

12

EUROPEAN PATENT APPLICATION

Application number: 82302152.2

Int. Cl.³: **G 08 B 25/00**
H 01 H 9/28

Date of filing: 27.04.82

Priority: 28.04.81 GB 8113059

Date of publication of application:
01.12.82 Bulletin 82/48

Designated Contracting States:
AT BE CH DE FR GB IT LI LU NL SE

Applicant: **TANN-SYNCHRONOME LIMITED**
Station Road
Westbury Wiltshire BA13 3JT(GB)

Inventor: **Anderson, Michael**
33, Bradley Road
Warminster Wiltshire(GB)

Inventor: **Mitchell, Peter John**
57, The Common
Boughton Gifford Melksham Wiltshire(GB)

Inventor: **Watkins, Antony John**
57, Manor Fields
Bratton Wiltshire(GB)

Representative: **Evans, David Charles et al,**
F.J. CLEVELAND & COMPANY 40-43, Chancery Lane
London, WC2A 1JQ(GB)

54 Mechanically actuated signalling apparatus.

57 A signalling apparatus of the type including a switch member (8) biased from its signal-operating position by a breakable member (11) which upon breakage allows the switch to move to its signal operating position, is provided with a fulcrum element (6) on which said breakable member (11) bears, and which is so located that upon breakage of the breakable member (11) said element (6) remains in contact with the same broken portion (12) of the breakable member as the switch member, thereby both preventing ready access to the switch and allowing the switch member to move to its alarm-operating position by applying a pivotal force to said broken portion (12) of the breakable member (11) about the fulcrum element (6).

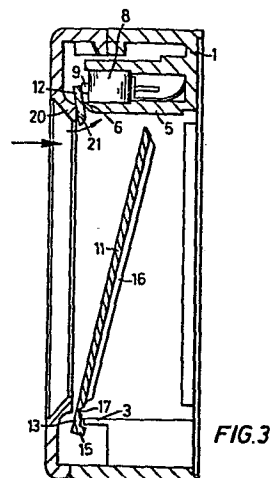


FIG. 3

- 2 -

DESCRIPTION

This invention relates to mechanically actuated signalling apparatus, and may find particular application in signalling apparatus for electrical fire alarms.

5 The types of alarm actuation apparatus in which a glass plate is broken to produce a signal to operate a fire alarm are well known. Some of these types of apparatus are adapted to be operated by the impact from, for example, a
10 small hammer which is provided in association with the apparatus, while others are adapted to operate under a steadily applied force, such as that which could be applied by hand alone. It has been customary in the past to use a small
15 plate of glass as the breakable element in these types of apparatus but the pieces of broken glass that are left after operation can be a hazard. It is therefore desirable to use an alternative material such as a thermoplastics material which
20 does not leave jagged pieces when broken and has a better response to a steady force applied directly by hand. Once broken, the mechanical constraint imparted by the plate on an operating member inside the apparatus, normally a moving portion
25 of a switch, is removed.

- 3 -

With either type of breakable member,
but particularly with the plastics type, provision
may need to be made to ensure that once broken,
pieces of the broken plate do not remain in such
5 a position relative to the operating member inside
the apparatus, that the operating member is still
not free to operate. This is of particular
importance where the movable switch member is in
the vicinity of an edge region of a breakable
10 plate when this region is purposely arranged to
be inaccessible from the exposed area of
the apparatus. This inaccessibility is desirable
so that it is not easy to move the operating
member of the switch back to its non-operative
15 position once the breakable member has fractured.
The problem that arises from this is that pieces
of the broken plate may remain in the inaccessible
regions of the apparatus and not allow the movable switch
member to operate properly. It is an object of
20 the present invention to provide signalling
apparatus of the kind employing a breakable
member in which this problem is alleviated.

According to the present invention there is
provided a signalling apparatus comprising a biased

- 4 -

switch member (8) held from its signal-operating position by a breakable member (11) which upon breakage allows the switch to move to its signal operating position;

5 characterized in that a fulcrum element (6) is provided on which said breakable member (11) bears, and which is so located that upon breakage of said breakable member (11) said element (6) remains in contact with the same broken portion (12)
10 of the breakable member as the switch member, thereby to allow the switch member to move to its alarm-operating position by applying a pivotal force to said broken portion (12) of the breakable member (11) about the fulcrum element (6).

