

(19)



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(11)

EP 0 831 445 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
25.03.1998 Bulletin 1998/13

(51) Int Cl.⁶: **G09F 3/20**

(21) Application number: **97830452.5**

(22) Date of filing: **16.09.1997**

(84) Designated Contracting States:
**AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC
NL PT SE**

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(30) Priority: **20.09.1996 IT MI961941**

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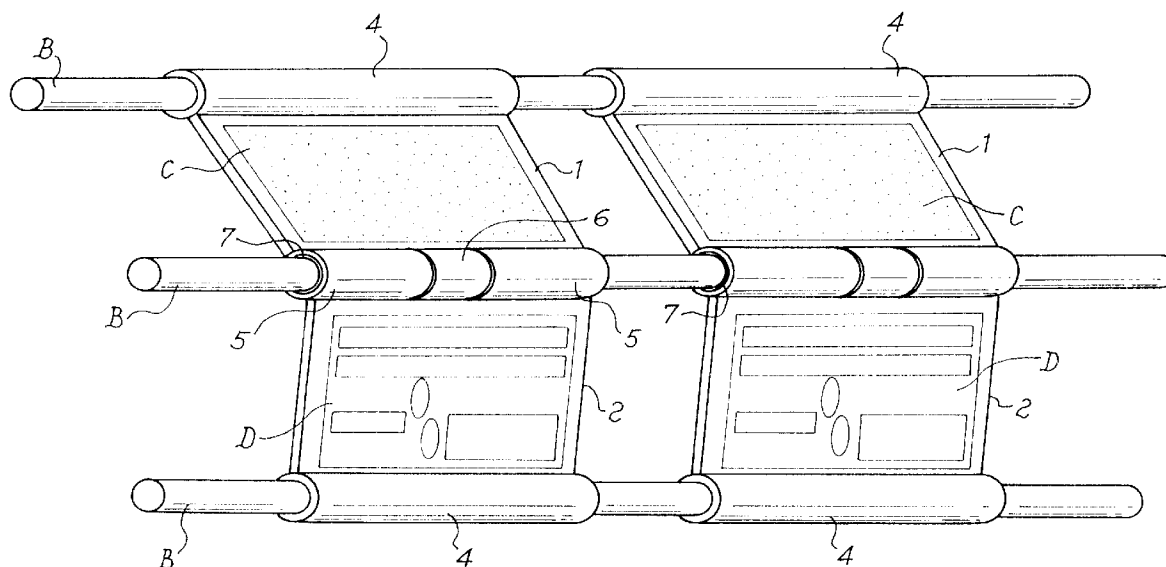
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(54) **Adjustable device for coupling electronic labels to shelves and the like**

(57) An adjustable device for coupling to shelves and the like an electronic label, including a solar cell (C) which feeds an LCD display (D) and the electronic control circuits therefor, includes a first plate (1) and a second plate (2) mutually hinged along a side thereof through a joint (3), each plate (1, 2) being provided with

a coupling element (4) arranged along a side opposite to the hinge side as well as with an inner cavity suitable to receive said solar cell (C) and said display (D) respectively. The joint (3) is obtained by forming along the facing sides of the two plates (1, 2) three complementary hollow lugs (5, 6) connected by a hollow transverse pin (7).

Fig. 7



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Description

The present invention relates to electronic labels for supermarkets and the like, and in particular to an adjustable device for coupling said labels to the shelves of the point of sale.

The term "electronic labels" is used here with reference to a displaying device essentially consisting of a liquid crystal display (LCD) controlled by a microprocessor and fed by a solar cell. An example of such a device is disclosed in the international patent application WO 95/25300 to which reference is made for structural details. Here it will be sufficient to recall that in this type of electronic label the supply to the LCD display and to the relevant electronic control circuits is provided by the solar cell only. In order to assure this supply, the solar cell must therefore have a minimum size which in the present case is equal to 95 x 28 mm. Also the display must obviously have a proper size, similar to that of the cell, so as to allow an easy reading of the displayed data.

Since the electronic labels have been designed to replace the conventional paper labels on the shelves of the points of sale, there is the problem of coupling them to the front edge of the shelves in such a way that they take up the same room. In particular, the thickness of the shelves is usually between 30 and 35 mm, while the label width must be limited to 120 mm. A height greater than 35 mm would result in the label projecting above or below from the shelf thickness, with consequent difficulties in placing or removing the goods from the shelf. Moreover, a width greater than 120 mm would not allow a full exploitation of the shelves in the case of small goods placed on the shelves with a high density, or it would result in having the label positioned below two adjacent products.

