



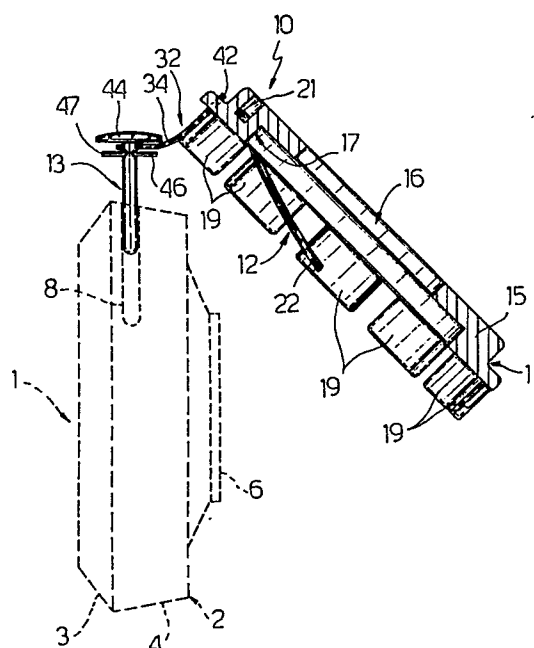
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EUROPEAN PATENT APPLICATION

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74) Representative: Prato, Roberto et al, c/o Ingg. Carlo e Mario Torta Via Viotti 9, I-10121 Torino (IT)

According to the invention the device (10) includes a spring (12) fixed to the said cover (11) and able to exert a resilient thrust tending, in use, to separate the cover (11) from the body (2) of the mine (1).



A SAFETY DEVICE USABLE FOR THE ACTIVATION OF SOWABLE MINES

The present invention relates to a safety device usable for the activation of sowable mines. In more detail, the present invention
5 relates to a device of the type comprising a cover which can fit on the body of the mine and a pin connected to the cover and introduceable into the body of the mine to lock the associated arming mechanism.

10 In general, mines which adopt a safety device of the above-specified type have an irregular external structure: in fact, they have an external configuration constituted by a pair of frusto-conical portions connected at their major bases; axially from one of the smaller bases of these frustoconical portions extends a dome
15 or pressure plate constituting the sensor element for the operation of the mine. In general, the above-mentioned safety device is constituted by a suitably shaped cover which is superimposed over the said dome whilst, through a suitable bridge arm it supports the pin which engages radially in the body of the mine.

20 It is observed that the unit constituted by the mine and the associated device is not well suited to be stacked together with similar such mines and associated safety devices in appropriate containers for the launching of armed mines, such as for example,
25 the launcher tubes with which modern mines are sown from the ground or from helicopters, or specific carriers such as battlefield rockets or projectiles. In fact, because of the irregular peripheral structure of the unit comprising the mine and the above-described device, it is not possible to house the mines in a
30 regular stack both because the contact zone between each mine and the cover of the safety device of the adjacent mine is not flat, and because, due to the particular structure of the cover of the device, there is an air space between each mine/safety device unit

and the associated facing inner surface of the container.

It is likewise observed that, especially in the case in which the trajectory followed by the mine/safety device unit is short, and
5 this happens in general when launching is effected from the ground rather than from helicopters, it happens that the safety device does not separate from the mine before falling on the ground. This essentially occurs due to the fact that, because of the limited duration of the external ballistic phase and the particular
10 expulsion position of the mine-safety device unit, this latter is not oriented in the right direction by the air so that it does not become separated from the body of the mine, in some cases even after falling to the ground, and therefore the said pin prevents the mine from operating. The object of the present invention is
15 that of providing a safety device able to overcome the above-indicated disadvantages of the devices of the above-listed known type.

The said object is achieved with the present invention in that it
20 relates to a safety device for sowable mines, of the type comprising a cover which can engage on the body of the mine and a pin connected to the said cover by articulatable means, which pin can be introduced into a recess provided in the body of the mine to lock the arming mechanism of this latter, characterised by the fact
25 that it includes spring means fixed to the said cover on the part which in use faces the body of the said mine, and able to exert a resilient force tending in use to separate the said cover from the body of the said mine.