15 The fulcrum element (6) is in the general form of a knife edge disposed in opposition to a casing element (21) spaced from, and extending at least substantially parallel to said edge to define an opening therebetween to accommodate the broken
20 portion (12), whereby on breakage of the member (11) the pivot axis about which the force acts lies along a line between said knife edge and said casing element (21).

 The breakable member (11) may include one or
25 more weakened areas (17) along which fracture occurs

- 5 -

when it is broken, the switch member and the fulcrum element being on the same side of each weakened area (17). The breakable member (11) may be a laminar piece of material mounted in a housing (20) such that a large part of one of its major surfaces forms a facing surface of an alarm actuation device, the marginal regions of the piece of material being located within the housing and said switch member being arranged to act on an enclosed marginal region of a major surface of the piece of material.

In a preferred embodiment the fulcrum element defines one side of a narrow opening through which the breakable member (11) extends, a marginal area of the breakable member and the switch member (8) being beyond this opening and enclosed by the housing so that manual access to the switch member (8) after the breakage is prevented

- 6 -

by the narrow width of the opening.

Embodiments of the invention will now be described by way of example only with reference to the accompanying drawings. In the drawings:

5 Figure 1 is an exploded view of signalling apparatus for use in an electrical fire alarm system;

Figure 2 is a cross-sectional view through the apparatus of Figure 1 viewed from the side; and

10 Figures 3 and 4 are similar cross-sectional views to that of Figure 2 but showing the position of components of the apparatus after breakage of a breakable member and illustrating two breaking modes.

15 Referring to the Figures, a unit for actuating a fire alarm comprises a main box housing 1 and includes within it a smaller box housing 2 both housings having a common, open, frontward-facing side. The inner housing 2 includes a horizontal wall 3 at
20 its lower end, the edge surface of which, facing outwardly from the main housing 1 has a shallow receiving-recess 4. The upper part of the inner housing 2 comprises a horizontal ledge 5 the forward edge 6 of which is tapered to a blunt knife-edge. Below its
25 lower corner towards the centre of the main housing 1 the inner

- 7 -

housing 2 has a projecting boss 7 with a screw threaded bore for locating a cover plate, as will be described. Between the upper surface of the inner housing 2 and the upper wall of the main housing 1 is located a micro-switch 8 with an actuating button 9 facing outwardly from housing 1. The surface of the micro-switch 8 is set just behind the outward facing edges of the housing 2, but the actuating button 9 extends outwardly beyond these edges. The main housing 1 includes, on the exterior of its upper wall, two moulded hinge-receiving recesses 10.

The breakable element of the apparatus is a moulded plate of clear plastics material 11 which is generally rectangular in outline. This breakable plate is shaped to fit over the area defined by the inner housing 2. The plate 11 is shorter in the horizontal direction, and on its two shorter edges are respective small tabs 12 and 13 integrally moulded with the main portion of the plate. The upper tab 12 is adapted to be disposed over the actuating button 9 of the micro-switch when the breakable plate 11 is located, so that the rear surface 14 of the tab 12 depresses the button 9. The lower tab 13 is located in the recess 4 in forward edge of the ledge 3 of the inner housing 2 so that the lower horizontal edge

- 8 -

of the breakable plate 11 rests on the ledge 3.

The lower end of the rearward facing surface of the tab 13 is provided with a horizontal lip 15 which is adapted to be positioned just beneath the ledge 3 and so prevent the breakable plate 11 from rotating outwardly from its vertical, located position.

The breakable plate 11 has, along its longer, vertical edges, an integral thickened region 16 which extends the full height of the plate and serves to strengthen the main body of the breakable plate against forces applied perpendicular to its face. However, in contrast to the strengthened elements, the breakable plate 11 is weakened by the inclusion of two V-shaped grooves 17 in its rear surface extending along the junction line between each of the tabs 12 and 13 and the main area of the plate. These grooves become preferential breaking lines when a perpendicular force is applied to the main face of the plate.

