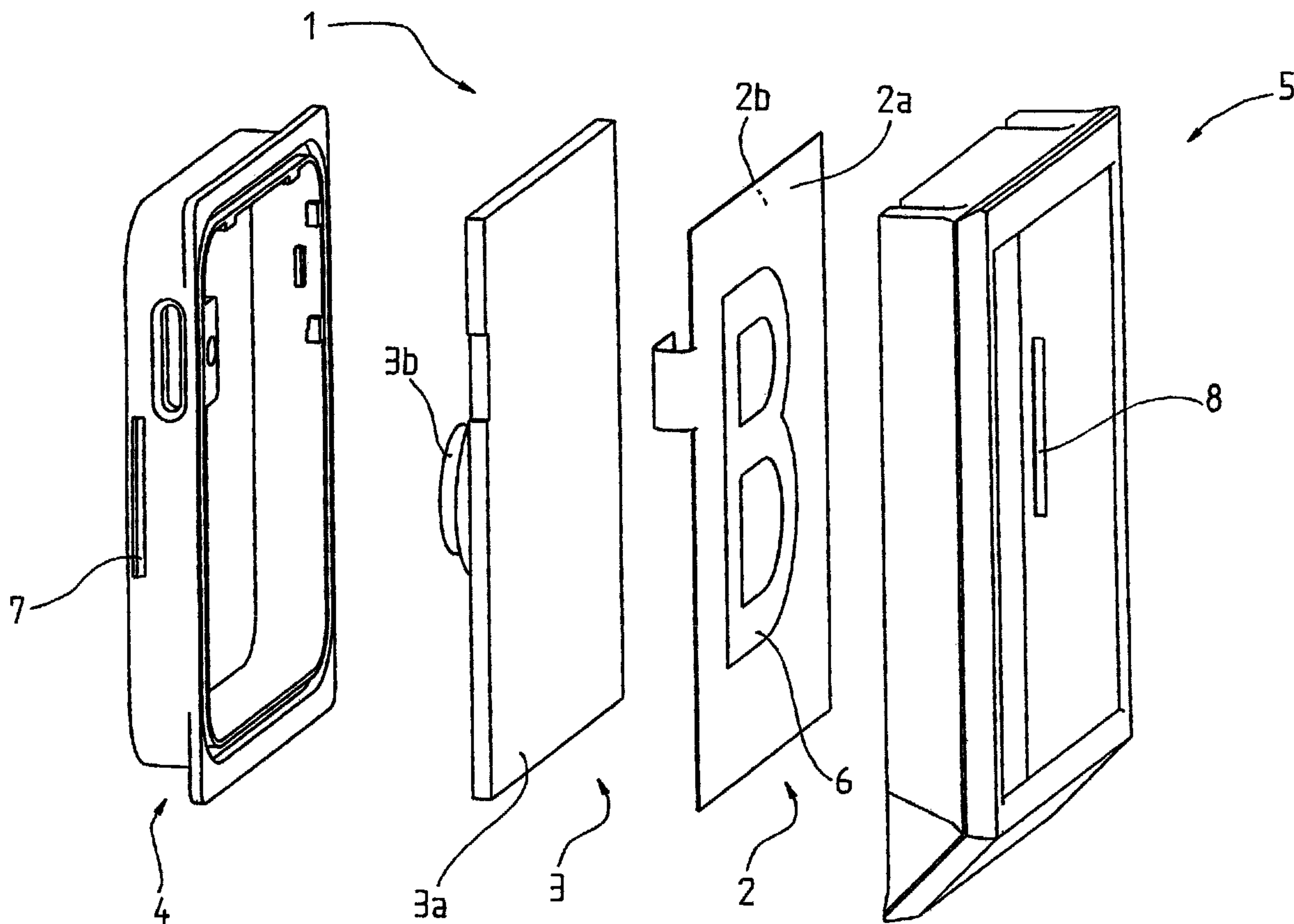




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 (72) Inventeur/Inventor:  
BARMET, LUKAS, CH  
 (73) Propriétaire/Owner:  
INVENTIO AG, CH  
 (74) Agent: RICHES, MCKENZIE & HERBERT LLP

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(57) Abrégé/Abstract:

The invention relates to an indicating device for a lift installation, wherein the indicating device (1) comprises an electroluminescent indicator (2) and sound-reproducing apparatus (3) and wherein the sound-reproducing apparatus (3) is glued to the rear side (2b) of the electroluminescent indicator (2).