30 For a better understanding of the present invention a preferred embodiment is now described purely by way of non-limitative example and with reference to the attached drawings, in which:

Figure 1 is a transverse section of a safety device formed according to the present invention and illustrated in combination with a mine of known type;

Figure 2 is a side view of the device of Figure 1;

5 Figure 3 is a view from below of the device illustrated in Figures 1 and 2;

Figures 4 and 5 are respective sections taken on the lines IV-IV and V-V of Figure 3; and

10 Figure 6 relates to a container in which a plurality of mine/safety device units are stacked, illustrated on a reduced scale with respect to that used in Figure 1.

With particular reference to Figure 1, a mine essentially of known type is indicated generally with the reference numeral 1, which
15 from the structural point of view has a body 2 constituted by two frusto-conical portions 3, 4 respectively joined at their larger bases the diameters of which are identical. A dome 6 extends axially and in a central position from the portion 4, which dome acts as a sensor element of the mine 1 which, if pressed, controls
20 the explosion of the mine itself. This latter further has, within its portion 4, a radial socket through which it is possible to intercept and lock the arming mechanism (not illustrated) of the mine itself.

25 According to the present invention there is proposed a safety device generally indicated 10 and essentially comprising a cup-shape cover 11 able to cooperate with the frusto-conical portion 4 of the mine 1 against the action exerted by a flexing spring 12, and a pin 13 conveniently fixed, in a removable manner,
30 to an outer edge of the cover 11 and operable to engage, in use, the socket 8 of the mine 1.

With particular reference to Figures 1, 3 and 5, it is observed

that the cover 11 has a circular structure with a bottom wall 15 having a central through hole 16 and an annular seat 17 coaxial with the hole 16, which in use constitutes a housing seat for the dome 6 of the mine 1. As already said, the cover 11 is cup-shape and has a side wall essentially constituted by a plurality of peripheral tongues 19 extending perpendicularly of the wall 15; consequently, in a transverse sense, the cover 11 has an essentially cylindrical volume.

With particular reference to Figure 3, it is observed that the spring 12 is of the wire type, extends essentially for a semi-circumferential section, and is housed within a corresponding groove 20 formed in the bottom wall 15 of the cover 11 on the side which in use faces the mine 1. In more detail, the spring 12 has a portion 21 entirely housed within the groove 20 and a portion 22 which projects from this groove 20 and is able to exert in use a resilient thrust on the surface of the smaller base of the portion 4 of the mine 1 for the purpose of separating the cover 11 from the body 2 of the mine itself. In more detail, it is seen that the spring 12 is retained within the groove 20 by means of a bridge 24 of the bottom wall 15 of the cover 11 in such a way as to cover a portion of the groove 20 in which an intermediate part of the spring 12 is housed. This latter further has a folded end portion 25 (See Figure 5) which extends at 90° from the portion 21 and engages a corresponding through hole 26 formed in the bottom 15 of the cover 11 in such a way as to prevent the spring 12 from slipping along the above-mentioned groove 20. This spring 12 has, finally, in a median zone of its portion 21, a deformed portion 27 in the form of a hump able to establish an interference in a transverse sense with the opposite walls of the groove 20 (See Figure 3) in such a way as to obtain a precise and constant positioning of the spring 12 with respect to this groove and therefore with respect to the cover 11.

With particular reference to Figures from 1 to 5, it is seen that the pin 13 is connected to the bottom wall 15 of the cover 11 by means of a fork element 32 having two wire-like arms 33, 34 which are joined together by a bridge portion 35 having a longitudinal slot 36. The end of each arm 33, 34 engages an associated through hole 37, 38 in the bottom wall 15 of the cover 11 and further carries an associated transverse portion 41, 42 the dimensions of which are such as to prevent the associated arm 33, 34 from coming out of the above-mentioned through holes 37, 38.

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With reference to Figures 1, 2, 4 and 5 it is seen, finally, that the pin 13 has a transverse head portion 44 the dimensions of which are of the order of the bridge portion 35 of the fork element 32. Beneath this portion 34 and at a distance slightly greater than the thickness of the bridge portion 35 of the fork element 32 the pin 13 has a pair of diametrically opposite tabs 46, 47 the dimensions of which are such as to permit the passage thereof, with slight interference, into the interior of the slot 36.