A front cover 18 is provided for the apparatus and this covers the forward facing opening of the housing 1 but has a rectangular aperture 19 corresponding to the position of the breakable plate 11 when located over the inner housing 2. Surrounding the rectangular aperture

- 9 -

19 on the front cover 18 and projecting from the rearwardly facing surface of the front plate is a rim 20 whose rearwardly facing edge 21 bears directly on the frontward surface of the breakable plate 11 to define
5 a central, exposed area of the plate and a marginal region around the perimeter of the plate which is obscured within the housing.

Figure 2 illustrates the manner in which the edge surface 21 of the front cover engages the edge
10 region of the breakable plate 1 and forces it against the blunt knife edge 6 of the ledge 5 of the inner housing and also against the actuating button 9 of the micro-switch 8. At the lower end of the breakable plate 11 edge surface 21 of the rim 20 forces the plate 11
15 against the lower ledge 3 of the inner housing 2. The front cover plate 18 is fixed to the housing by hinges 30 locating in the recesses 10 on the main housing and by a socket-headed screw 22 on the lower margin of the front plate which fits in the threaded bore through the
20 boss 7 on the inner housing 2. As the fixing screw 22 is tightened it draws in the front cover 18 causing the upper element tab 12 to depress the actuating button 9 of the microswitch.

The microswitch 8 is of sub-minature size
25 and is connected to an electrical circuit which extends to control equipment of a fire alarm system. When the actuation button 9 is released switch contacts of

- 10-

the microswitch 8 change state and a signal is transmitted to the control equipment, thereby indicating an alarm condition. Figure 2 illustrates the position of the components in the normal state when the apparatus is not
5 operated and no alarm signal is transmitted.

When a certain amount of manual pressure is applied at any point of the exposed area of the breakable plate 11 of the plate will break, and
10 will do so along one or other of the V-shaped grooves 17. This results in one of the tabs 12 and 13 becoming broken off; Figures 3 and 4 of the drawings illustrate the consequences of this. In the breakage mode illustrated in Figure 3 the
15 upper tab 12 is the one which is broken off to leave the main portion of the breakable plate attached to the lower tab 13. The location of the lower rim 20 of the cover plate in relation to the ledge 3 of the inner housing ensures that this
20 main portion pivots towards the back of the cavity while the tab 12 under the action of the bias force of the actuating button 9 pivots about the edge 6 as a fulcrum without being fouled by the broken tab 12.

25 Figure 4 illustrates the breakage mode in which the lower tab 13 is broken off from the main portion of the plate 11. In this case the

- 11 -

lower broken edge of the main portion of the plate 11 is free to move inwardly into the cavity contained within the housing 2 but not outwardly because of the obstruction by the rim 20 of the cover plate. Thus the bias force of the microswitch actuation button 9 can again prevail, in this circumstance by pivoting the tab 12 about the fulcrum 6, whereupon the main part of the plate 11 moves inwardly and again the microswitch is operated without being impeded by the broken plate.

It will be appreciated that whichever mode of breakage occurs the microswitch actuation button 9 will still operate and the electrical signal indicating an alarm condition will be sent to the control box. It will also be appreciated that the small gap between the surface 21 of the upper rim 20 of the cover plate and the fulcrum edge 6 makes it extremely difficult for the switch to be reset from the front opening of the apparatus. To reset the microswitch the unit must be opened and fitted with a new breakable element.

CLAIMS

1. A signalling apparatus comprising a biased switch member (8) held from its signal-operating position by a breakable member (11) which upon breakage allows the switch to move to its signal operating position;

characterized in that a fulcrum element (6) is provided on which said breakable member (11) bears, and which is so located that upon breakage of said breakable member (11) said element (6) remains in contact with the same broken portion (12) of the breakable member as the switch member, thereby to allow the switch member to move to its alarm-operating position by applying a pivotal force to said broken portion (12) of the breakable member (11) about the fulcrum element (6).

