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(54) Tamper-resistant changeable sign.

(57) A tamper-resistant sign comprising a holder (10) having a front wall (11) spaced from a rear wall (12) to define a sign chamber (17) between the walls, and a sign panel (30) inserted in the sign chamber (17). The sign panel (30) includes a retaining element (32) extending therefrom and a wall (12) of the holder includes a recess (18). The retaining element (32) and the recess (18) are positioned in their respective elements so as to be aligned with one another when the sign panel (30) is fully inserted in the sign chamber (17); the retaining element (32) is then received in the recess (18) to restrict unauthorized removal of the sign panel (30) from the holder (10).

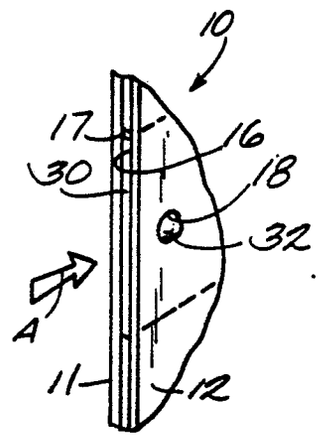

Fig. 3b

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TAMPER-RESISTANT CHANGEABLE SIGN

This invention relates to signs of the type combining a holder and a sign panel adapted to be inserted in the holder.

In connection with the use of signage to direct and inform people, it is often necessary to employ a sign system capable of accommodating changing the graphic information displayed by the signage. Signs used to display the name of a person in a particular office, designate a specific location in an office building or factory, or designate the presence of a hazardous material, designate the function or occupant of a room in a hospital or clinic, for example, require new information to be displayed when there is a change in the use of the area.

One of the known systems for changeable signage is to apply the graphic information onto a thin sign panel, insert the sign panel into a slot in a permanently mounted holder open on both ends. This system can provide an attractive sign display due to the use of the thin sign panel and allows for ready changeability, but it offers no security against unauthorized removal of the sign because the sign panel can be removed easily, or modified, without the need for any tools. Also, the method of insertion and removal of the sign panel is obvious and readily apparent to an observer, thereby further diminishing the security of this system. One solution to improve the security of this type of sign system is to use a metal frame and thicker sign panel in which the frame forms the holder, together with some form of fastening system to enable one side of the frame to be detachable for insertion and removal of the sign panel. However, this approach is not always satisfactory due to the need to use bulky frames that can be unattractive; moreover, it can be difficult to provide a rigid frame with sufficient structural integrity to retain a rectangular shape, which is another problem since it can be impossible to insert a sign panel if the frame deforms to an out-of-square condition. There is an additional problem with this latter solution in that the frames of large signs can usually be flexed sufficiently to allow for removal of the sign panel without frame disassembly, thereby also compromising the security of this system. The most secure signage system for a display including changeable sign panels is the use of a lockable cabinet with a glass or plastic front cover and a metal frame to completely enclose the sign panels. Disadvantages of lockable changeable sign systems of this type include the relatively large size of the lockable cabinets, high purchase price and high cost of installation.

The present invention relates to a sign system of the type comprising (l) a holder having front and rear spaced walls which define a sign chamber between them with an access to the sign chamber and (2) a sign panel insertable through the access into the sign chamber for positioning behind the front wall of the holder characterized in that a retaining element extends from the sign panel and a recess means is defined in a wall of the holder, and the retaining element is received in the recess means to thereby retain the sign panel in position and limit unauthorized removal of the sign panel from the holder, and the wall of the holder with the recess means or the retaining element is flexible upon insertion of the sign panel into the chamber and removal therefrom.

Some of the principal objects of the present invention are to provide a tamper-resistant sign system including a holder and one or more sign panels; to provide a tamper-resistant sign system which is economical; to provide a tamper-resistant sign system in which the means for limiting unauthorized tampering is not readily observable to a viewer; and to provide a tamper-resistant sign system which can be fabricated using relatively thin lightweight materials, in addition to being capable of manufacture with heavier weight materials. Other more specific objects will become apparent throughout the following description and in the claims.

The present invention is described in the description which follows by reference to the accompanying drawings, in which:

Fig. I is a perspective view, with portions broken away, of a holder for a sign panel incorporating the present invention;

Fig. 2 is a plan view of a sign panel incorporating the present invention;

Fig. 2a is an end view of the sign panel of Fig. 2;

Figs. 3, 3a and 3b are sequential views in perspective, with portions broken away, illustrating insertion of the sign panel of Fig. 2 into the holder of Fig. I;

Fig. 4 is a plan view showing the completed assembly of the sign panel of Fig. 2 and the holder of Fig. I;

Figs. 5, 5a, 5b, 5c, and 5d are perspective views, with a portion broken away, illustrating a sequence of steps involved in a procedure for removing the sign panel of Fig. 2 from the holder of Fig. I;

Fig. 6 is a plan view of a second sign incorporating the present invention;

Fig. 7 is a side view of the sign of Fig. 6; and

Fig. 8 is a plan view of third sign according to the present invention.

