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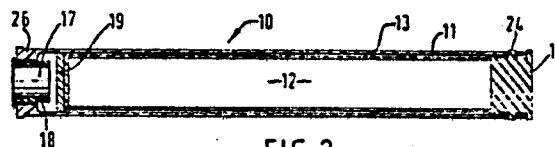
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54 **Chaff dispenser.**

57 A chaff dispenser, primarily a cartridge, has a chaff payload (12) disposed within an elongate tubular primary retainer (11). The primary retainer (11) is closed at one end by an end cap (16) and has a pyrotechnic charge (17) sealed at the other end. Disposed between the charge (17) and the chaff payload (12) is a piston (19) operative to eject the chaff payload (12) from the primary retainer (11) upon actuation of the pyrotechnic charge (17). the chaff payload (12) is contained in one or more secondary retainers (13) which is/are ejected with the chaff to prolong the radar response period of the chaff and to reduce aircraft contamination.



**FIG. 2.**

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"CHAFF DISPENSER"

This invention relates to a chaff dispenser for radar reflective chaff.

Chaff consists of fine electrically conducting filaments or foils which reflect radar waves and is  
5 used to confuse and distract weapon systems which rely on the use of radar. The chaff is dispensed and dispersed in a variety of different ways depending upon the effect to be created.

One form of dispensing system manufactured by us  
10 is a chaff cartridge as shown in Figures 1a and 1b of the accompanying drawings which are perspective and cross-sectional views respectively. The cartridge shown is designed primarily for use with electronic counter measure systems mounted on aircraft and was developed  
15 to provide maximum radar coverage with ease of handling. The cartridge illustrated consists of plastics liner 1 retaining a plurality of chaff dipoles 2 and having, at one end, a pyrotechnic squib 3. Disposed between the squib 3 and the chaff 2 is a piston 4 and felt pad  
20 5 for protecting the chaff dipoles on ejection. At the other end of the plastics liner 1 is a releasable end cap 6. On actuation the pyrotechnic squib 3 generates a gas pressure behind the piston 4 which drives the chaff along the plastics liner 1 ejecting the chaff from  
25 the other end. The chaff used is determined by the

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response required but typically may be 0.001 inch  
(25.4 microns) diameter aluminium coated glass dipoles.

A similar chaff cartridge is shown in published U.K.  
Patent specification No. A 2075155 in which the end cap  
5 and piston are each provided with a sealing ring to  
provide a moisture proof barrier protecting the chaf  
dipoles retained by the plastics liner.

We have now found that there is a danger of chaff  
contamination of the carrier body, e.g. an aircraft with  
10 cartridges of this general type.

According to one aspect of the present invention  
there is provided a chaff dispenser comprising primary  
retainer, a chaff payload within the primary retainer, a  
pyrotechnic charge, and piston means disposed between  
15 the pyrotechnic charge and the chaff payload,  
characterised in that the chaff payload is contained in  
one or a plurality of secondary retainers whereby, on  
actuation, the secondary retainer or retainers and the chaff  
payload therein are ejected from the primary retainer. The  
20 secondary retainer or retainers protect the chaff  
during ejection and prevent aircraft structure  
contamination.

Preferably, the second retainer or retainers  
encapsulate the chaff payload and comprise two separable  
25 parts which may or may not be hinged together. This  
piston means may be a separate piston or may form an

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integral part of the secondary retainer.

In order to provide against loss of gas pressure during ejection and ingress of moisture it is preferred to provide a sealing end cap and means sealing about the pyrotechnic charge. The end cap may include a plug portion seated within the primary retainer and having a circumferentially extending seal engaging with the primary retainer. The other sealing means may be a sleeve surrounding the pyrotechnic charge and sealing between the charge and the primary retainer whereby the cartridge is moisture-resistant.

According to a further aspect of the invention there is provided a method of dispensing radar reflective chaff ejected from a chaff dispenser comprising packaging the chaff within a retainer, ejecting the chaff and retainer from the cartridge, and dispersing the chaff from the ejected retainer subsequent to ejection. By packing the chaff within a retainer the radar response period may be prolonged and the risk of chaff contamination on the carrier, e.g. aircraft structure, is reduced.