2. An apparatus according to claim 1 characterized in that the fulcrum element (6) is in the general form of a knife edge disposed in opposition to a casing element (21) spaced from and extending at least substantially parallel to said edge to define an opening therebetween to accommodate the broken portion (12); whereby on breakage of the member (11) the pivotal axis about which the force

acts lies along a line between said knife edge and said casing element (21).

3. An apparatus according to either of the foregoing claims, characterized in that the breakable member (11) includes one or more weakened areas (17) along which fracture occurs when it is broken, and in that the switch member (8) and the fulcrum element (6) are on the same side of each weakened area (17).

4. An apparatus according to any preceding claims, characterized in that the breakable member (11) is a laminar piece of material, mounted in the housing (20) such that a large part of its major surface forms a facing surface of an alarm actuation device, and in that marginal regions of the piece of material are located within the housing; said switch member being arranged to act on an enclosed marginal region.

5. An apparatus according to claim 4, characterized in that the breakable member (11) is generally rectangular having a pair of opposed sides including a strengthened rib portion (16) and a pair of side bearing tabs (12, 13) thereon, said

tabs constituting the portions forming the broken portion.

6. An apparatus according to any preceding claim characterized in that the fulcrum element (6) defines one side of a narrow opening through which the breakable member (11) extends, a marginal area of the breakable member and the switch member (8) being beyond this opening and enclosed by the housing (20) so that manual access to the switch member (8) after breakage is prevented by the narrow width of the opening.

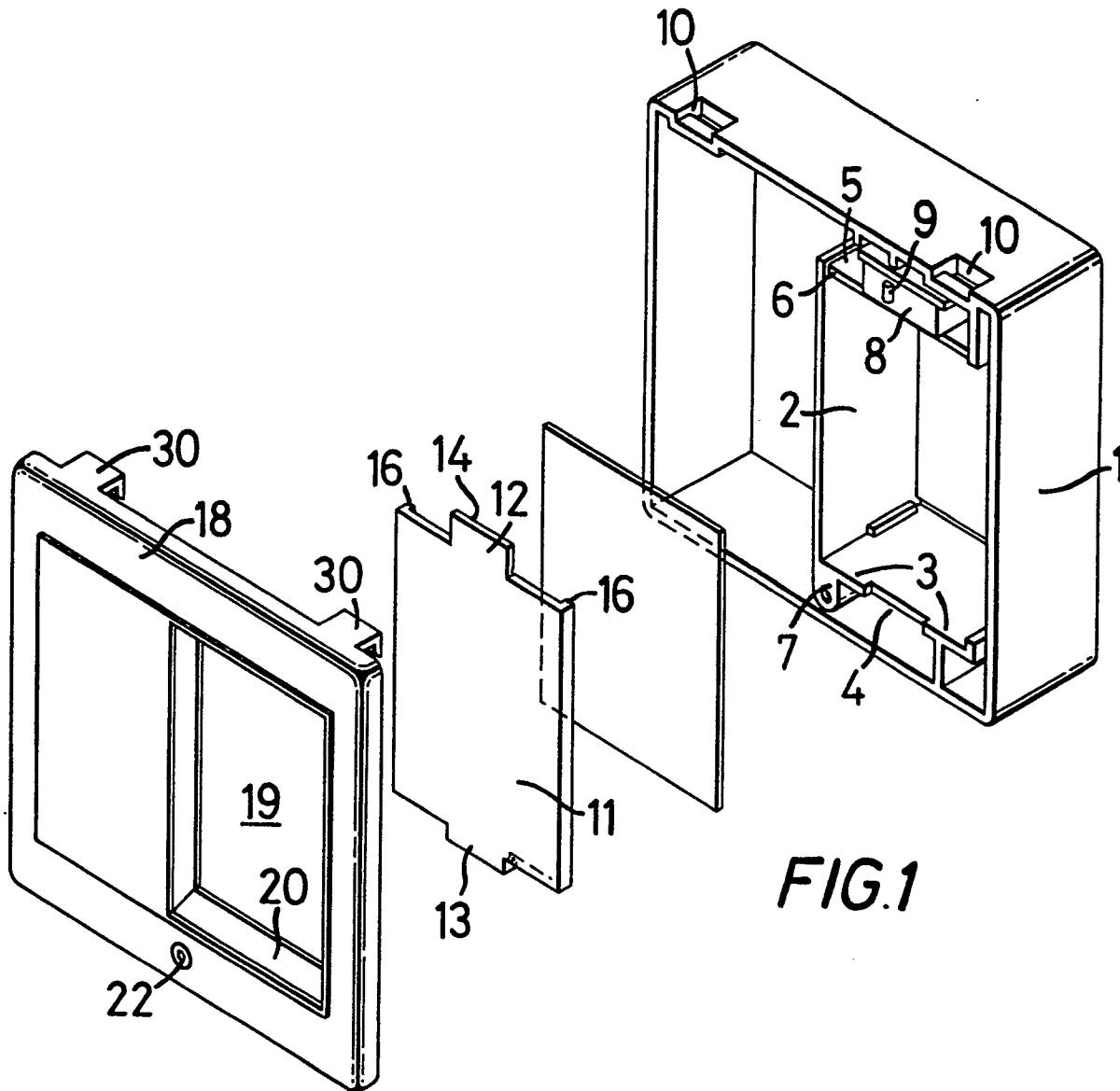
7. An apparatus according to any one of the preceding claims, characterized in that the direction of relative pivotal rotation of the broken portion (12) is the same where ever a line of fracture occurs in the breakable member (11) sufficient to allow the switch member (8) to move to its operating position.