Figs. 1-5 illustrate a first embodiment of a tamper-resistant sign according to this invention comprising two elements, a holder 10 shown in Fig. 1 and a sign panel 30 shown in Figs. 2 and 2a. Figs. 3-3b illustrate the manner in which the sign panel is inserted into the holder of Fig. 1, Fig. 4 illustrates the assembled sign, and Figs. 5-5d illustrate a procedure for removing the sign panel from the holder.

Referring first to Fig. 1, the holder 10 comprises front wall 11 and rear wall 12 with longitudinal horizontal spacers 13 and 14 and a vertical end spacer 15 positioned between the walls 11 and 12 to retain them in spaced relation relative to one another. Spacers 13, 14 and 15 close off three sides of the rectangular shaped holder 10. The fourth side of the holder, the right hand side as seen in Fig. 1, is open between the edge portions of walls 11 and 12 between spacers 13 and 14 to define an access slot 16. The front and rear surfaces of spacers 13-15 are joined to edge portions of the walls 11 and 12 in contact therewith by any suitable means to retain the holder in its assembled condition, such as adhesive bonding, glue bonding, solvent welding, sonic sealing or with mechanical fasteners, or other means appropriate for joining the specific materials selected for the walls and the spacers. The holder 10 includes front and rear walls that are spaced from one another a distance D (the thickness of spacers 13-15) to define a sign chamber 17 between the walls; access to the sign chamber is provided by slot 16 but access to the balance of the chamber is restricted by the spacers 13-15.

In accordance with the invention, a recess 18 is formed in the rear wall 12 of the holder 10 near the access slot 16, illustrated as an aperture extending through the rear wall in the exemplary embodiment. The purpose of recess 18 will be explained later in this description.

The front wall 11 of the holder is to be made of a material that is transpicuous, preferably transparent or at least translucent, so that the graphic material placed behind it will be visible to an observer. Any clear or transparent plastic material is suitable for the front wall 11, such as an acrylic, vinyl, polycarbonate or polyolefin sheet or the like; and the front wall 11 may also comprise a glass panel. In this first embodiment, front wall 11 of the holder 10 is a rigid acrylic panel and may be, for example, about 3mm (1/8 inch) thick.

A mask 19 surrounds the periphery of first wall to define a window 20 within the frame. Preferably, the mask 19 is opaque and is sized such as to cover the spacers 13-15. The mask 19 can be printed onto the front wall 11 or it may be an opaque material, such as colored vinyl or other plastic film, die-cut to shape and laminated to the front wall with a suitable adhesive. The mask 19 can be on either the exterior or the interior surface of front wall 11. The mask 19 can surround all four sides of the holder 10 as shown, but it is to include at least a portion 21 along the access slot 16.

Rear wall 12 of the holder in the first embodiment is made of a material that is slightly flexible, for a purpose to be described hereinafter. Plastic sheets are particularly useful materials for the rear wall, but thin metal and heavy card stock also may be used. In a prototype, a rear wall 12 of about 0.8mm (0.030") thick vinyl plastic film was found useful for the rear wall, although other materials of other thicknesses also may be employed.

The sign panel 30, turning now to Figs. 2 and 2a, is rectangular and sized to fit inside the sign chamber 17. The sign panel 30 is to carry graphic information 31, which can be any suitable legend including alphanumeric characters, designs etc. The graphic information can be applied to the front surface of sign panel 30, such as by printing, adhesive lamination of die-cut material, etc. Also, if the sign panel 30 is of transparent material, the graphic information can be applied to its rear surface. Particularly useful materials for the sign panel 30 include transparent or translucent plastics such as vinyls, polyolefins, polycarbonates, acrylics, and the like. Also, the sign panel 30 can be made of thin metal, heavy card stock or any other suitable sign material. An advantage of the present sign construction is that the sign panel can be a thin transparent plastic sheet material, in the range of 0.25 to 0.5mm (10 to 20 mils) thick. The graphic information can be any selected information such as, for example, the name of a person, area or location, or informational graphics such as directions or instructions.

In accordance with this invention, a retaining element is shown as extending from the back of the sign panel 30. In the exemplary panel 30 the retaining element is illustrated as a hemispherical dome 32 extending from the rear of the sign panel 30. The dome is shown as an integral portion of sign panel and may comprise, for example, a portion of the sign panel embossed or coldformed with an appropriate die in the selected configuration; this technique is particularly useful when the sign panel is made of plastic or metal materials which can be coldformed in this manner. Although illustrated as hemispherical, the dome 32 can be of any desired shape including cylindrical, rectangular, oval, etc. However, for the reason explained below, the dome 32 of the sign panel 30 and recess 18 of the rear wall 12 of the holder preferably have the same configuration. The dome 32 is to

extend from the rear surface of sign panel 30 at least to the extent that the distance between the rearmost end of dome 32 and the front surface of the sign panel, indicated as E in Fig. 2a, is greater than the distance D between the front and rear walls 11 and 12 of the holder 10. In the exemplary sign panel of Figs. 2 and 2A, the distance E is also greater than the distance D plus the thickness T of the rear wall 30.

