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(54) Fire extinguishers.

(57) A fire extinguisher comprises a tubular body (2) having a cylindrical wall (3) and containing extinguishant. A detonator tube (12) is mounted coaxially within the tubular body (2). Longitudinal and transverse score lines (20a,20b) define a zone of weakness in the wall (3). Upon detonation of the detonation tube (12) the wall (3) of the body (2) ruptures preferentially in the weakened zone so that extinguishant is discharged in a predetermined direction over a predetermined area.

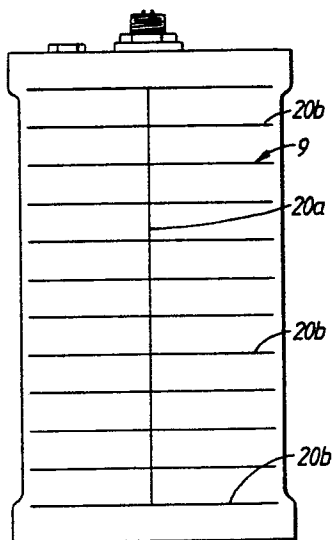


Fig.3.

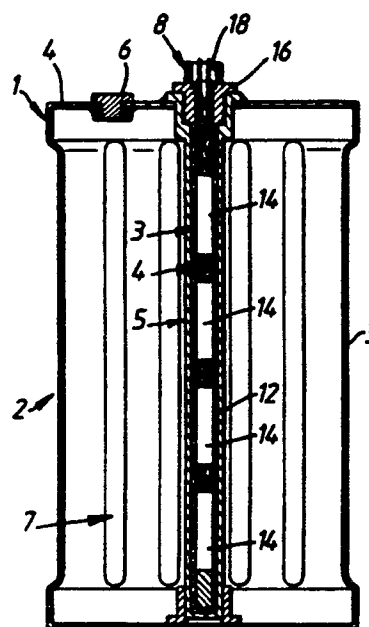


Fig.1.

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FIRE EXTINGUISHERS

The present invention relates to a fire extinguisher and more particularly to a fire extinguisher capable of operation in any attitude.

Fire extinguishers are conventionally designed for operation in a predetermined attitude, that is with the extinguisher orientated so that the discharge head is on top of the fire extinguisher body or underneath the fire extinguisher body. The designs will normally accommodate variations in orientation of up to about 45 degrees, but effective discharge will not normally be obtained at large variations from the design attitude. Fire extinguishers for use in military vehicles must be capable of very rapid discharge within milliseconds at any orientation of the vehicle. In the past it has been common practice to mount an extinguisher for a military vehicle in a gimble-type mounting system which enables the extinguisher to remain in a constant attitude irrespective of changes in attitude of the vehicle. Such a mounting system is not only expensive, but is also susceptible to damage in battle conditions and adds to the weight of the vehicle.

An object of the invention is to provide an inexpensive lightweight fire extinguisher capable of rapid discharge in any orientation.

According to the present invention there is provided a fire extinguisher comprising a body containing extinguishant, and detonation means mounted within the body and being operative, upon detonation, to cause a wall of the body to rupture and discharge of the extinguishant characterised in that the wall of the body has at least one zone of weakness whereby rupturing occurs preferentially in the zone so that extinguishant is discharged in a predetermined direction over a predetermined area.

Preferably, the weakened zone is so formed that rupturing occurs by splitting of the wall approximately midway within said zone to form two wall portions which are folded outwardly by the explosive force of the detonation means.

Preferably, the weakened zone is defined by score-lines in the wall of the body.

The body may have a tubular wall, and the weakened zone may be defined by a longitudinal score line and by a plurality of transverse score lines defining two wall portions arranged symmetrically to either side of the longitudinal score line, which, upon detonation of the detonation means, are folded outwardly about their outer, longitudinal edges.

Preferably, the part of the container wall which is not intended to rupture is reinforced. The reinforcement may be formed by ribs formed into the relevant wall portion.

The wall of the body may have a plurality of said weakened zones whereby, upon rupturing of the wall, the extinguishant is discharged in different, predetermined directions over respective predetermined areas.