8. An apparatus according to any preceding claim wherein the pivotal force is imparted by a spring member disposed in the said switch (8)

and acts upon said member (11) via a switch element (9).

9. An alarm system comprising a signalling apparatus according to any one of the preceding claims.

1/4



2/4

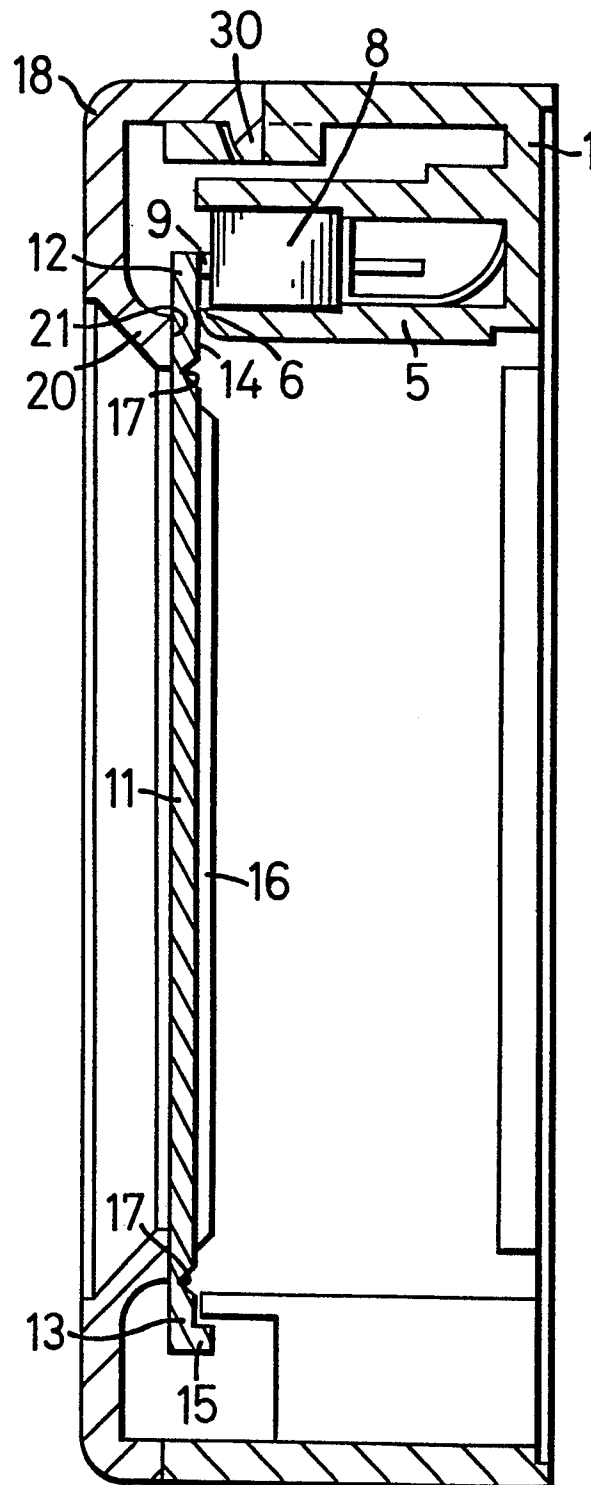


FIG. 2