**Abstract**

The invention relates to an indicating device for a lift installation, wherein the indicating device (1) comprises an electroluminescent indicator (2) and sound-reproducing apparatus (3) and wherein the sound-reproducing apparatus (3) is glued to the rear side (2b) of the electroluminescent indicator (2).

Fig. 1

## Description

### **Indicating device**

The invention relates to an indicating device, wherein the indicating device comprises an electroluminescent indicator and sound-reproducing apparatus.

In this application there is meant by indicating device a device which enables the reproduction of visual and/or acoustic data.

By sound-reproducing apparatus there is to be understood all apparatus which convert electrical signals into acoustic, audible signals, for example into words, music, especially sound tones and so forth.

There is known from the specification EP 0 403 232 an electroluminescent display system for a lift which comprises not only an electroluminescent screen for visual representation of lift data, but also a loudspeaker for acoustic reproduction of lift data. The electroluminescent screen is constructed in pixel-like manner and has a glass plate at its front side or illuminated side. The loudspeaker lies on the same plane as the electroluminescent screen, but at a specific spacing therefrom.

It is disadvantageous with this known solution that a separate place for the loudspeaker has to be present around the electroluminescent screen and at a spacing therefrom. The screen in that case is a thin-film electroluminescent screen which uses a glass plate as support material. This necessarily causes a thicker construction of the finished display system. Thus, quite a large amount of installation space for this known display is needed in the lift installation, which is also connected with higher production costs.

The invention has the object of proposing an indicating device of the kind stated in the introduction, which does not have the aforesaid disadvantages and which is space-saving.

This object is met by the features of claim 1, namely an indicating device for a lift installation, wherein the indicating device comprises an electroluminescent indicator and sound-reproducing apparatus and wherein the sound-reproducing apparatus is arranged at a side of the electroluminescent indicator.

An advantage is to be seen in that apart from the electroluminescent indicator, no separate space, which is spaced therefrom, is necessary for the sound-reproducing apparatus.

Advantageous developments and improvements of the indicating device stated in claim 1 are possible by the measures expressed in the dependent claims.

In one embodiment, the sound-reproducing apparatus is connected with the electroluminescent indicator. This has the advantage that the indicating device according to the invention can have a compact mode of construction. The sound-reproducing apparatus and the electroluminescent indicator can be assembled as one part.

In a further embodiment the sound-reproducing apparatus is connected with the electroluminescent indicator by means of an adhesive. This leads to a simple and uncomplicated capability of assembly of the electroluminescent indicator with the sound-reproducing apparatus.

In a further embodiment the sound-reproducing apparatus and the electroluminescent indicator are arranged one behind the other. In this embodiment the fact is advantageous that constructional space is required only in depth and not in width. The projection of the electroluminescent indicator onto a surface determines the requisite amount of area for the entire indicating device.

The sound-reproducing apparatus and the electroluminescent indicator can be arranged between a frame and a housing. This looks after a stable combination of the electroluminescent indicator and the sound-reproducing apparatus in the indicating device.

In addition, the sound-reproducing apparatus can be constructed as a flat loudspeaker. This leads to a thin mode of construction of the indicating device. These forms of loudspeakers can be glued in simple manner with the electroluminescent indicator, whereby its high qualitative properties are not lost.

In a further embodiment the electroluminescent indicator is constructed in accordance with the principle of thick-film electroluminescence. This has the advantage that no glass plate is present at the front side of the electroluminescent indicator, which leads to a space-

saving construction and favourable capability of manufacture. The illuminated side is constructed to be very thin and can be glued in a problem-free manner in front of sound-reproducing apparatus. Moreover, such electroluminescent lamps have an area illumination, which leads to a homogeneous illumination.

In addition, the electroluminescent indicator can be constructed as an electroluminescent lamp. This embodiment enables the use of a single electroluminescent lamp, which can be controlled in simple manner. Two terminals are sufficient for driving the electroluminescent lamp.

Moreover, the indicating device comprises a fixing means so that the indicating device is fixable to a wall of the elevator installation. In particular, these fixing means comprise a wall mount. The indicating device can be mounted quickly and in stable manner to a wall by these fixing means.

All explained features are usable not only in the respectively indicated combinations, but also in other combinations or by themselves without departing from the scope of the invention.

In one aspect, the present invention resides in an indicating device for a lift installation, wherein the indicating device comprises an electroluminescent indicator and sound-reproducing apparatus, wherein the sound-reproducing apparatus and the electroluminescent indicator are arranged one behind the other.