Preferably, the extinguisher is mounted in a bracket which at least partly encloses the wall portion which is not intended to rupture, with the bracket being open in the area of the weakened zone. The open portion of the bracket may be bounded by outwardly divergent walls which cause controlled shaping of the wall portions which fold upon rupture.

Preferably, a guard which traps debris on detonation is mounted in front of the weakened zone. Advantageously the guard is carried by the bracket in front of the open portion of the bracket.

Embodiments of the invention will now be described, by way of example only, with reference to the diagrammatic drawings, in which:

Figure 1 is a longitudinal section through a fire extinguisher in accordance with the invention;

Figure 2 is a plan view of the extinguisher shown in Figure 1;

Figure 3 is a side elevation of the extinguisher shown in Figure 1 and showing a weakened zone in the wall of the extinguisher body;

Figure 4 is a transverse section through the body of the extinguisher;

Figure 5 is a view similar to Figure 3 but showing the body after rupture of the weakened zone upon firing of the extinguisher;

Figure 6 is a plan view equivalent to Figure 5;

Figure 7 is a side view of an extinguisher body having a weakened zone of different shape in order to provide a different discharge zone;

Figure 8 is a schematic transverse section showing the discharge area of the extinguisher of Figure 7;

Figures 9 and 10 and Figures 11 and 12 are views equivalent to Figures 7 and 8 respectively and showing other configurations of the discharge zone;

Figures 13 to 15 are schematic transverse sections showing different configurations in which two discharge zones are provided;

Figure 16 is a schematic front view of an extinguisher having an elongate tubular body;

Figure 17 is a view similar to Figure 16 but showing the body after rupturing;

Figure 18 is a perspective view showing a bracket for the extinguisher;

Figure 19 is a front perspective view similar to Figure 18 but showing the extinguisher after

rupturing; and

Figure 20 is a transverse section equivalent to Figure 19 and showing the discharge pattern of the extinguisher.

As shown in figure 1, a fire extinguisher in accordance with a preferred embodiment of the invention comprises a tubular body 2 having a cylindrical wall 3 which is closed at both ends and which is filled with extinguishant, the extinguishant being charged into the body through a port in an end wall 4 and which is subsequently closed by means of a plug 6. Preferably, the extinguishant is a liquified extinguishant gas, for example as sold under the name "Halon". The liquified gas may be charged into the body 2 at relatively low pressures, typically up to 200 p.s.i. which means that the body 2 does not have to be constructed to withstand high internal pressures. A tubular receiver 8 open at one end is fitted between the opposed end walls 4,10 of the body 2 so as to extend centrally of the body 2. The open end of the receiver is internally threaded and is seated within an opening in the associated end wall 4 of the body so as to open externally of the body. The receiver 8 houses a detonator tube 12 containing a series of explosive charges 14 which are spaced along the length of the body. The detonator tube 12 is closed at its outer end by a cap 16 which screws into the threaded end of the receiver tube 8 and which includes an electrical connector 18 projecting externally of the fire extinguisher body for connection to control circuitry. The receiver tube 8 and detonator tube 12 are each constructed of a thin gauge, low strength material so as to shatter within the fire extinguisher body upon firing of the explosive charges 14.

The extinguisher body is so constructed that the pressure waves produced internally of the body upon firing of the charges 14, and which is normally in the form of a spherical wave, will cause the cylindrical wall 3 of the body to rupture in a predetermined zone so as to cause discharge of extinguishant through that zone and hence in a predetermined direction relative to the body. Discharge will occur irrespective of the attitude of the body. Preferably, the zone of the wall 3 which is intended to rupture is defined by score-lines, machined or otherwise formed into the thickness of the wall in that zone so as to create predetermined lines of weakness along which rupture will occur, with the pattern of the score-lines being such as to create a predictable rupturing effect. In the embodiment shown, the wall 3 of the extinguisher body is designed to rupture over an arc of approximately 180 degrees and for this purpose there is provided a pattern of score-lines consisting of a longitudinal score-line 20a (see Figure 3) extending centrally of the intended arc of rupture and lateral score-lines

20b at right angles to the longitudinal score-line 20a and spaced along the length of the body.