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With reference to Figure 6, this illustrates a launching tube, generally indicated 50, operable to launch a plurality of mines simultaneously, each equipped with an associated safety device 10. The launching tube 50 has a side wall 51 which is closed at one end by means of a plug 52 and at the other end by an expulsion device 53 of known type. In more detail, the plug 52 is fixed internally to the wall 51 of the tube 5 by means of a plurality of gripper teeth 54 which engage an annular groove 55 formed on the inside of the said wall 51. Moreover, the cover 52 has an annular seat 56 which receives an annular seal 57 interposed between the plug 52 and the facing inner surface of the wall 51. The device 53 is essentially a piston 59 movable axially with respect to the tubular wall 51 by the effect of the thrust exerted by a gas under pressure developed by the expulsion device 53 and acting on the surface of

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the piston 59 on the side opposite that facing the plug 52.

5 The operation of the device 10 is as follows. When the mine 1 is within the launching tube 50 the pin 13 is correctly inserted into the socket 8 and the cover 11 lies over the surface of the mine itself. Moreover, a portion 22 of the spring 12 is preloaded and therefore exerts on the facing surface of the mine 1 a thrust tending to maintain the cover 11 partially raised from the body 2 of the mine itself. Upon sowing of the mines the displacement of
10 the piston 59 causes the end plug 52 to blow off therefore permitting the mines 1 and the associated devices 10 to escape freely. The separation of the device 10 from the body 2 of the mine 1 takes place initially by the effect of the spring 12 and subsequently by the fact that the body 11 is braked in a greater
15 measure than the body of the mine 1 because of the particular shape of the cover 11 itself, which in practice constitutes an aerodynamic brake. This obviously causes the device 10 to fall separately from the mine 1 with consequent secure activation of the arming mechanism of this latter.

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From a study of the characteristics of the device formed according to the present invention the advantages which can be obtained thereby are evident. First of all, this device serves both the functions of separator between the stacked mines and of boundary
25 member between a mine and the associated container which, in the illustrated example, is constituted by the launching tube 50. In fact, the device 10 acts to complete the shape of the body 2 of the mine 1 in such a way as to obtain an overall volume of essentially cylindrical form which facilitates stacking as well as positioning
30 with respect to the associated container. It is further observed that the cover 11 introduces practically no additional increase in the axial dimension from that represented by the body 2 of each mine 1 so that the number of mines which can be housed within the

interior of an associated container is not limited axially thereby.

Further it is seen that the presence of the spring 12 facilitates the separation of the device 10 from the body 2 of each mine 1 in all cases and especially when the mine is launched by means of a ground mine sower such that the external ballistic phase after launch is rather short. Finally, it is seen that, because of the very loose connection between the pin 13 and the cover 11 the operation of removal of the pin 13 from the associated seat 8 is particularly easy.

Finally, it is clear that the device 10 described above can have modifications and variations introduced thereto without by this departing from the present invention. In particular, it is evident that the spring 12 rather than being constituted by a wire, could be made and positioned in any other way providing it exerts a resilient thrust tending to separate the cover 11 of the device 10 from the body 2 of the mine 1.

CLAIMS

1. A safety device for sowable mines of the type comprising a cover which can be fitted on the body of the mine and a pin
5 connected to the said cover by articulatable means and able to be introduced in a socket provided in the body of the said mine to lock the arming mechanism of this latter, characterised by the fact that it includes spring means (12) fixed to the said cover (11) on the side which in use faces the body (2) of the said mine (1) and
10 operable to exert a resilient force tending in use to separate the said cover (11) from the body (2) of the said mine (1).
2. A device according to Claim 1, characterised by the fact that the said spring means (12) are essentially constituted by a wire
15 spring having a portion (21) fixed to the said cover (11) and a portion (22) which is raised with respect to the said cover (11) and which can be resiliently deformed when the said cover (11) is held against the surface of the body (2) of the said mine (1).
- 20 3. A device according to Claim 2, characterised by the fact that the said cover (11) has an annular groove (20) to receive the said wire spring (12).
4. A device according to Claim 3, characterised by the fact that
25 the said cover (11) has positioning means (24, 26) for positioning the said spring (23) with respect to the said groove (20).
5. A device according to Claim 4, characterised by the fact that the said positioning means essentially comprise a bridge (24) which
30 partially covers the said groove (20) for the purpose of constituting a stop element in the radial sense against displacement of the said spring 12.