Figs. 3-3b illustrate three sequential steps in the act of inserting sign panel 30 into holder 10. In Fig. 3, the sign panel 30 is partially inserted into the sign chamber 17 through the access slot 16 in the direction of arrow A. Continued movement of the sign panel in the direction of arrow A reaches the stage of Fig. 3a wherein the dome 32 extending from the rear surface of sign panel 30 contacts the flexible rear wall 12 of the holder; inasmuch as the rear wall is flexible, it deforms sufficiently to enable dome 32 to pass through access slot 16. Inward movement of the sign panel 30 is continued until the condition of Fig. 3b is reached wherein the dome 32 enters recess 18 defined in rear wall 12 of the holder. In this first embodiment, the dome extends completely through the recess 18. This cooperative engagement between the dome 32 and recess 18 is achieved by positioning the dome and the recess on their respective elements so as to be aligned with one another when sign panel 30 is fully covered by front wall 11 of the holder.

The assembled condition of the sign following the stage of Fig. 3b is depicted in Fig. 4. Sign panel 30 is fully covered by front wall 11 of the holder. Mask 19 preferably covers the entire periphery of the sign chamber so as to obscure the spacers 13-15, and portion 21 of the mask hides the dome 32 of the sign panel from an observer, so that the presence of a retaining element in the sign panel is not readily apparent to an observer. Access to the three sides of the sign chamber 17 enclosed by the spacers 13-15 is prevented so that the sign panel cannot be removed from this portion of the periphery of the sign chamber. The sign panel 30 is fully covered by the front wall, so that it does not have an end projecting outwardly of the access slot 16. The graphic information 31 on the sign panel is visible through window 20 of the front wall, and the front wall also prevents access to the sign panel. Although the access slot 16 of the holder is open, the sign panel cannot be removed manually through the slot because the dome 32 extends from the front surface of the sign panel a distance E that is greater than the distance D between the front and rear walls of the holder. A sign system combining a holder and sign panel has thereby been provided in accordance with this invention, in which the sign panel cannot be conveniently removed by an unauthorized person, thereby providing a tamper-resistant sign. The holder can be attached to a wall, for example, using adhesive means or mechanical fastening means, such as strips of pressure sensitive adhesive on the back of the rear wall, two side adhesive coated foam tape, or screws or bolts extending throughout the holder. When the holder has a slightly flexible rear wall as in this first embodiment, it is preferably mounted slightly spaced from a wall to enable the rear wall to flex to permit removal of a sign panel as described in the next paragraph.

Inasmuch as a sign construction has now been provided wherein it is difficult to remove the sign panel from the holder, the question remains of providing for removal of the sign panel by an authorized person when it is desired to change the sign panel to one carrying different graphic information. An effective procedure for accomplishing this is illustrated in Figs. 5-5d. A removal tool 35 is provided comprising a flat sheet element thin enough to fit through access slot 16 of the holder. An aperture 36 extends through the holder near its forward end, which may be tapered as illustrated to facilitate entry into the access slot. As shown in Fig. 5a, removal tool 35 is inserted into the access slot behind the sign panel 30 in the direction of arrow A, and rear wall 12 of the holder flexes a sufficient amount to enable the tool 35 to pass over the rearmost end of dome 32. The condition shown in Fig. 5b is thereafter reached in which aperture 36 of the tool 35 surrounds dome 32. After the dome has been captured in aperture 36 in this manner, turning to Fig. 5c, the operator pulls insertion tool 35 in the direction of arrow B (the reverse of arrow A) and pulls sign panel 30 from the holder until dome 32 clears the edge of the holder along the access slot. The removal tool 35 is disengaged from the dome 32 after the sign panel has been pulled out sufficiently, see Fig. 5d, and the operator can manually remove the sign panel from the holder.

Figs. 6 and 7 illustrate a second embodiment of a tamper-resistant sign according to the present invention comprising a holder 40 and a plurality of sign panels 60. The holder 40 includes front wall 41 and rear wall 42 spaced from one another by a plurality of horizontal spacers 43 that extend between the two edges of the walls, and vertical end spacers 45. Both the front and rear wall of this embodiment are of slightly flexible material. The front and rear walls 41 and 42 are thus spaced from one another to define a plurality of sign chambers 47a-47e in which three sides of each sign chamber are closed off by spacers 43 and 45 and an access slot 46 is provided between the front and rear walls along the right hand edge of the chambers as viewed in Fig. 6. The specific sign illustrated in Figs. 6 and 7 was designed to provide a sign that

users can employ to comply with an OSHA regulation requiring warning to workers of possible hazardous materials at their work place as set forth at 29 C.F.R. Part 1910.1200, entitled Occupational Safety and Health Administration Hazard Communication Standard. The upper portion of the front wall 41 defines a panel on which is printed or otherwise applied a diamond 52 marked off in four color-coded sections 52a (red), 52b (blue), 52c (white) and 52d (yellow), which is a standard symbol promulgated by the National Fire Protection Association.

Sign panels 60 are color-coded to match sections 52a-d. Thus, sign panel 60a is colored red to match section 52a, sign panel 60b is colored blue to section 52b, sign panel 60c is colored white to match section 52c, and sign panel 60d is colored yellow to match section 52d. Sign panels 60a-d each carry graphic information to advise a workman of the specific type of these four hazards that are found at the designated area. The bottommost sign panel 60e is used to provide additional information, such as the name of the particular hazardous material to which the sign relates.