It is clear that an electronic label has a size larger than a conventional paper label, in particular due to the LCD display which must come along with the relevant solar cell as mentioned previously. However, owing to the above-mentioned size limitations it is not possible to reduce the size of the solar cell and/or the display, neither can be ignored the above-mentioned room limits on the shelves. Due to these reasons it is not possible to use a label wherein the solar cell and the display are arranged horizontally or vertically on the same plane.

In addition to the room limits, the electronic labels have other specific needs which paper labels do not have. First of all, the solar cell must be oriented so as to be exposed to a light flow as large as possible, otherwise it can not assure a sufficient supply to the LCD display. As a second point, also the LCD display has to be oriented differently according to the height of its position since the best view angle is quite small.

A first object of the present invention is therefore to provide a coupling device which meets all the above-mentioned requirements.

A further object of the present invention is to provide a device which allows the coupling and uncoupling of

the label only to the authorized personnel so as to prevent an easy removal of the labels by the customers, since their value is not negligible.

These objects are achieved by means of a device having the characteristics disclosed in claim 1.

The fundamental advantage of the device according to the present invention is to assure that all the above-mentioned requirements are met by a very simple and cheap structure, yet strong and versatile.

Another advantage of the present device is that it can be easily made with a kind of universal mechanical "interface" so that it can be adapted to any type of shelves.

These and other advantages and characteristics of the device according to the present invention will be clear to those skilled in the art from the following detailed description of two embodiments thereof, with reference to the annexed drawings wherein:

Figs. 1a and 1b are partial front and side schematic views, respectively, which show the general structure of the present device;

Fig. 2 is a schematic side view showing the elements which make up the present device;

Fig. 3 is a schematic side view showing three possible adjustments of said device;

Figs. 4a and 4b are schematic front views showing a first embodiment of the present device;

Figs. 5a and 5b are schematic side views showing a second embodiment of the present device;

Fig. 6 is a schematic perspective view of a shelf with an interface suitable for the coupling of the device illustrated in the preceding figures; and

Fig. 7 is a perspective view showing two electronic labels mounted on the shelf of fig. 6 by using the first embodiment of the present device.

Referring to figs. 1a, 1b and 2, there is seen that the device according to the present invention essentially consists of a first plate 1 and a second plate 2 mutually hinged along a side through a joint 3, each plate 1, 2 being provided with a coupling element 4 arranged along the side opposite to the hinge side. Both plates 1, 2 are made of a transparent material (plastic) at least on the face looking outwards (upper side in fig. 2), and have an inner cavity suitable to receive respectively the solar cell C and the display D, which is fed by cell C through the supply wires E passing through joint 3. The cavities which receive cell C and display D are hermetically sealed by airtight lids so as to protect the members of the electronic label by external agents (humidity, dust, liquids, etc.).

The presence of this joint 3 allows the adjustment of the angle α between plates 1 and 2, so as to be able to respect the room limits. In fact, fig. 1a clearly illustrates that by arranging plate 1 in a horizontal position and plate 2 in an almost vertical position, with an angle α of about 120° between the two plates, the label can

remain within the height H (30-35 mm) of the shelf R of the set of shelves since the thickness of plate 1 is a few mm. At the same time, fig. 1b clearly illustrates that also the front room limit is respected, since the two plates 1, 2 vertically superimposed remain within the width limit L equal to 120 mm.

It is clear that the above-described present device can be easily adjusted so as to arrange cell C and display D according to the best angles for catching the light and for the reading respectively. Figure 3 illustrates three examples of positions which the present device can take according to the height of the shelf R on which it is mounted. Since the lighting usually comes from above, obviously plate 1 containing cell C will be placed in a substantially horizontal or slightly inclined upper position. On the contrary, plate 2 will be arranged in a more vertical position, inclined downwards or upwards depending whether the label is placed respectively higher or lower than the eye level of the customers.

It is also clear that the supply wires E are provided with a length sufficient to maintain the connection between cell C and display D at any position of angular adjustment.