Different examples of embodiment of the invention are illustrated in the schematic drawings and explained in more detail in the following description, in which:

Fig. 1 shows an exploded illustration of an indicating device according to one embodiment of the invention,

3a

Fig. 2 shows a detail illustration from Fig. 1,

Fig. 3 shows the exploded illustration of Fig. 1 with additional illustration of fixing means,

Fig. 4 shows the indicating device of Fig. 1 in the installed state and

Fig. 5 shows one possible use of the indicating device according to the invention in a lift installation.

Figure 1 shows some components of an indicating device 1 for a lift installation in the uninstalled state. An electroluminescent indicator 2 and sound-reproducing apparatus 3 are arranged in alignment with a frame 4 and a housing 5. In this example, the electroluminescent indicator is constructed as an electroluminescent lamp 2 and the sound-reproducing apparatus as a flat loudspeaker 3. The flat loudspeaker 3 comprises a panel 3a and an exciter 3b. The electroluminescent lamp 2 is denoted in this application as an electroluminescent film 2. For the sake of simplicity the term electroluminescent is abbreviated in the following to the designation EL.

A symbol, which, for example, is in the form of a letter 6 which, for example, denotes a lift of a lift group, is applied to the EL film 2. These indicating devices can be arranged above a lift door on a storey of a building or at another favourable position. The EL film 2 and the flat loudspeaker 3 are assembled together with the frame 4 and the housing 5. The frame 4 has at its outer circumference lateral projections 7 which detent in corresponding complementary cut-outs 8 of the inner circumference of the frame 5 when the frame 4 and the housing 5 are assembled together. A simple snap connection is thereby achieved. Only one projection 7 and one cut-out 8 are shown in Figure 1. The frame 4 is so constructed that in the installed state a distortion of the flat loudspeaker 3 is prevented.

In Figure 2 there is illustrated a detail of Figure 1 in which the EL film 2 and the flat loudspeaker 3 are indicated in more detail. The EL film 2 has a front side or illuminated side 2a and a back side or rear side 2b. Denoted as front side 2a is the bright side, on which the letter 6 is readable. A layer of adhesive 9, by means of which the EL film 2 is fixedly connected with the loudspeaker 3, is applied to the rear side 2b, i.e. on the side of the EL film 2 facing the loudspeaker 3. The loudspeaker 3 is thus glued to the rear side 2b of the EL film 2 in the installed state.

The EL film 2 further comprises a flexible tongue 10 which has the electrical terminals 11 for the drive control and thus for illumination of the EL film. Two terminals 11 are sufficient in order to cause illumination of the EL film 2, i.e. the EL lamp. The tongue 10 is bent around a corresponding groove 10a in the flat loudspeaker 3. The ends of the electrical terminals 11 thus lie on the rear side of the flat loudspeaker 3 in the installed state, i.e. on the side of the flat loudspeaker 3 remote from the EL film 2.

The EL technology employed in the indicating device according to the invention is based on the principle of thick-film electroluminescence (TFEL). The EL film comprises thick-film EL components. The basic construction appears as follows: EL pigments (for example, ZnS:Cu) are arranged between two electrodes (anode and cathode). In electrical terms, this arrangement is like a capacitor. The voltage is applied to the electrodes and through excitation of the electrons in the EL pigment and return thereof into the basic state, radiation is emitted in accordance with the energy band diagram. The production of the thick-film EL components can be carried out by means of screen-printing techniques, which is relatively simple by comparison with other technologies. The construction of layers is typically as follows: starting with the carrier material, namely a transparent ITO (indium-tin-oxide) film, there follows a transparent, conductive layer, subsequently the active layer (consisting of EL pigments in a screen-printed matrix), a dielectric non-conductive layer and finally a silver (or graphite) electrode. Typical thicknesses of the printed layers for TFEL components lie in the range of 50 to 60 microns and typical thicknesses of the entire construction lie between, for example, about 200 and 400 microns. In order to achieve a high service life, the individual EL pigments can be encapsulated (for example, aluminium-hydroxide encapsulation) so as to protect these against moisture.

The use of a flat loudspeaker instead of a usual conical loudspeaker produces, apart from a thinner mode of construction, also a more diffuse radiation. The angle of radiation is less frequency-dependent than in the case of conventional loudspeakers. In flat loudspeakers the principle of function is based more on complex vibrations in a panel than on the movement of the diaphragm. The flat loudspeaker is particularly suitable for gluing with an EL film.