6. A device according to Claim 4 or Claim 5, characterised by the fact that the said positioning means include a hole (26) which receives a bent head portion (25) of the said wire spring (12).

5 7. A device according to any of Claims from 2 to 6, characterised by the fact that the said first portion (21) of the said wire spring (12) has a deformed zone (27) which establishes a partial interference coupling in a radial sense with the said groove (20).

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8. A device according to any of Claims from 2 to 7, characterised by the fact that the said wire spring (12) has a semi-annular conformation and by the fact that the said two portions (21, 22) are essentially identical in length.

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9. A device according to any preceding Claim, characterised by the fact that the said cover (11) has an essentially cup-shape structure with a bottom wall (15) and a side wall constituted by a plurality of tongues (19) distributed in an essentially uniform manner.

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10. A device according to Claim 9, characterised by the fact that the bottom wall (15) of the said cover (11) has an essentially flat outer surface and a through hole (16) defining a seat to receive, in use, a sensor portion (6) of the said mine (1).

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11. A device according to Claim 9 or Claim 10, characterised by the fact that the said tongues (19) defining the side wall of the said cup-shape cover (11) are delimited externally by an essentially cylindrical surface.

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12. A device according to any preceding Claim, characterised by the fact that the said articulatable means connecting the said pin

(13) to the said cover (11) include at least one wire (33, 34) the opposite end portions of which are connected in a releasable manner to the said cover (1) and to the said pin (13) respectively.

5 13. A device according to Claim 12, characterised by the fact
that the said articulatable means essentially comprise a fork
element (32) having two wire-like arms (33, 34) having first ends
connected together by means of a bridge element (35) supporting the
said pin (13) and having opposite free ends which hook onto the
10 said cover (11).

14. A device according to Claim 13, characterised by the fact
that the said bridge element (35) has an internal slot (36) within
which the said pin (13) is rotatable; this latter being fixed to
15 the said bridge element (35) by means of a transverse head portion
(44) which interferes with the said element (35), and a pair of
transverse tabs (46, 47) positioned beneath the said transverse
element (44) and operable to deform the said bridge element (35)
elastically to pass through the said slot (36) in such a way as to
20 maintain the said bridge element (35) interposed between the said
transverse head element (44) and the said tabs (46, 47) of the said
pin (13).