Referring now to figs.4a and 4b, there is illustrated a first embodiment of joint 3 which connects the two plates 1, 2. This first solution provides a "fork-like" joint obtained by forming on one of the two plates, plate 1 in the illustrated example, two outer hollow lugs 5 making up a "fork" wherein an inner hollow lug 6 formed on the other plate is inserted (fig.4a, the play between the parts is exaggerated for the sake of representation). The connection between the two plates is carried out by a pin 7 which is transversally inserted and then secured in any known way (fig.4b). Clearly the number and arrangement of the lugs which make up this type of joint may be freely changed. Furthermore, pin 7 is preferably hollow for the reason which will be explained further on.

Figures 5a and 5b illustrate a second embodiment of joint 3, which does not allow a complete freedom of the angle between the plates as in the above-described first embodiment, but does not require a separate element (pin 7) for assembling the device. As clearly shown in these figures, the joint is made up of two coaxial cylindrical bodies 8, 9 in mutual contact, respectively formed along facing sides of plates 1 and 2. The outer cylindrical body 9 lacks about 1/4 of the lateral surface so as to allow its rotation around the inner cylindrical body 8. It is clear that this type of joint has a limited angular stroke, ranging from the position of greatest angle between the two plates (fig.5a) to the position of smallest angle (fig.5b), which can be defined on the base of the missing portion of cylinder 9. However, the angular extension of cylinder 9 has to be such as to assure a permanent connection between the two plates, i.e. the integrity of the joint, in any angular position. It is obvious that nothing changes if the position of the two cylindrical bodies 8, 9 is inverted by forming the inner body on plate 2 and the outer body on plate 1.

With reference also to the scheme of fig.6, an interface for coupling the present device to a shelf S is now described. This interface essentially consists of a pair of vertical end supports T, secured to the shelf S by means of connecting elements F such as screws or the like, with two or more rods B (three in the illustrated example) extending between them with a circular cross-section. Supports T may be provided with mechanisms for adjusting the position of rods B and/or with a plurality of mounting seats for rods B so as to change their arrangement.

The coupling of the electronic label to shelf S is carried out by slipping the coupling elements 4 on rods B suitably arranged so as to achieve the desired angle between plates 1 and 2, i.e. between solar cell C and display D. In order to make tougher and safer the coupling of the label to the shelf, it is preferable that also joint 3 is slipped on a rod B (for this reason pin 7 is hollow). In this way, the labels form a unitary body with the shelf and rods B take up the frontal bumps that the labels may receive from the shopping trolleys, while preventing side bumps. The illustration of fig.7 shows said type of mounting of the labels through the coupling device of figs.4a, 4b.

It should be noted that if the coupling elements 4 consist of complete cylinders, the labels have to be inserted on rods B at the end, one after the other, but this is unpractical when an intermediate label has to be replaced. therefore, it is preferable that the coupling elements 4 are semicircular so that the label can be mounted directly in the desired position and subsequently removed without touching the adjacent labels. Obviously, in order to prevent its removal it is necessary to lock the coupling elements 4 on rods B by completing their cylindrical structure with rear shells, whose removal requires a specific tool supplied to the personnel of the point of sale. An example of this solution is illustrated in figs.5a and 5b, wherein the semicircular coupling elements 4' are completed by respective rear shells 4" which also provide the locking of the label in the required position by exerting a little friction on rods B.

Though the coupling elements 4 provide a tough anchoring for the label, nonetheless it is useful to provide the coupling device with an anti-theft sensor which indicates the unauthorized removal of the label. This sensor is housed in one of the coupling elements 4 so that it abuts against rod B when the label is positioned, and it may consist of a sliding electric contact (if rod B is of conducting material) or a membrane microswitch. This sensor is connected to an input of the label which monitors its logic state and therefore also the possible change of the logic state of said input in case of removal from rod B or if the label is pulled out of its seat in plate 2. In such an instance, the label transmits by radio an alarm signal to the system which controls the label apparatus, unless this check function has been previously deactivated by means of a proper command issued by a portable transmitter supplied to the personnel of the

point of sale.

It is clear that the above-described and illustrated embodiments of the device according to the invention are just examples susceptible of various modifications. In particular, joint 3 may be obtained through other types of mechanically equivalent structures, and the same can be said for the coupling elements 4 which may have a shape different from the hollow cylindrical shape shown in the figures.