In Figure 3 there is illustrated, in addition to the already mentioned components of the indicating device 1, the fixing means by means of which the entire indicating device is fixed to a wall 20 or another favourable position of the lift installation. The inner circumference of the frame 4 has projections 12 and a support surface 12a, which are intended for reception of the electronic part 13. The electronic part is constructed as a printed circuitboard and is thus suspended on the projections 12 and on the support surface 12a of the frame 4. The EL film 2 and the flat loudspeaker 3 are assembled together with the frame 4 and the housing 5. The EL film 2 together with the flat loudspeaker 3 are received in the housing 5. The circumference of the housing 5 is for that purpose larger than the



circumference of the EL film or the flat loudspeaker 3. Due to the snap connection of the frame 4 with the housing 5 (that means in the installed state) it is achieved that the rear side of the loudspeaker 3 lies on a support surface 4a of the frame 4. The frame 4 is also received in the housing 5. In one variant the ends of the electrical terminals 11 of the EL film 2 lie, in the installed state, on the side of the loudspeaker 3 facing the printed circuitboard 13. In another variant, the ends of the electrical terminals 11 in the installed state lie between the printed circuitboard 13 and a spring element 14. In this case the tongue 10 is bent around the loudspeaker 3 and around a part of the frame 4, wherein the tongue 10 is guided through a cut-out 4b of the frame 4. The printed circuitboard 13 and the electrical terminals 11 are pressed together by the spring element 14. The printed circuitboard 13 and the spring element 14 are fastened by means of a fastening means 15, for example a screw, to the frame 4. The indicating device 1 further comprises a wall mount 16 which serves for mounting the indicating device 1 on a wall 20. A plug connector 17 is mounted on the wall mount 16 by means of further fastening means 18, for example screws. This plug connector 17 is so constructed that this can be inserted into the printed circuitboard 1. The wall mount 16 is then fastened to the wall 20. At the conclusion of the mounting, the housing 5, together with all elements already contained therein, i.e. EL film 2, flat loudspeaker 3, frame 4 and printed circuitboard 13, is placed against the wall mount 16 and fixed with the wall mount 16 by means of fastening elements 19, such as, for example, screws. A distortion of the flat loudspeaker 3 is thus further avoided, since the frame 4 is clamped between wall mount and housing.

Figure 4 shows a front view of the assembled indicating device 1 of Figure 1.

In Figure 5 there is indicated a possible use of the indicating device 1 according to the invention in a lift installation. The indicating device 1 is arranged above the lift door 21 and serves as a designation plate for lift passengers.

In a special embodiment a raster print can be provided on the front side or illuminated side 2a of the EL film 2. The body colour of the EL film 2 used in the indicating device 1 appears bright grey. This contrasts with the normally used zinc pressure-casting coloration of the housing 5. In order to avoid this contrast and to maintain the impression of a metal plate the EL film 2 can be subsequently printed with a raster of metallic colour. In the case of a mounting height of about 2 metres the raster printing is no longer recognisable. A raster is to be printed so that the illumination of the EL film still remains

visible to sufficient extent. The optical effect of a micro-raster printing in front of an EL film in order to simulate a metallic surface can also be used for other forms of light sources and use locations.

In principle, no limits are imposed on the shape of the indicating device. Areas up to several square metres are possible in theory.

The preferred field of use of the present invention is as a designation plate above the lift door, for example in conjunction with an already known destination call control (for example, MICONIC 10 (registered trade mark) of the applicant). In this connection, it fulfills the following task:

- acoustic guidance for visually-handicapped persons for lift cages (gong, lift designation, door status, service reports)
- visual guidance of aurally-handicapped persons (flashing).

Further fields of use are possible wherever a combination of acoustic and visual reports appear feasible, for example:

- travel direction indicator and acoustic reports to the storey in conventional controls,
- loudspeaker for communication interfaces and other acoustic reports in combination with an emergency illumination lamp,
- speech system with signal illumination in and outside the lift cage and
- further guidance systems with audio-visual support.

The indicating device according to the invention could also have several illuminated fields (service reports). The indicating device can be constructed in pixel-like manner with a corresponding number of terminals.

In addition, different forms of the loudspeaker and the film are possible and are simple to realise (oval, circular, etc.).

With the indicating device according to the invention a simple connection of a lamp with a loudspeaker is produced, which does not cause any acoustic problems, since they are firmly glued. Thanks to the EL technology there is achieved a flat illumination of the lamp.