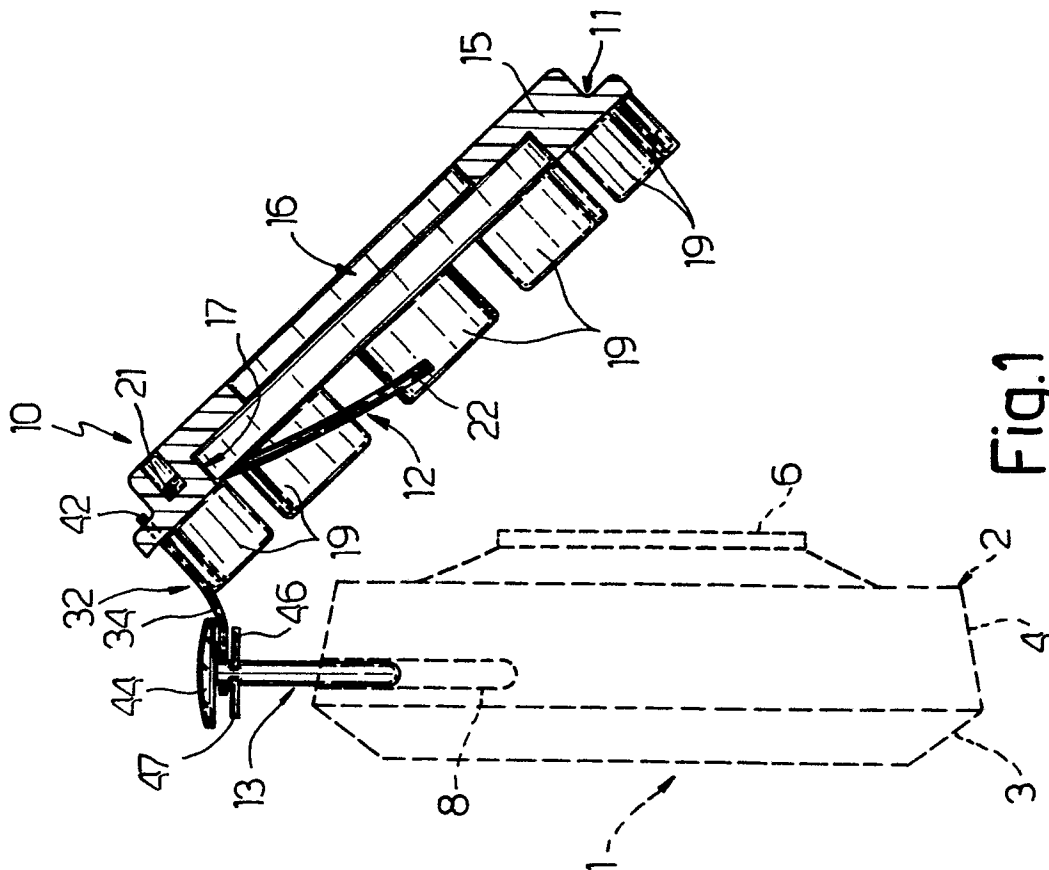


Fig. 1

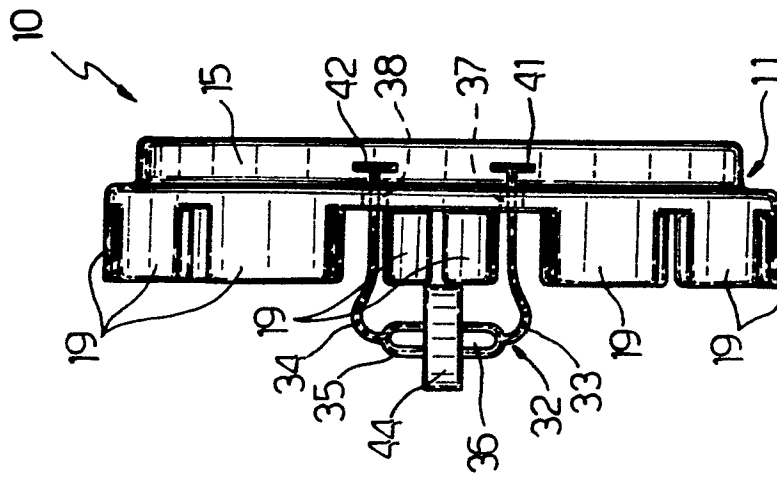


Fig. 2