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Claims

1. An adjustable device for coupling to shelves and the like an electronic label including a solar cell (C) which feeds an LCD display (D) and the electronic control circuits therefor, characterized in that it includes a first plate (1) and a second plate (2) mutually hinged along a side thereof through a joint (3), each plate (1, 2) being provided with a coupling element (4) arranged along a side opposite to the hinge side as well as with an inner cavity suitable to receive said solar cell (C) and said display (D) respectively. 15 20 25
2. A device according to claim 1, characterized in that the joint (3) is obtained by forming along the facing sides of the two plates (1, 2) three or more complementary hollow lugs (5, 6) connected by a hollow transverse pin (7). 30
3. A device according to claim 1, characterized in that the joint (3) is obtained by forming along the facing sides of the two plates (1, 2) two coaxial cylindrical bodies (8, 9) in mutual contact, the outer cylindrical body (9) lacking a portion of the lateral surface so as to allow its rotation around the inner cylindrical body (8). 35
4. A device according to any of the preceding claims, characterized in that the coupling elements (4) and the joint (3) have a hollow cylindrical structure. 40
5. A device according to claim 4, characterized in that the cylindrical structure of the coupling elements (4) consists of a semicircle (4') integral with the plates (1, 2) and a rear shell (4'') which can be removed only by means of a specific tool. 45
6. A device according to one or more of the preceding claims, characterized in that it further includes an anti-theft sensor housed in one of the coupling elements and connected to an input of the control circuits of the electronic label. 50 55
7. A device according to claim 6, characterized in that the sensor is a membrane microswitch.

8. A device according to claim 6, characterized in that the sensor is a sliding electric contact.

9. A device according to one or more of the preceding claims, characterized in that the cavities which receive the solar cell (C) and the display (D) are hermetically sealed by airtight lids.