With this pattern of score-lines, the weakened zone will tend to rupture into two parts 22 along the central score-line 20a with the two parts being folded back at their outer longitudinal edges approximately as shown in Figures 5 and 6. The folded parts 22 act to define the limits of the ruptured zone and form opposed walls of a nozzle which provides a degree of guidance for the extinguishant released from the body. Preferably, the part of the wall 3 which is not intended to be ruptured is reinforced and this may be done by forming pressed ribs 24 into that part of the body. Other forms of reinforcement may alternatively be provided.

The extent of the scoring and reinforcing ribs on the wall 3 can be varied to provide different arcs of discharge. For example the arrangement of Figures 7 and 8 provides a discharge arc of 35 degrees, that of Figures 9 and 10 provides a discharge arc of 90 degrees, and that of Figures 11 and 12 provides a discharge arc of 110 degrees. The scoring may be provided in two discrete zones of the wall so as to provide two spaced arcs of discharge. Figure 13 shows a configuration in which there are two separate arcs of discharge, diametrically opposed with one arc being over 30 degrees and the opposite arc being over 90 degrees. Figure 14 shows two separate arcs of 20 degrees and 60 degrees at a subtended angle of approximately 60 degrees between the two arcs. Figure 15 shows two arcs of discharge of almost 180 degrees each, which will effectively provide discharge over an arc of 360 degrees. It will be appreciated that by appropriately positioning the score-lines and reinforcement, rupture of the wall and hence discharge of extinguishant can occur in one or more accurately defined areas and in defined directions in order to achieve release of extinguishant into one or more predetermined areas. Full discharge of extinguishant will occur within a matter of milliseconds after detonation in order to obtain effective fire suppression.

The shape of the extinguisher body can also be varied to obtain the required discharge pattern. In Figures 16 and 17, the body is in the form of an elongate tube which can be made of any desired length in order to obtain a discharge over a large area.

As shown in Figures 18 to 20, the extinguisher is mounted within a bracket 30 which encloses those parts of the wall 3 which are not intended to rupture and which is open in the area of the extinguisher wall which is intended to rupture. Advantageously, the open section of the bracket 30 is bounded by outwardly-divergent wall portions 32 which shape the ruptured parts 22 of the wall 3 as

they are folded back and hence more accurately define the shape of the discharge area. The bracket 30 also carries a mesh guard 34 which overlies the open area of the bracket in order to trap and contain any loose particles which arise as a result of the explosion of the detonators and the rupturing of the extinguisher body.

The extinguisher particularly described herein can be fabricated relatively inexpensively from sheet metal components and can be made in a wide variety of shapes to suit the intended application. The extinguisher is designed for one-shot operation and is replaced in its entirety after each firing.

The embodiments have been described by way of example only and modifications are possible within the scope of the invention.

Claims

1. A fire extinguisher comprising a body (2) containing extinguishant, and detonation means (12) mounted within the body and being operative, upon detonation, to cause a wall (3) of the body to rupture and discharge of the extinguishant characterised in that the wall of the body has at least one zone of weakness whereby rupturing occurs preferentially in the zone so that extinguishant is discharged in a predetermined direction over a predetermined area.

2. A fire extinguisher as claimed in claim 1, wherein the weakened zone is so formed that rupturing occurs by splitting the wall (3) approximately midway within the zone thereby to form two wall portions (22) which are folded outwardly by the explosive force of the detonation means (12).

3. A fire extinguisher as claimed in claim 1 or claim 2, wherein the weakened zone is defined by score-lines (20) in the wall (3) of the body (2).

4. A fire extinguisher as claimed in claim 3, wherein the body has a tubular wall (3), and the weakened zone is defined by a longitudinal score line (20a) and by a plurality of transverse score lines (20b) defining two wall portions arranged symmetrically to either side of the longitudinal score line, which, upon detonation of the detonation means (12), are folded outwardly about their outer, longitudinal edges.

5. A fire extinguisher as claimed in any one of claims 1 to 4, wherein the wall of the body has a plurality of said weakened zones whereby, upon rupturing of the wall, the extinguishant is discharged in different, predetermined directions over respective predetermined areas.