## Reference numeral list

- 1 indicating device
- 2 EL indicator / EL lamp / EL film
- 3 sound-reproducing apparatus / flat loudspeaker
- 3a panel
- 3b exciter
- 4 frame
- 4a support surface
- 4b cut-out
- 5 housing
- 6 symbol / letter
- 7 projection
- 8 cut-out
- 9 adhesive
- 10 tongue
- 11 electrical terminal
- 12 projection
- 12a support surface
- 13 electronic part / printed circuitboard
- 14 spring element
- 15 fastening means / screw
- 16 wall mount
- 17 plug connector
- 18 fastening means
- 19 fastening means
- 20 wall
- 21 lift door

What is claimed is:

1. Indicating device for a lift installation, wherein the indicating device (1) comprises an electroluminescent indicator (2) and sound-reproducing apparatus (3), wherein the sound-reproducing apparatus (3) and the electroluminescent indicator (2) are arranged one behind the other.
2. Indicating device according to claim 1, wherein the sound-reproducing apparatus (3) is connected with the electroluminescent indicator (2).
3. Indicating device according to claim 2, wherein the sound-reproducing apparatus (3) is connected with the electroluminescent indicator (2) by means of an adhesive (7).
4. Indicating device according to any one of claims 1 to 3, wherein the sound-reproducing apparatus (3) and the electroluminescent indicator (2) are arranged between a frame (4) and a housing (5).
5. Indicating device according to any one of claims 1 to 4, wherein the sound-reproducing apparatus (3) is constructed as a flat loudspeaker.
6. Indicating device according to any one of claims 1 to 5, wherein the electroluminescent indicator (2) is constructed in accordance with the principle of thick-film electroluminescence.
7. Indicating device according to any one of claims 1 to 6, wherein the electroluminescent indicator (2) is constructed as an electroluminescent lamp.
8. Indicating device according to any one of claims 1 to 7, wherein the indicating device (1) comprises fixing means so that the indicating device (1) is fixable to a wall (20) of the lift installation.