Fig. 1a

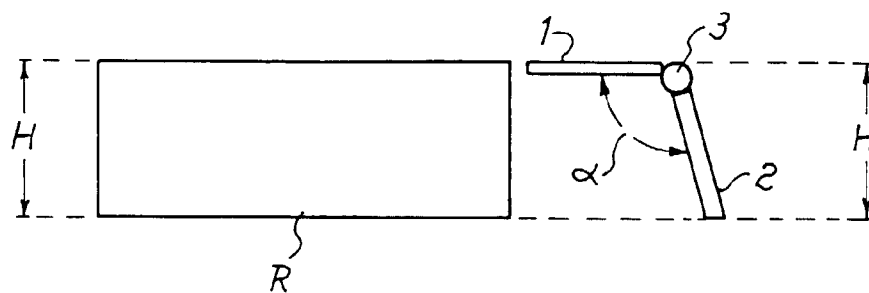


Fig. 1b

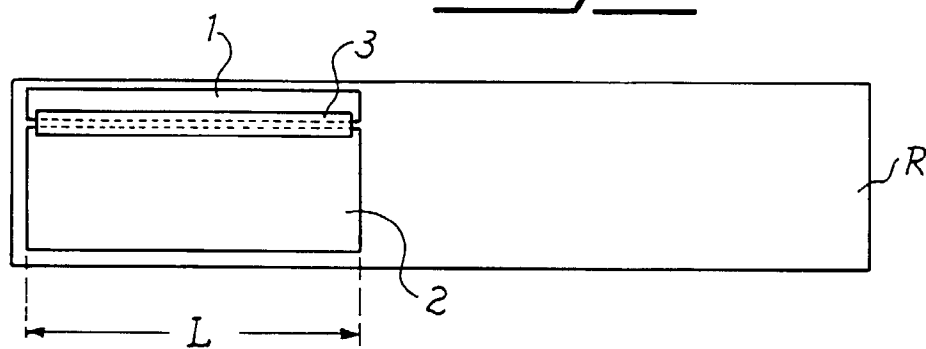


Fig. 6

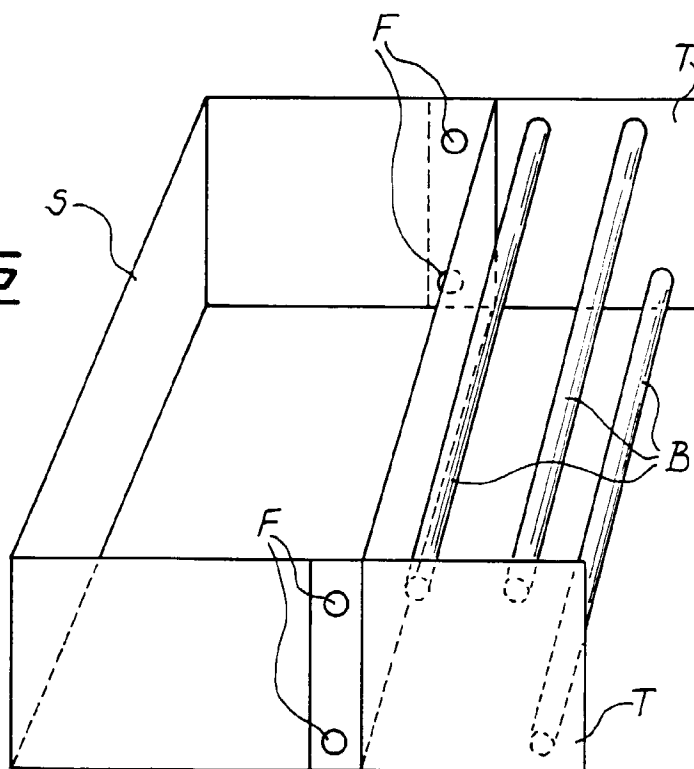


Fig. 2

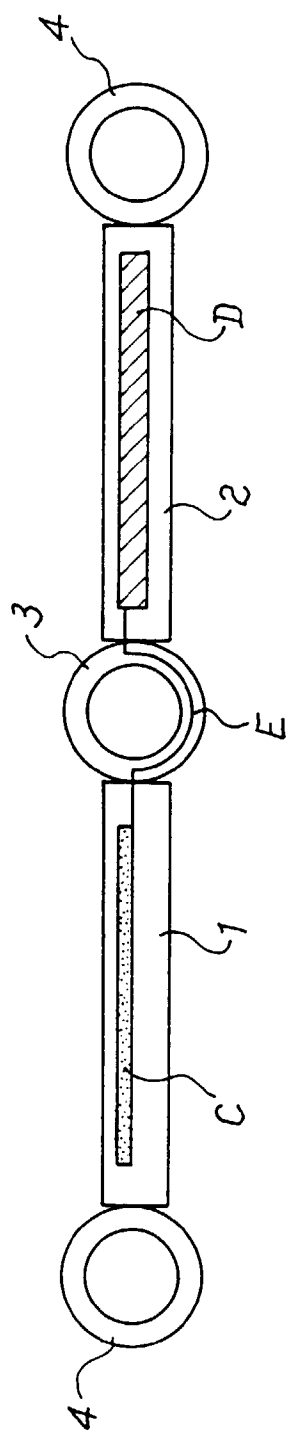


Fig. 3