6. A fire extinguisher as claimed in any one of claims 1 to 5, wherein the part or parts of the wall of the body which are not intended to rupture are

reinforced.

7. A fire extinguisher as claimed in claim 6, wherein the reinforcement comprises ribs (24) formed into said part or parts of the wall (3).

8. A fire extinguisher as claimed in claim 1, including a bracket (30) which at least partially encloses the part of the wall not intended to rupture, the bracket being open in the region of the weakened zone.

9. A fire extinguisher as claimed in claim 8, wherein the open part of the bracket is bounded by outwardly divergent walls (32) which cause controlled shaping of respective wall portions which fold outwardly upon rupturing.

10. A fire extinguisher as claimed in any one of claims 1 to 9, comprising a guard (34) mounted in front of a weakened zone or zones so as to trap debris produced upon rupturing of the wall (3).

11. A fire extinguisher as claimed in claim 8 or claim 9, comprising a guard (34) which is carried by the bracket and is mounted thereby in front of said weakened zone so as to trap debris upon rupturing of the wall (3).

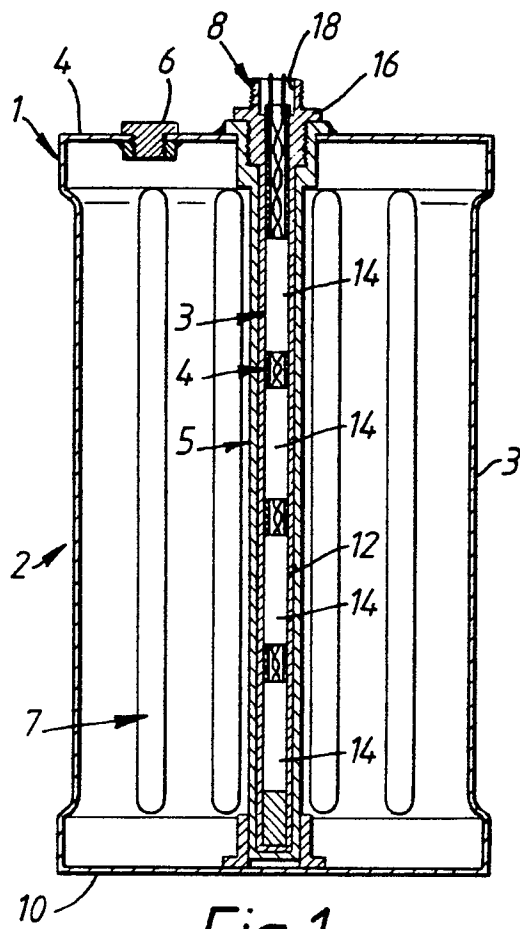


Fig. 1.

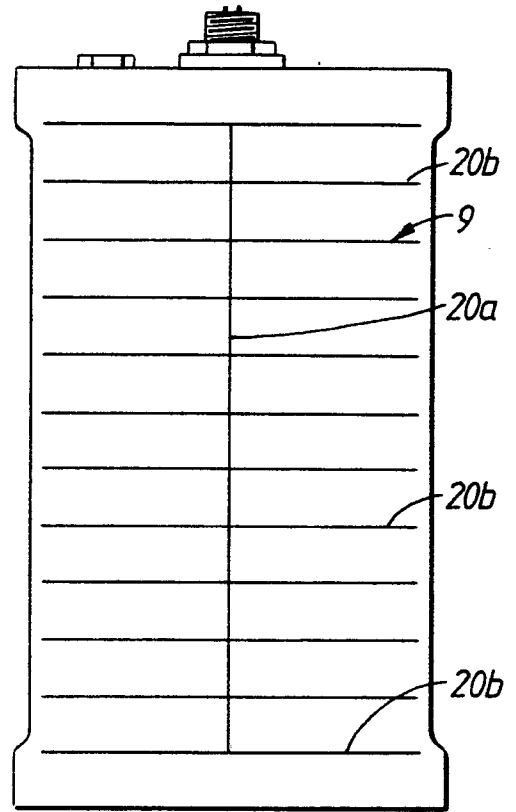


Fig. 3.