Each sign panel 60 includes a dome 62 extending from its rear surface which is received in a recess (not shown) extending through the rear wall 42 of the holder, with the dome and recess aligned with one another when the sign panels are fully inserted in the holder so that the domes extend through the recesses as best seen in Fig. 7. The sign panels are fully enclosed by the front wall 41 of the holder, see Fig. 6, which is narrower than the rear wall in this second embodiment. This feature is useful in that it facilitates location of a specific sign chamber and insertion and removal of a sign panel into or from a sign chamber. Details of the tamper-resistant engagement of a dome and recess as well as insertion and removal of the sign panels are as described above in connection with the first embodiment.

Fig. 8 illustrates a third embodiment of a sign according to the present invention that is specifically designed to provide a directory such as may be used at an office. The sign includes a holder 70 including a large rear wall 72 and a group of three front walls 71 spaced from the rear wall and spaced from one another to provide three columns. Six sign chambers 77 are provided between each front wall and the rear wall by spacers arranged as described in the prior embodiments. There is an access slot 76 at an end of each sign chamber. A sign panel 90 is provided to fit into each sign chamber, each carrying graphic information 91 comprising the name of an individual. Each sign panel also includes a retaining element (not shown) extending from its rear surface and the rear wall includes a recess (not shown) aligned with each retaining element when a sign panel is fully inserted in a sign chamber, thereby retaining the sign panels in position in the manner described in the previous embodiments. The cooperative engagement of retaining element and a recess are as described above, as are the insertion and removal of individual sign panels.

Several prototype signs were constructed according to this invention and tested to evaluate the utility of its concepts. A prototype of the first embodiment of Figs. 1-5 was made with a rigid transparent acrylic front wall about 3mm (0.125") thick and a slightly flexible rear wall of vinyl about 0.8mm (0.030") thick spaced from one another with spacers to define two sign chambers. Prototypes of the second and third embodiments were made with front and rear walls each made of slightly flexible vinyl about 0.8mm (0.030") thick. The distance D between the front and rear walls of the prototypes was about 0.86mm (0.034"). Sign panels about 0.5mm (20 mils) thick were made for each prototype, and each sign panel included a dome 32 that extended about 3mm (0.12") from the front surface of each sign panel; the dome was about 5.8mm - (0.23") in diameter and was centered 6.4mm (0.25") from one edge of a sign panel. A recess 6.4mm (0.25") in diameter was formed through the rear wall of each holder and positioned to align with a dome when a sign panel was fully inserted in a holder. A mask was provided on the front wall of each holder. It was found that the retaining means comprising the domes and recesses were not apparent to an observer and that it was difficult to remove a sign panel from a sign chamber without knowledge of the retaining means, thereby providing a tamper-resistant sign in accordance with this invention. Also, however, removal of a sign panel with a tool as illustrated in Figs. 5-5d was readily accomplished, thus permitting facile changing of the sign panels by authorized personnel.

The foregoing describes a novel retaining means construction for a changeable sign that provides for tamper-resistant engagement between a holder and a sign panel inserted therein. The holder comprises front and rear walls spaced from one another a selected distance D by spacer means to define at least one sign chamber between the walls, and an access slot is provided in communication with the chamber along part of the periphery thereof. Access is limited to the balance of the periphery of the sign chamber by the spacer means along the boundary of the sign chamber, illustrated as spacers in the above embodiments that completely seal off the balance of the periphery of the sign chamber between the front and rear walls. However, the spacer means need not entirely seal off the chamber in this manner, and may only restrict access to the sign chamber to a sufficient

degree to prevent a sign panel from being withdrawn through the sign chamber except through the access slot. Thus, the spacer means may comprise any construction other than as described above that will accomplish this purpose, such as, for example, a series of short intermittent spacers arranged along the periphery of the sign chamber with a space between each spacer that is too small to enable the side panel to be withdrawn through it. The foregoing spacer means constructions in combination with the retaining means provide a high level of tamper-resistance for a changeable sign. Also, however, the spacer means may restrict access to only two sides of a sign chamber, thereby defining a chamber with access slots along the two other sides. The retaining means of this invention can be combined with spacer means of this latter construction and provide a useful but somewhat lesser degree of tamper-resistance.

A retaining element has been described above as a dome extending from and comprising an integral portion of a sign panel. However, the retaining element can also comprise a separate member that is joined to a sign panel, such as by adhesive fastening means or mechanical fastening means. The recess means is disclosed in the three exemplary embodiments described above as an aperture extending through the rear wall of the various holders; however, the recess means may also extend only partially into the rear wall, particularly when the wall is thick enough to incorporate a recess means shallower than the thickness of the wall that will still provide the desired tamper-resistant engagement between a retainer element and the recess means. Although only one retainer element and one recess means has been illustrated in the described embodiments, two or more such retainer elements and recess means may be incorporated in a sign construction, particularly with a very large changeable sign.