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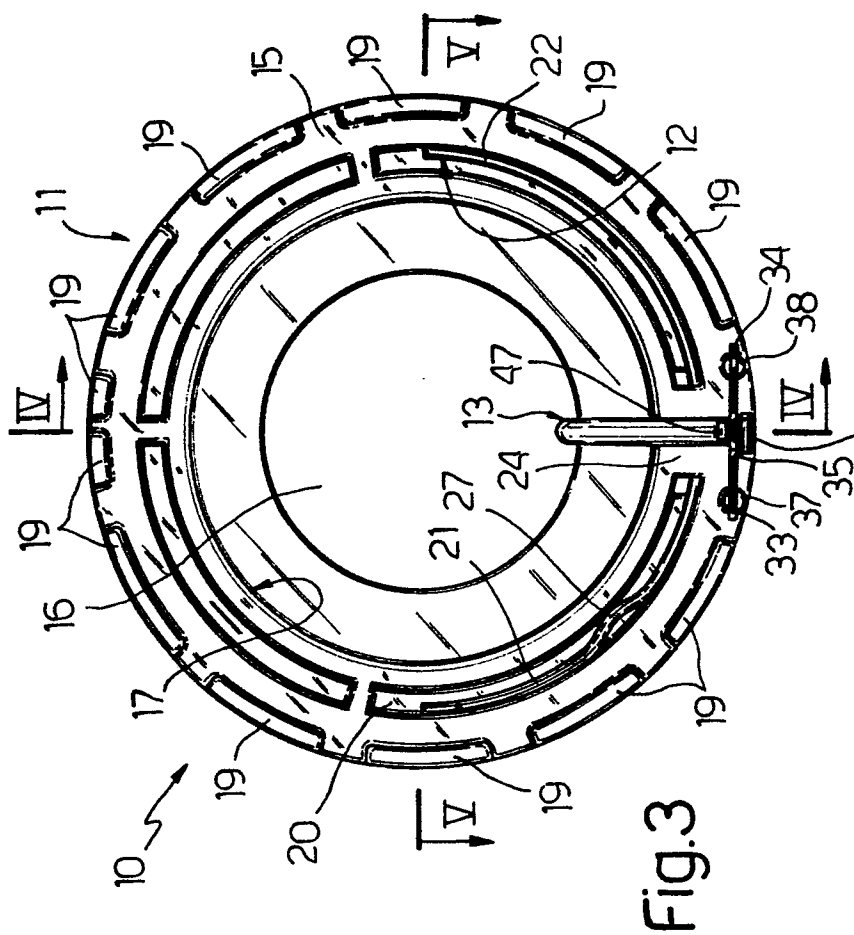