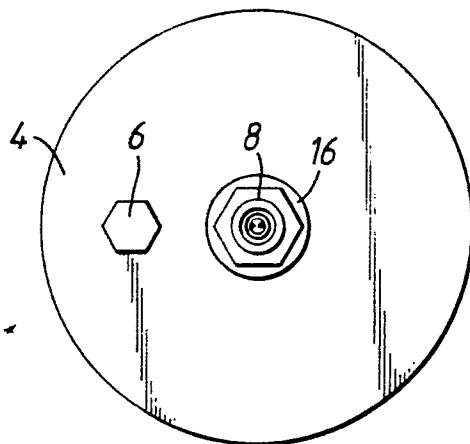


Fig. 2.

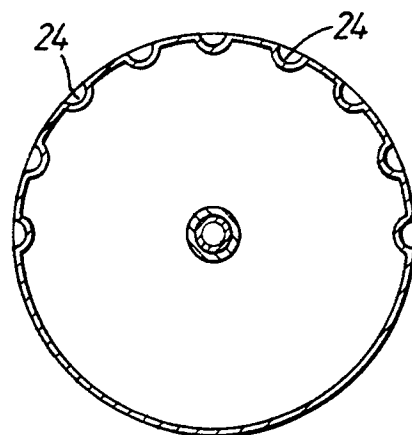


Fig. 4.

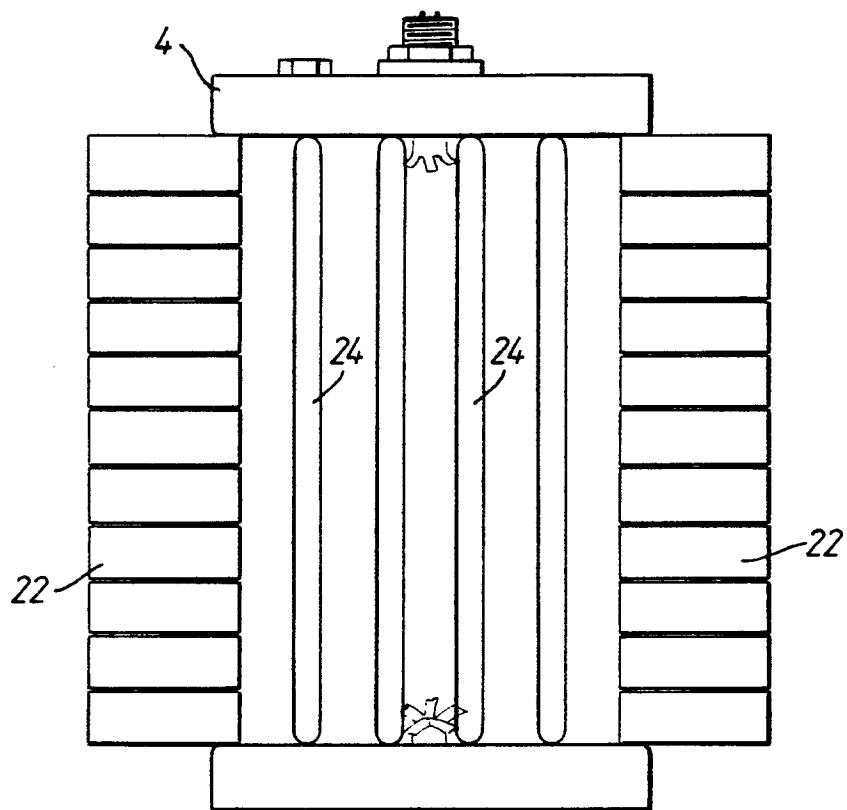


Fig. 5.