9. Indicating device according to claim 8, wherein the fixing means comprises a wall mount (16).

10. The indicating device according to any one of claims 1 to 9, wherein the indicating device (1) is a display device.

Fig. 1

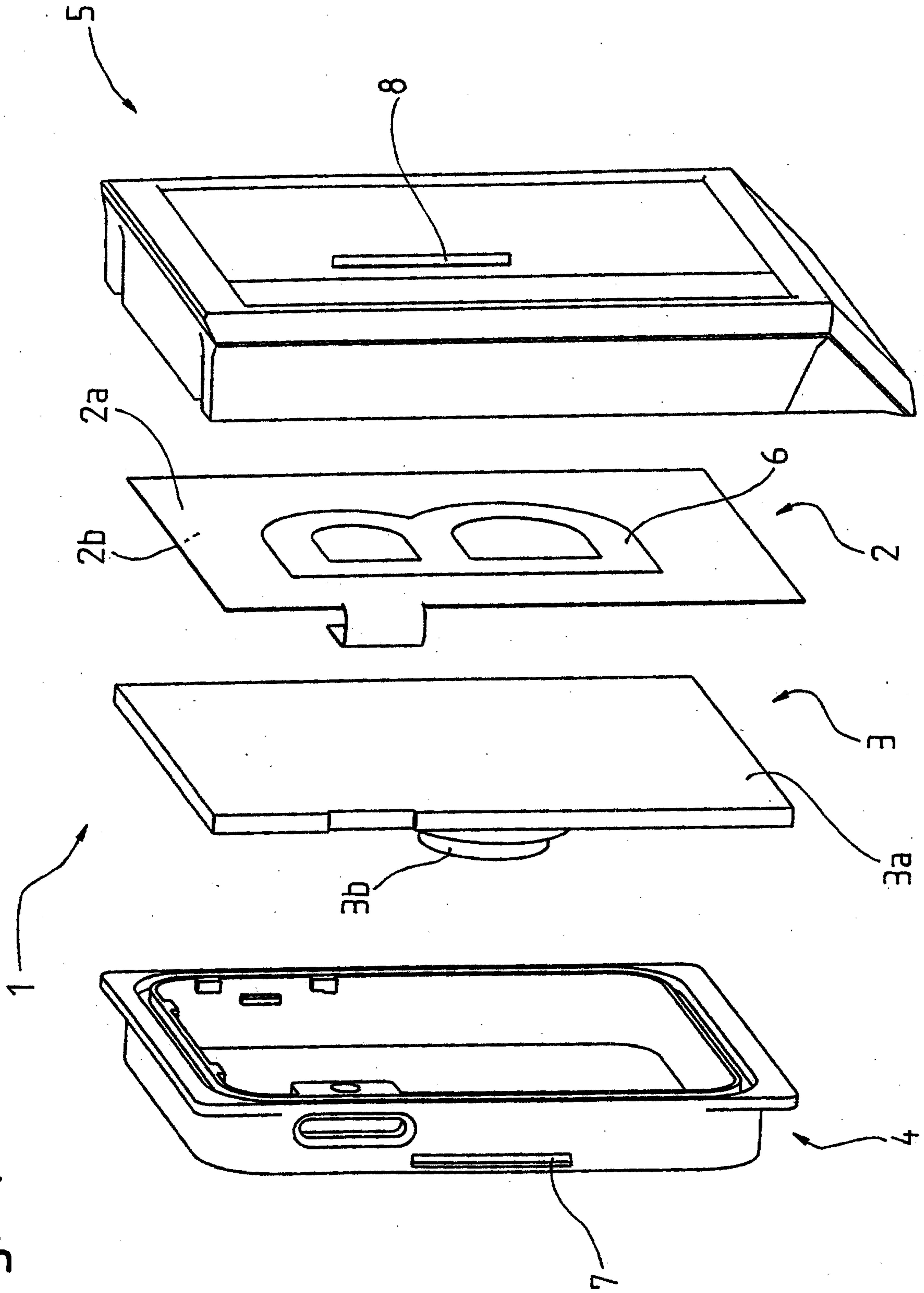


Fig. 2