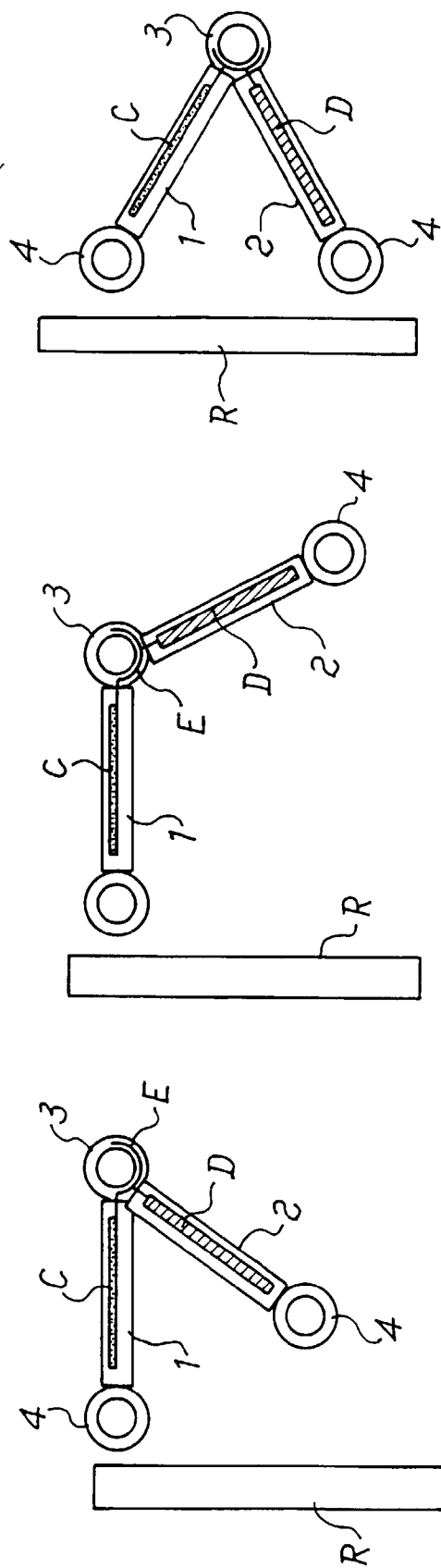


Fig. 4a

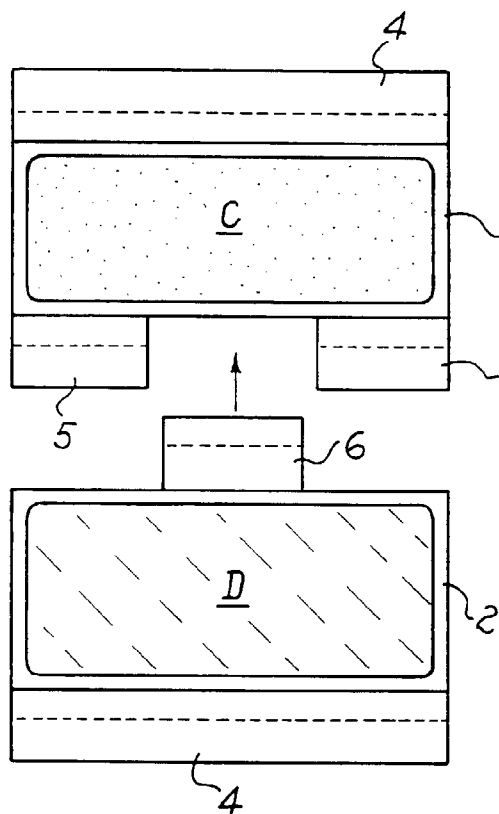


Fig. 4b

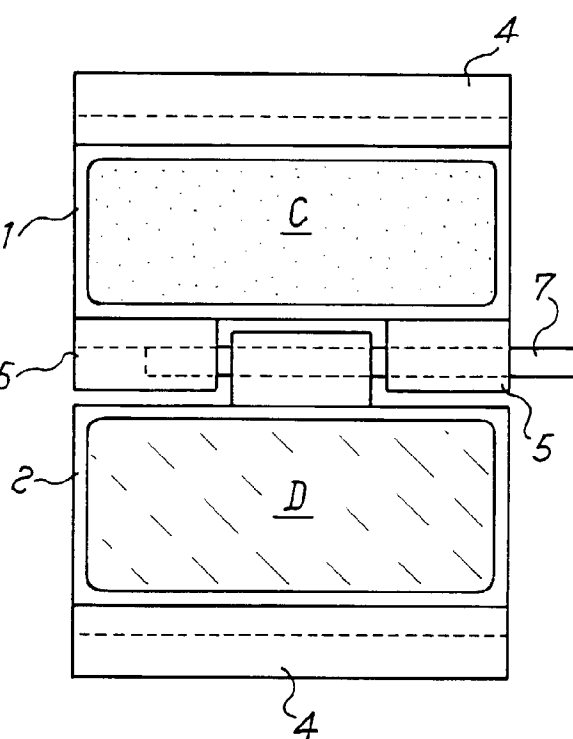


Fig. 5a

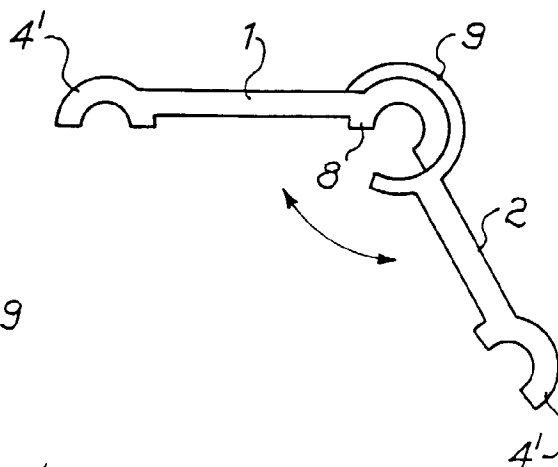


Fig. 5b