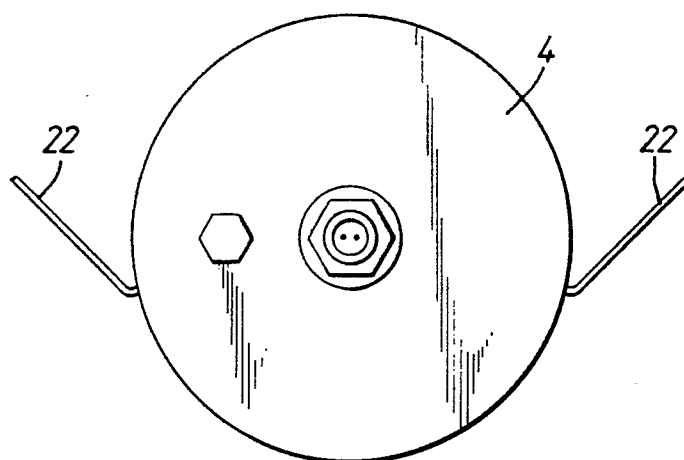
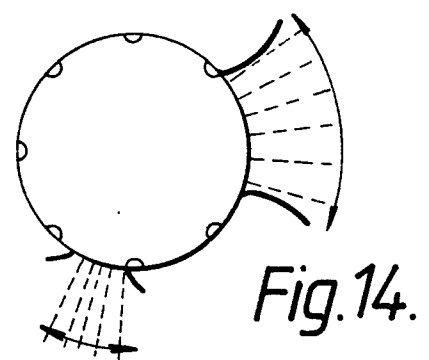
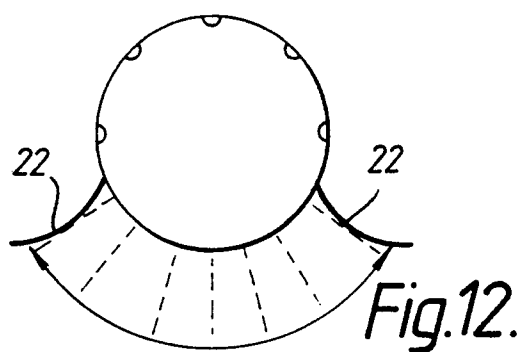
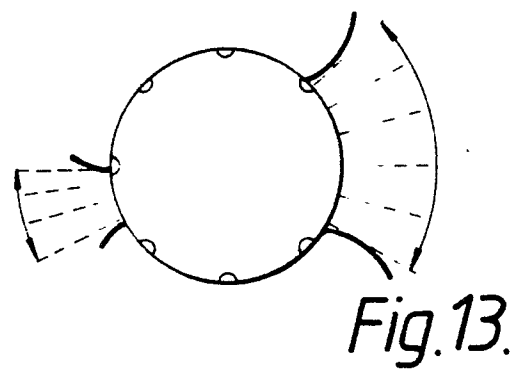
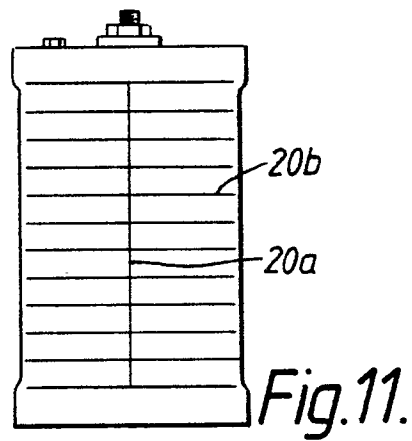
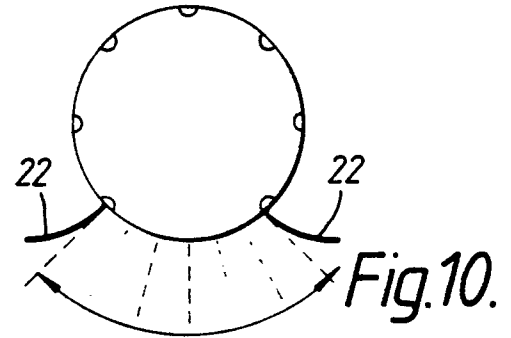
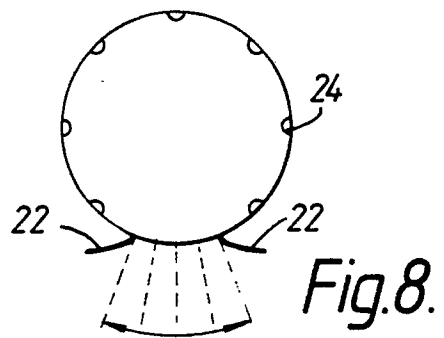
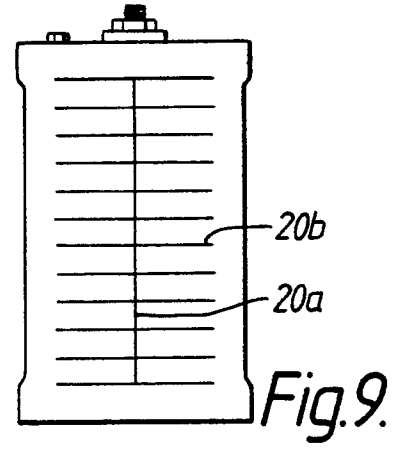
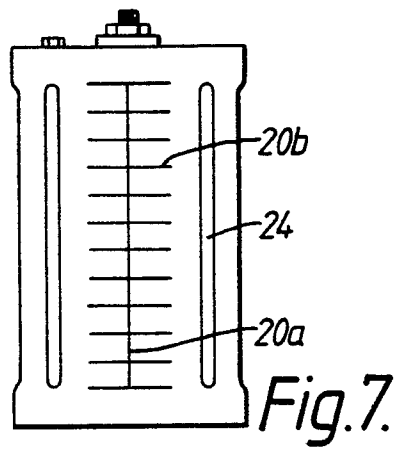