In the presently-preferred embodiments of this invention, at least one of the walls of the holder is to be at least slightly flexible so that it will flex sufficiently to enable the retainer element to enter into the sign chamber and engage with the recess means upon insertion of a sign panel into the holder. In the first embodiment, the flexible wall is shown as the rear wall of the holder and the front wall is rigid. In the second and third embodiments, both walls of the holder are of slightly flexible material. Also, the front wall of the holder may be flexible and the rear wall rigid in a holder that will meet the objectives of the present invention. As an alternative, also, the retaining element on the sign panel may be flexible and both walls of the holder rigid; the retaining element can be of rubber or other flexible or resilient material joined to the sign panel or a retaining element that is an integral portion of a sign panel can be formed to be thin enough or otherwise configured to be flexible. The holder may have front and rear walls of the same width or size as in the first embodiment, or the front wall may be narrower than the rear wall as in the second embodiment, or the holder can include a large rear wall with several front walls as in the third embodiment.

Numerous other modifications and changes to the three specific embodiments of this invention described above to illustrate its principles will become apparent to those skilled in the art. It is intended that the claims encompass all such obvious modifications and changes that remain within the spirit and scope of this invention.

Claims

I. A sign comprising a holder (I0,40,70) including a front wall (II,4I,7I) and a rear wall (I2,42,72) spaced from one another a distance (D) by spacer means (I3-I5,43,45) to define a sign chamber - (I7,47,77) therebetween, a marginal edge portion of the front wall (II,4I,7I) defining an access slot - (I6,46,76) in communication with the sign chamber (I7,47,77), and a sign panel (30,60,90) insertable through the access slot (I6,46,76) into the sign chamber (I7,47,77) for positioning behind the front wall (II,4I,7I) of the holder (I0,40,70), the sign panel (30,60,90) including graphic information on the front or rear surface thereof visible through the front wall(II,4I,7I), characterized in that a retaining element (32,62) extends from the front surface of the sign panel (30,60,90) a distance greater than the distance (D); recess means (I8,48) is defined in a wall of the holder (I0,40,70); the retaining element - (32,62) and the recess means (I8,48) being aligned when the sign panel (30,60,90) is fully covered by the front wall (II,4I,7I) of the holder (I0,40,70), and the retaining element (32,62) being received in the recess means (I8,48) to retain the sign panel - (30,60,90) in such position and thereby limit unauthorized removal of the sign panel (30,60,90) from the holder (I0,40,70); and the wall of the holder (I0,40,70) with the recess means (I8,48) or the retaining element (32,62) extending from the sign panel (30,60,90) is flexible upon insertion of the sign panel (30,60,90) into the sign chamber - (I7,47,77) and removal therefrom.

2. A sign according to claim I, characterized in that the front wall (II,4I,7I) of the holder (I0,40,70) is rigid and the rear wall (I2,42,72) of the holder - (I0,40,70) is flexible.

3. A sign according to claim I, characterized in that the front wall (II,4I,7I) and the rear wall - (I2,42,72) of the holder (I0,40,70) are both flexible.

4. A sign according to claim I, characterized in that the retaining element (32,62) extends rearwardly from the sign panel (30,60,90), and the recess means (I8,48) is defined in the rear wall (I2,42,72) of the holder (I0,40,70).

5. A sign according to claim I, characterized in that a mask (I9) on the front wall (II,4I,7I) covers the retaining element (32,62) and the recess means (I8,48) when the sign panel (30,60,90) is fully covered by the front wall (II,4I,7I).

6. A sign according to claim I, 2, 3, 4 or 5 characterized in that it includes a plurality of sign chambers (I7,47,77) and a plurality of sign panels - (30,60,90) insertable therein.

7. A sign according to claim I, 2, 3, 4 or 5 characterized in that it includes a plurality of sign chambers (47a-e); a portion of the front wall (4I) of the holder (40) defines a panel adjacent the sign chambers (47a-e); a color-coded symbol (52) is on said panel and includes a plurality of colors (52a-d) each designating specific information; and each sign panel (60) is color-coded to correspond to a selected one color (52a-d) of said symbol (52), there being at least one sign panel (60) for each such color (52a-d).

