the light absorbing surface forming part of the structure of the show case. At each end of the show case in front of the curved pane 8 there is provided a side panel 5, the surfaces of which are constituted by image reflecting surfaces, such for example as glass mirrors. The interior of the show case is provided with shelves 9 on which goods may be displayed and with a door 10 at the rear giving access to the interior of the show case.

It will be appreciated that any rays of light which strike the curved pane 8 are reflected therefrom to the light absorbing surface 4 in a manner in all ways similar to that described with reference to the construction shown in Figure 4.

If desired, the curved pane 8 may be stopped short of the light absorbing surface 4, for example at that point where it meets the lowest shelf 9 of the show case. The lowest shelf 9 in this case must be continued on the same curve as that of the glass to meet the light absorbing surface 4, in which case the surface of the curved portion of the lowest shelf 9 facing the light absorbing surface is highly polished so that it constitutes an image reflecting surface.

It will be obvious by reference to Figures 1, 4 and 5 that the invention is adaptable to use in store fronts, in built-in or portable show cases, or in any similar adaptation wherein it is desirable to display articles behind and through a transparent pane without subjecting the eyes of an observer to objectionable reflections from said pane.

As has been stated above, instead of employing side panels of mirror glass other image reflecting surfaces may be employed, such as clear glass or polished metal, whilst the said side panels may be curved.

If desired the mirror like surfaces may be coloured or tinted so that any rays of light which may be reflected from the curved pane or panes onto said mirror like surfaces are reflected back onto the goods displayed behing the curved pane or panes, and impart thereto a tinted or coloured appearance.

It will be seen that the window embodies centrally and laterally disposed wall portions bearing angular relation to each other and to the

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light absorbing surface whereby objectionable reflections are directed away from the eye of an observer and onto the light absorbing surface.

What we claim is:—

1. In a display window, the combination of a light absorbing surface disposed out of the direct line of vision of an observer, a curved transparent pane bearing such angular relation to said light absorbing surface as to take the field of reflected view away from ordinary outside objects to said light absorbing surface, and side panels of an image reflecting nature disposed at the sides of the pane and bearing such angular relation to said pane and said light absorbing surface that light reflected from said pane onto said panels will be reflected onto said light absorbing surface.

2. In a display window, the combination of a light absorbing surface disposed out of the direct line of vision of an observer, a curved transparent pane bearing such angular relation to said light absorbing surface as to take the field of reflected view away from ordinary outside objects to said light absorbing surface, and planar side panels of an image reflecting nature disposed at the sides of the pane and bearing such angular relation to said pane and said light absorbing surface that light reflected from said pane onto said panels will be reflected onto said light absorbing surface.

3. In a display window, the combination of a light absorbing surface disposed out of the direct line of vision of an observer, a curved transparent pane bearing such angular relation to said light absorbing surface as to take the field of reflected view away from ordinary outside objects to said light absorbing surface, and planar side panels of an image reflecting nature disposed at the sides of the pane and bearing such angular relation to said pane and said light absorbing surface that light reflected from said pane onto said panels will be reflected onto said light absorbing surface, said panels being disposed in parallel relation one to the other and color tinted for the purpose specified.

4. In a display window, the combination of a light absorbing surface disposed out of the direct line of vision of an observer, a curved transparent pane bearing such angular relation to said light absorbing surface as to take the field of reflected view away from ordinary outside objects to said light absorbing surface, and planar side panels of an image reflecting nature disposed at the sides of the pane and bearing such angular relation to said pane and said light absorbing surface that light reflected from said pane onto said panels will be reflected onto said light absorbing surface, said panels being disposed in parallel relation one to the other for the purpose specified.

GERALD BROWN.
EDWARD POLLARD.