Fig. 6.



X

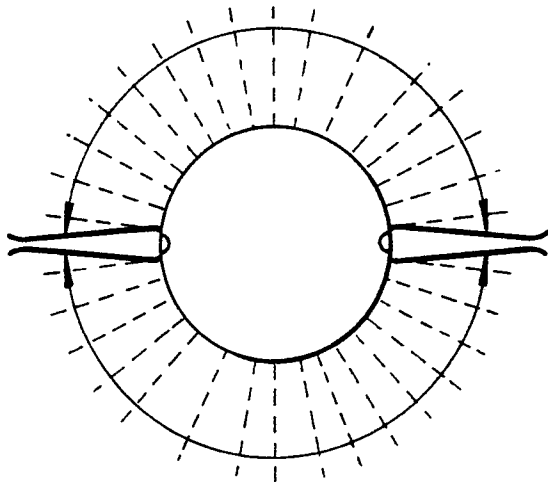


Fig.15.

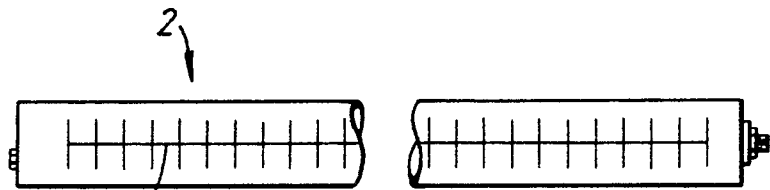


Fig.16.

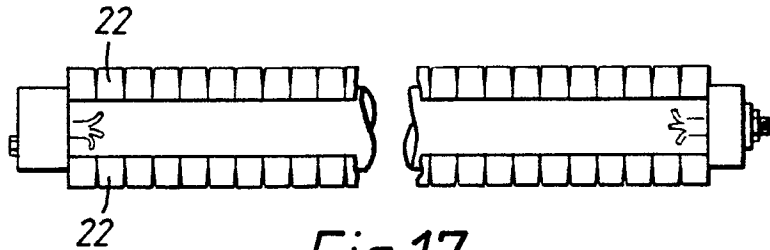


Fig.17.