3/4

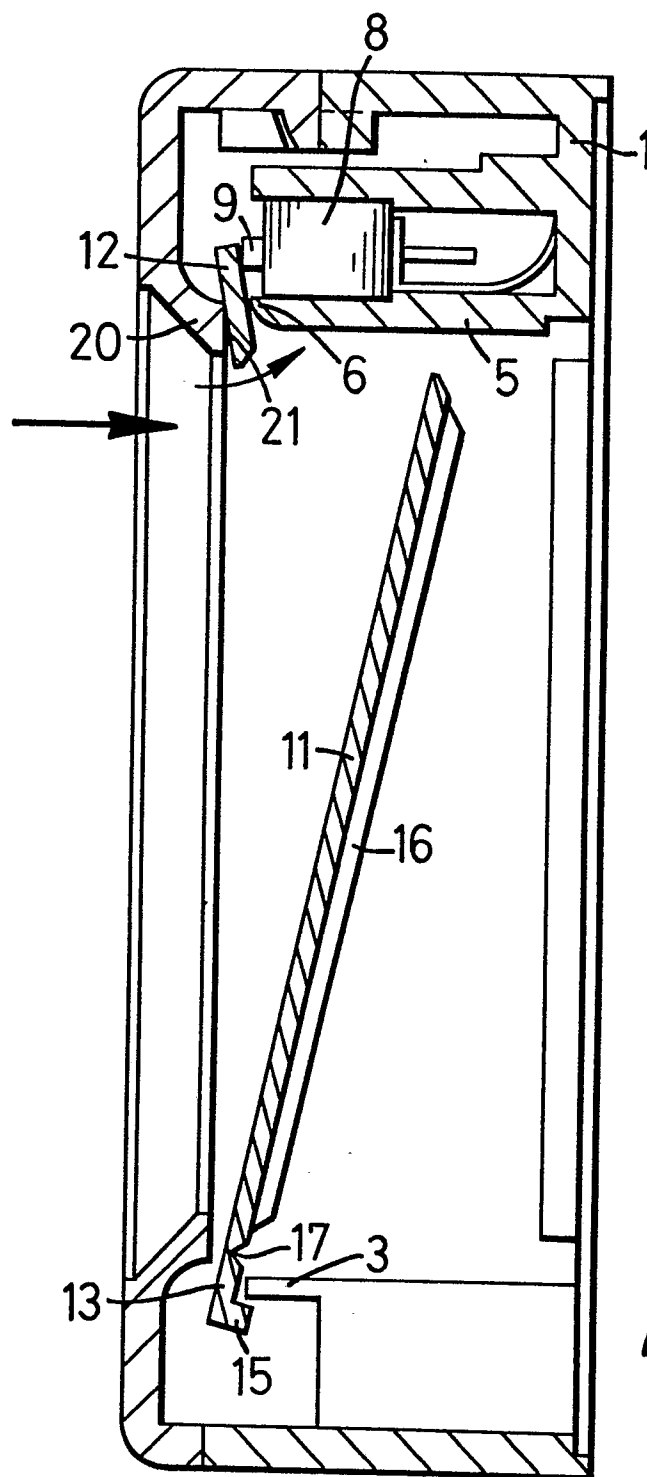
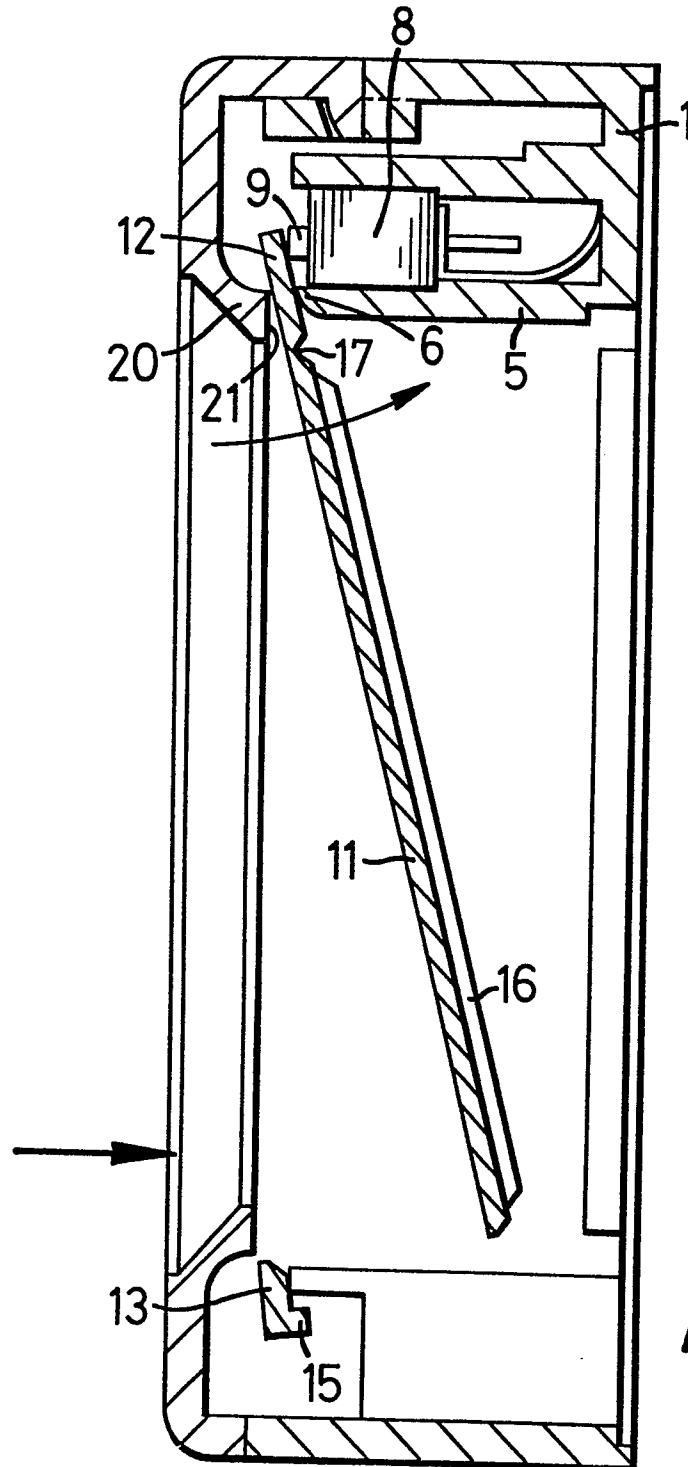


FIG. 3

4/4





European Patent
Office

EUROPEAN SEARCH REPORT

0065826

Application number

EP 82 30 2152

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
A	GB-A-1 103 457 (THE MINERVA DETECTOR COMPANY LIMITED) *The whole document*	1-5, 8, 9	G 08 B 25/00 H 01 H 9/28
A	GB-A-1 311 696 (R.J.REID) *The whole document*	1, 8, 9	
A	GB-A-1 574 703 (EMI LIMITED)		
A	DE-C- 544 483 (ELEKTROZEIT UND BLESSING)		
			TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
			G 08 B H 01 H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 06-08-1982	Examiner REEKMANS M.V.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			