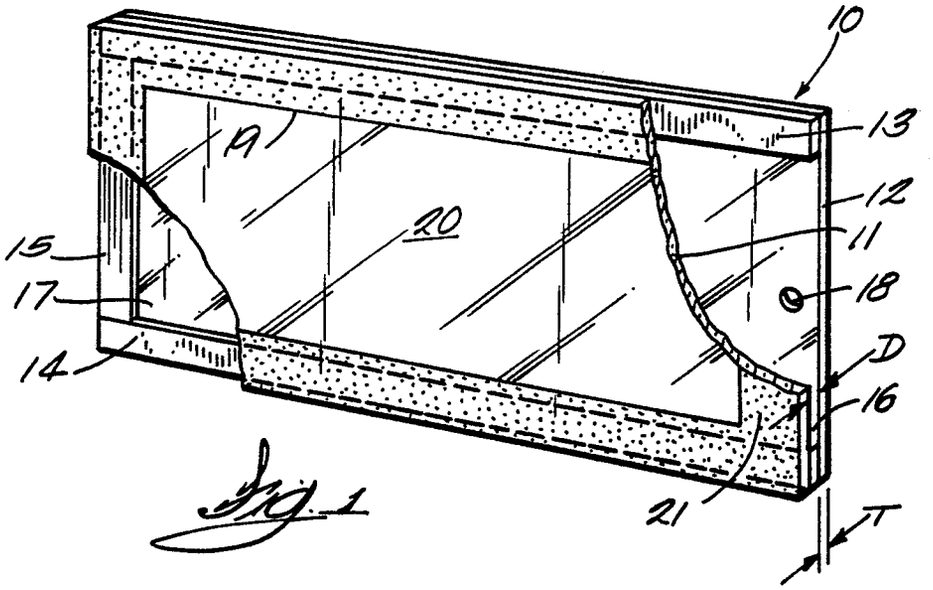

Fig. 1

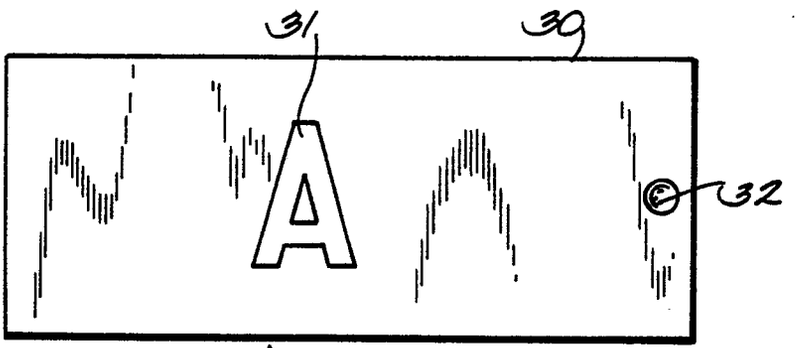

Fig. 2

Fig. 2a

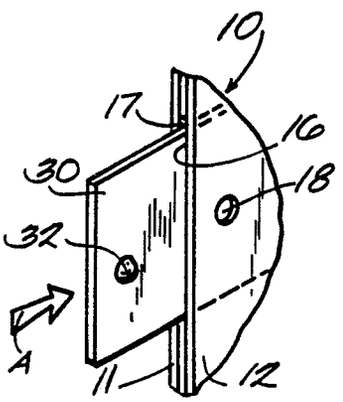

Fig. 3

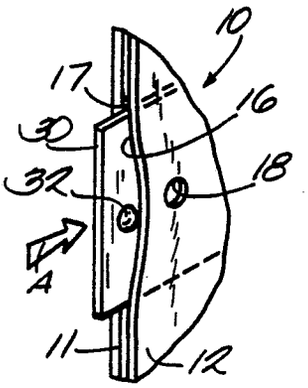

Fig. 3a

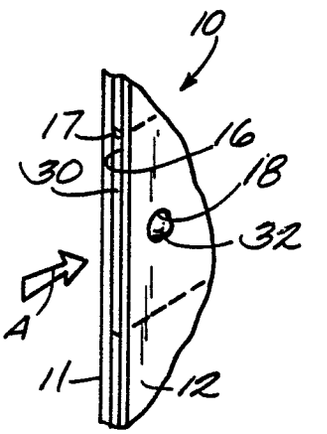