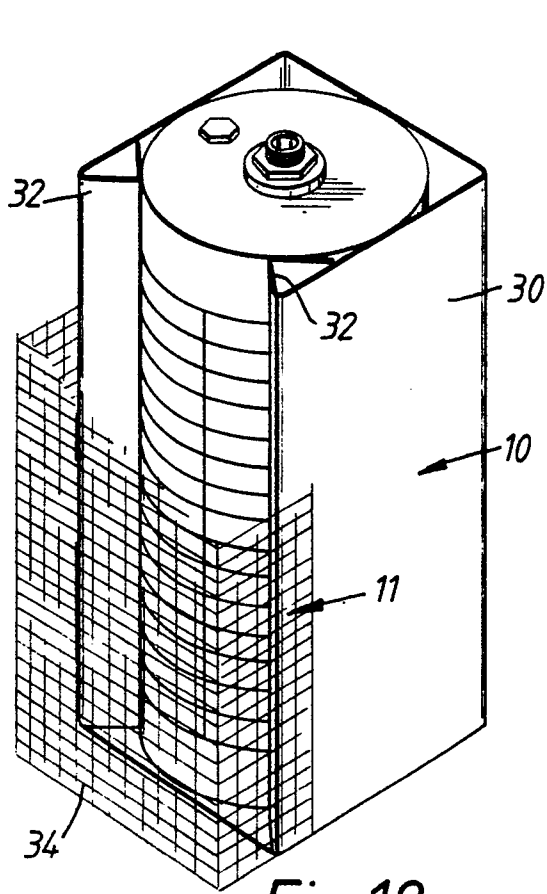


Fig. 18.

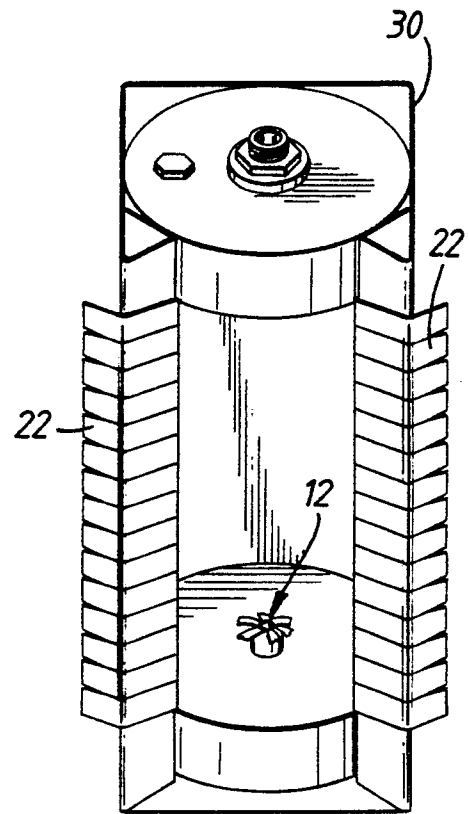


Fig. 19.

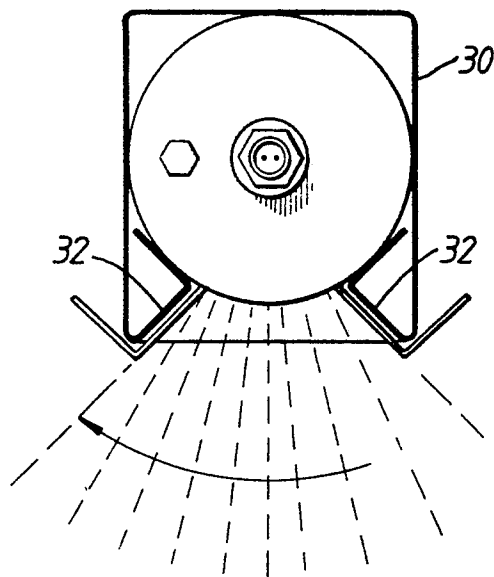


Fig. 20.



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.5)
X	WO-A-8803824 (SANTA BARBARA RESEARCH CENTER) * page 3, lines 11 - 20 * * page 10; figures 1, 2 * * page 12, lines 9 - 19 * * page 25, line 29 - page 27, line 25; figures 4a, 4b *	1, 3, 5	A62C35/08
A	----	2, 4	
X	US-A-3482637 (MITCHELL) * column 6, line 69 - column 7, line 26; figures 4-6 *	1, 3	
A	----	2, 4	
X	DE-A-2407790 (PYRO CONTROL) * page 5, lines 11 - 18 * * page 6, lines 4 - 31; figures 2, 3, 6 * * page 10, lines 2 - 17; figure 10 *	1, 3	
A	-----	4, 5	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A62C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 06 JULY 1990	Examiner KAPOULAS T.
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		I : 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	