Fig. 3

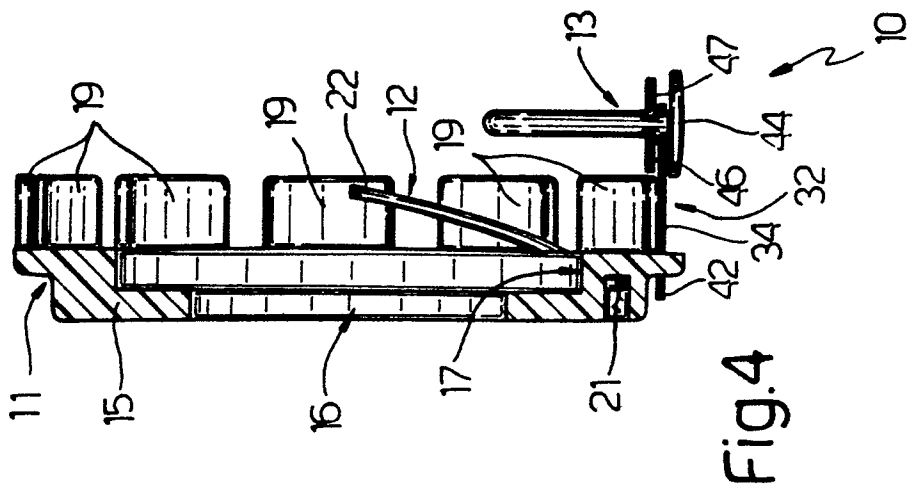


Fig. 4

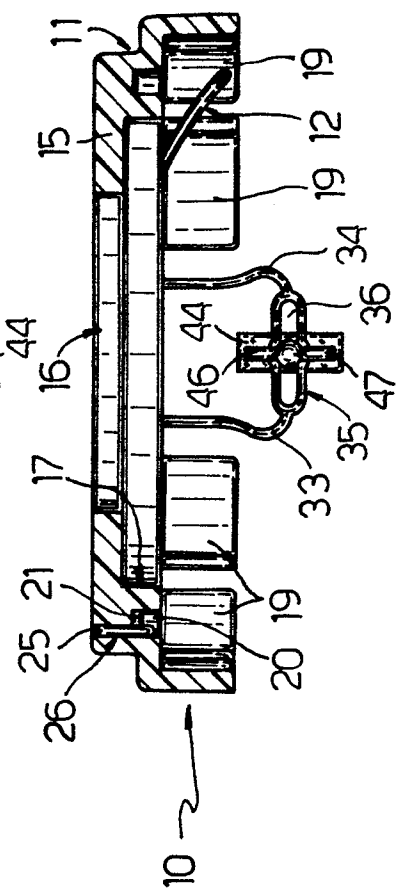
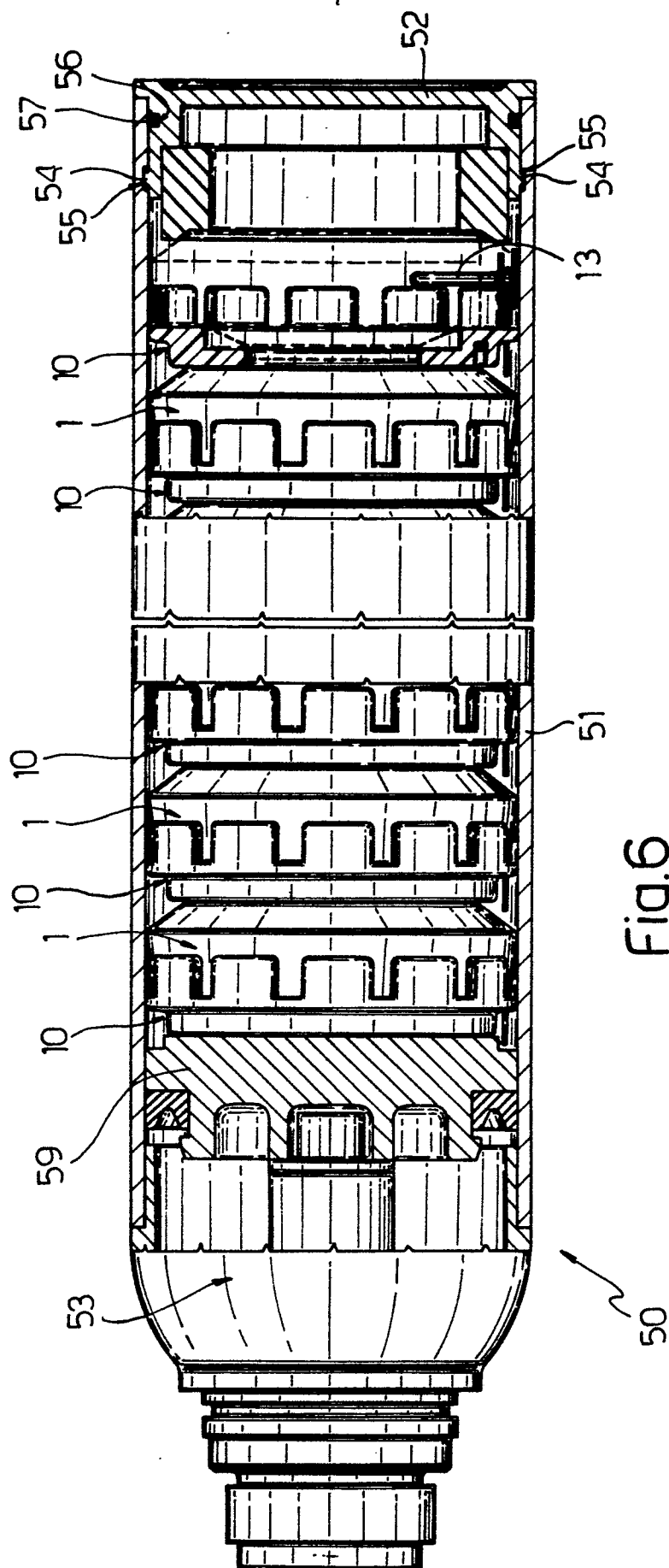


Fig. 5





DOCUMENTS CONSIDERED TO BE RELEVANT			EP 87103254.6
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
A	FR - A1 - 2 547 911 (ETIENNE LACROIX-TOUS ARTIFICES) * Page 7, line 18 - page 8, line 23; fig. 1,3 * --	1	F 42 C 15/14
A	AT - B - 349 360 (REDON TRUST) * Page 3, lines 44-51; fig. 1 * --		
A	DE - A1 - 2 428 340 (PAUL BEERMANN) * Page 6, last paragraph; fig. 2 * ----		
			TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
			F 42 B 13/00 F 42 B 23/00 F 42 C 15/00
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 31-08-1987	Examiner KALANDRA
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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</p>			