Fig. 3b

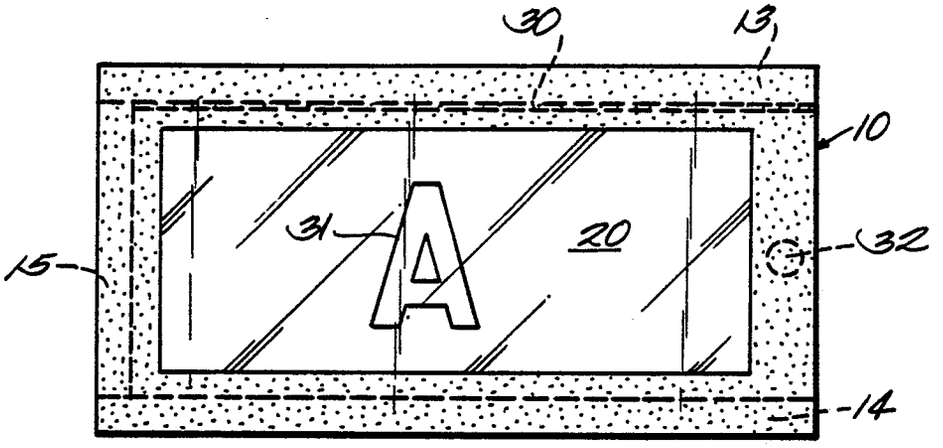

Fig. 4

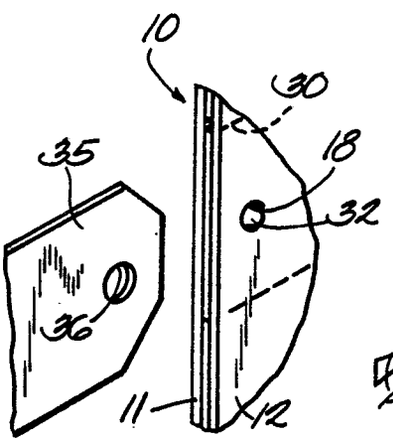

Fig. 5

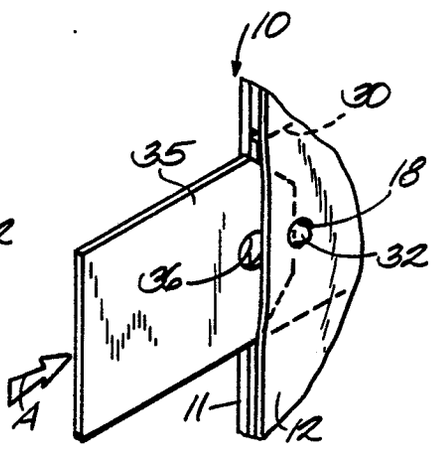

Fig. 5a

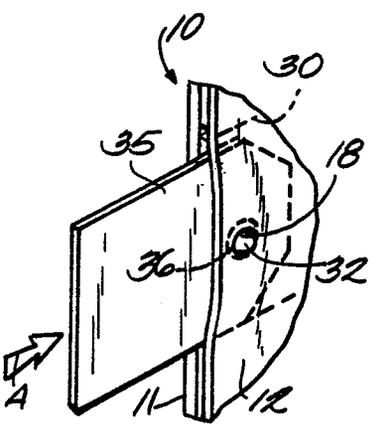

Fig. 5b