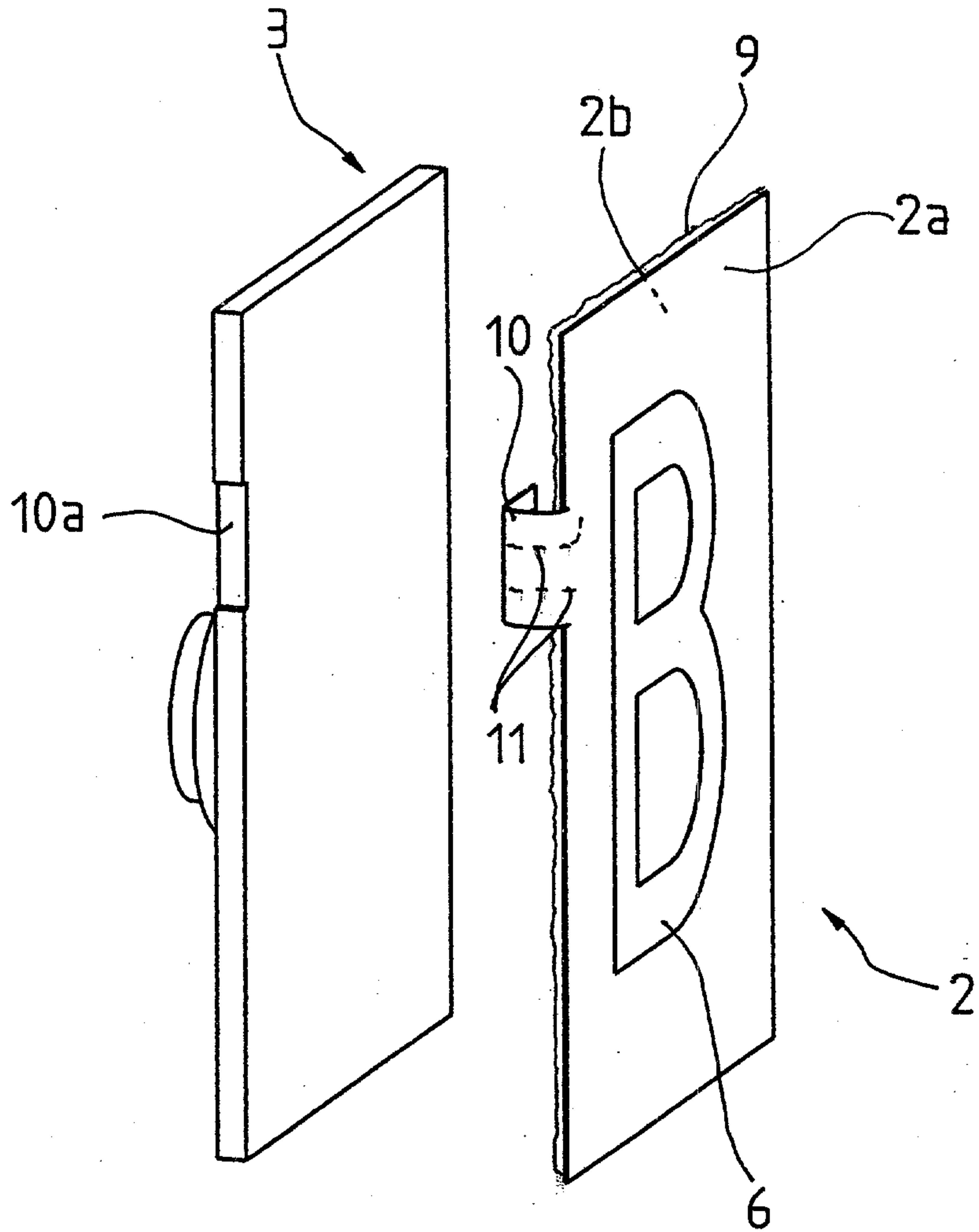


Fig. 3

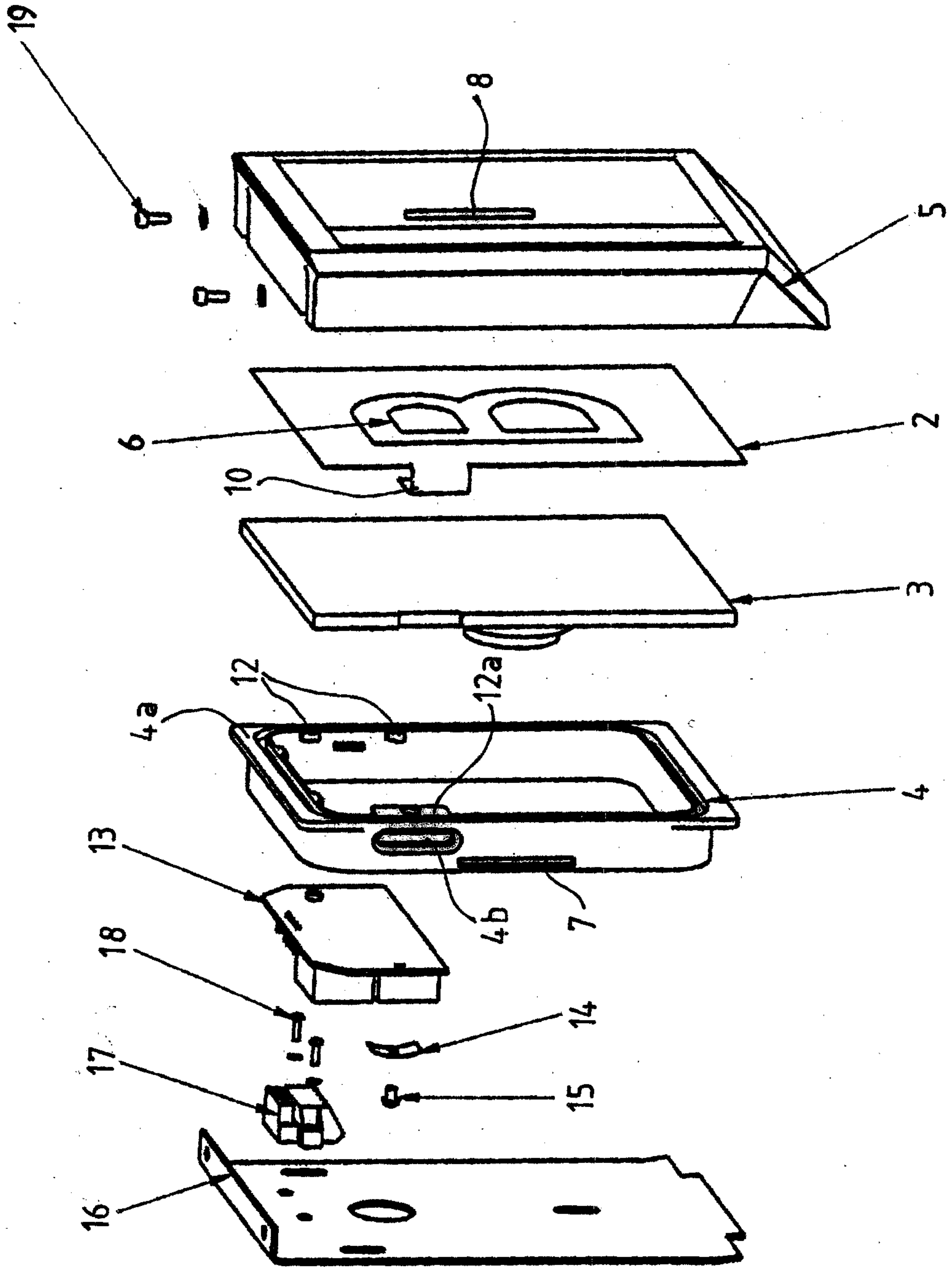




Fig. 4

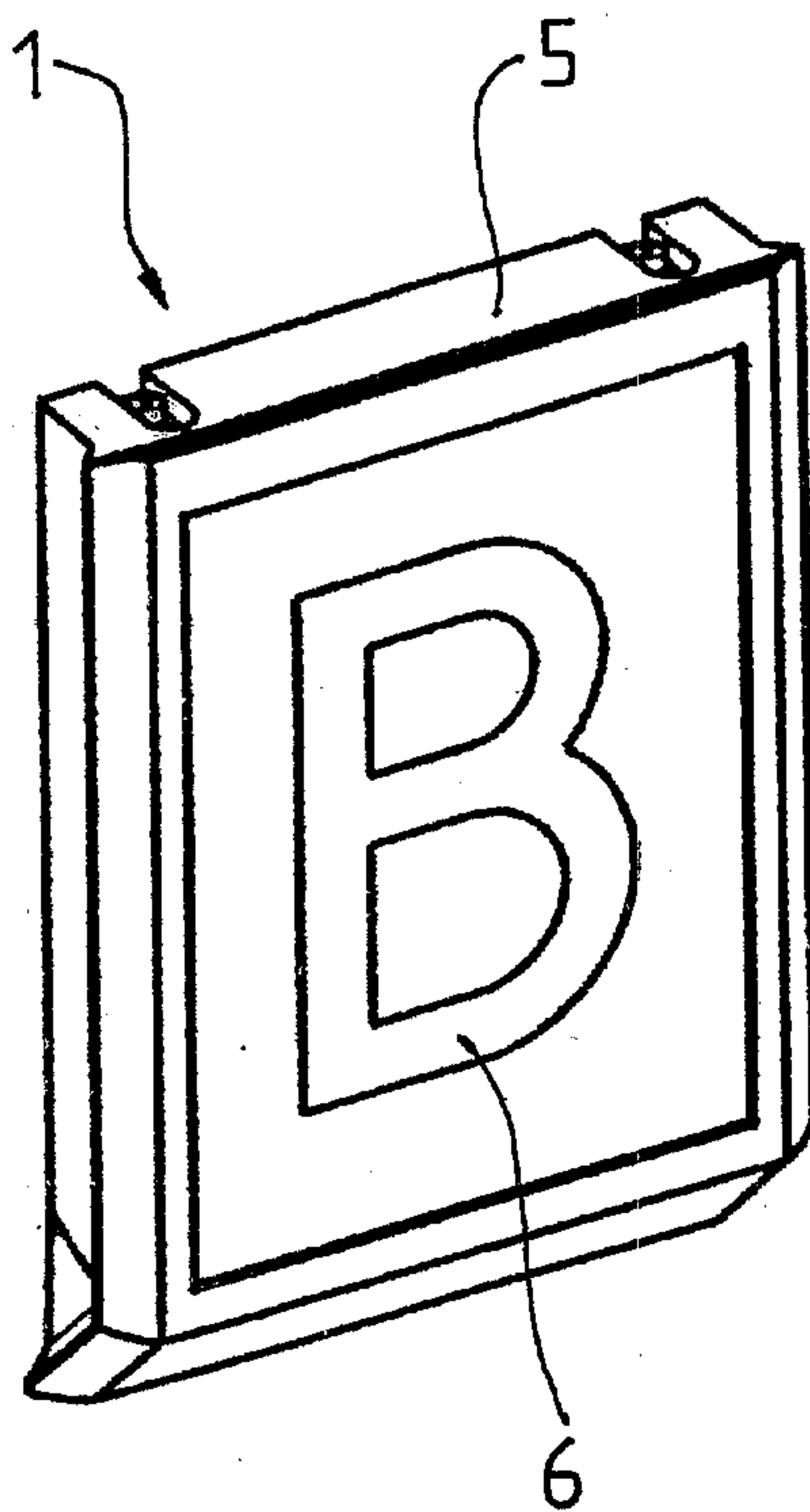


Fig. 5