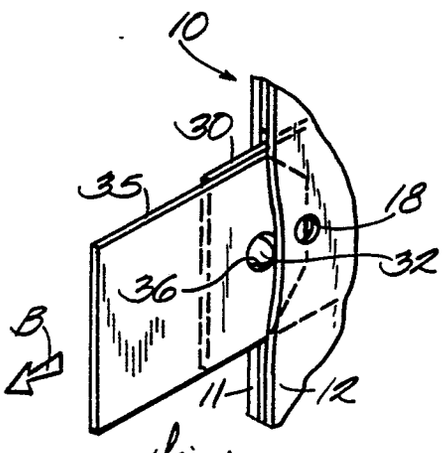

Fig. 5c

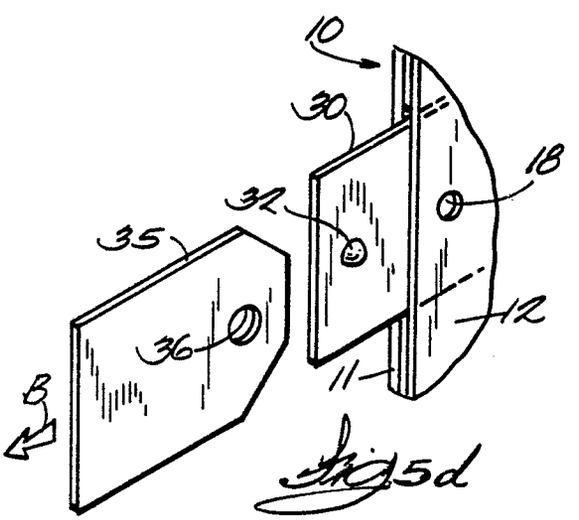

Fig. 5d

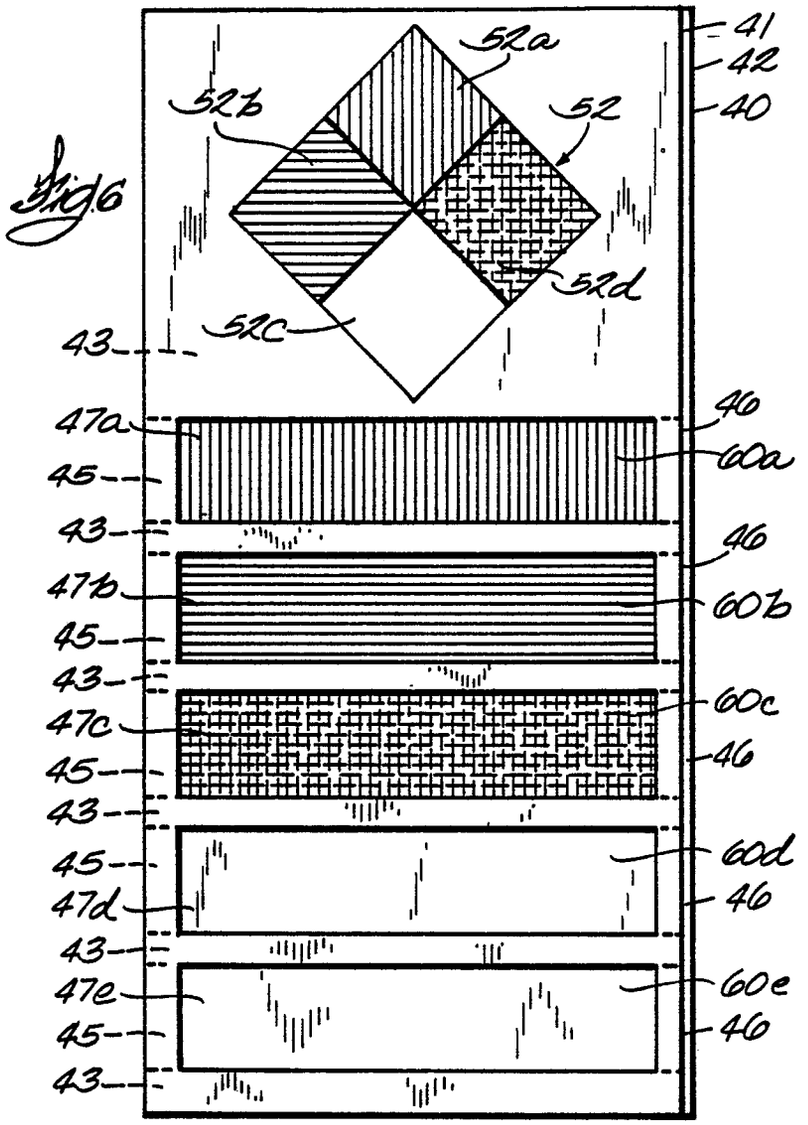

Fig.6

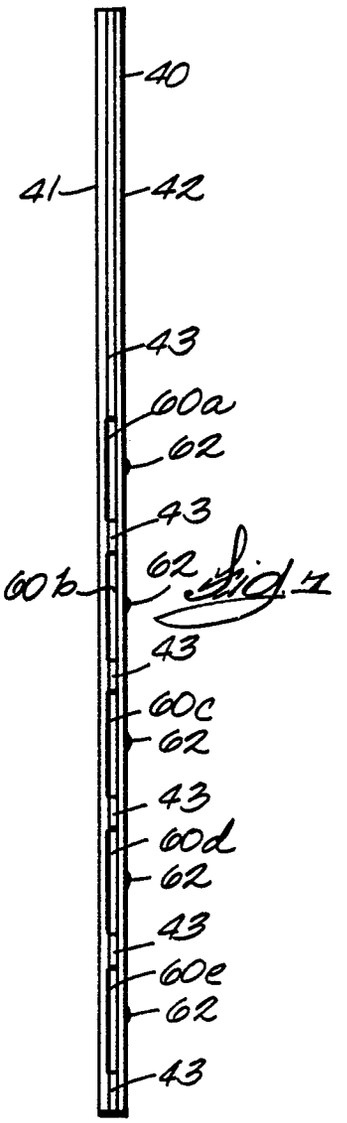

Fig.7

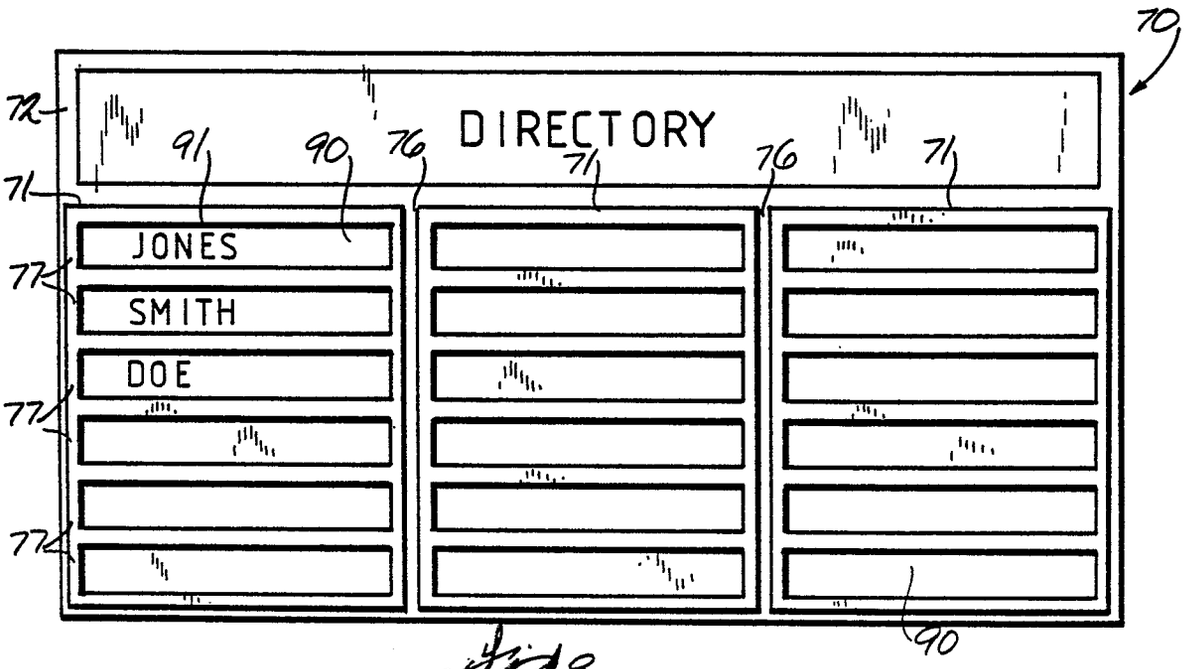

Fig.8