If desired, the chaff packaged within the retainer may be wrapped in suitable wrapping material. The chaff dispenser is preferably a chaff cartridge.

The invention will now be described by way of example with reference to Figures 2 to 7 of the accompanying drawings in which;

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Figure 2 is a longitudinal cross-section of the chaff cartridge of the present invention;

Figure 3 is an enlarged cross-sectional view of one variety of end cap on the centre line of Figure 2;

5 Figure 4 is an enlarged cross-sectional view of the sealing sleeve on the centre line of Figure 2;

Figure 5 is a perspective view of the secondary retainer;

Figure 6 is a diagrammatic view of the beginning of  
10 ejection; and

Figure 7 is a diagrammatic view of the chaff dispersion.

In Figures 2 to 7 a chaff cartridge 10 consists of a primary plastics tubular retainer 11 for retaining a  
15 plurality of chaff dipoles 12. The chaff dipoles 12 are packed into a secondary plastics retainer 13 made of two separable halves 14 and 15. One end of the primary plastics retainer 11 is closed by an end cap 16, which may or may not seal against the ingress of moisture,  
20 whilst the other end receives a pyrotechnic squib 17 surrounded by a sealing sleeve 18. Disposed intermediate the pyrotechnic squib 17 and the chaff dipoles 12 is a piston 19.

The type of end cap 16 shown is made of elastomeric  
25 material such as rubber and has, a flange 20 which abuts against the end of the primary plastics retainer 11, a

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plug portion 21 and a circumferentially-extending sealing lip 22 which seals firmly against the inside surface of the primary plastics retainer. In order to lock the end cap in position and prevent accidental release on low pressure at altitude, the plug portion 21 is provided, at two opposed sides, with two locating lugs 24 (only one shown) which engage in respective locating holes 25 in the primary plastics retainer 11.

At the other end of the primary retainer 11 the sealing sleeve 18 seals between the pyrotechnic squib 17 and an annular portion 26 of the primary retainer 11. In order to provide good sealing of the sealing sleeve 18 has three external circumferential beads 27, 28, 29 and internal bead 30. An end flange 31 is provided to locate the sleeve 18 in the desired position when inserted.

Suitably, in order to strengthen the secondary retainer 13 to enable force transmission from the piston 19 to the cap 16, the secondary retainer is provided with longitudinal strengthening ribs 32. On actuation the pyrotechnic squib 17 causes a build-up in pressure behind the piston 19 which causes the piston 19 to push the chaff in the direction of arrow A in figures 6 and 7. The secondary retainer 13 transmits the force behind the piston 19 to the end cap 16 and pushes it out of the end of the primary retainer 11 as illustrated in Figure 6. Then, once the secondary retainer 13 is free of the primary retainer 11, the two parts 14, 15 separate, as diagrammatically

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illustrated in Figure 7, allowing dispersal of the chaff to form the desired cloud.

The preferred form of chaff cartridge of the present invention has several advantages of the known chaff cartridges described above:

- (i) the sleeve 18 provides sealing against the back pressure set up on actuation of the pyrotechnic squic and provides the added advantage of moisture sealing at one end of the primary retainer 11 without interfering with the piston 19;
- (ii) the end cap 16 is designed to retain the chaff in the cartridge and, in one form, provides moisture sealing at the other end of the primary retainer with positive location by means of lugs 24;
- (iii) the secondary retainer 13 pushes off the end cap on ejection so that there is less damage to the chaff dipoles, the chaff dipoles may be packed less tightly giving better dispersion and the chaff may be wrapped or loose, these features providing less "bird-nesting" of dipoles, greater control and versatility in cloud formation;
- (iv) the provision of the secondary retainer 13 means that the chaff still retains its basic shape at ejection. Once the secondary retainer 13 is clear of the primary retainer the chaff tends to bleed from the separating parts over a large period maintaining the

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Doppler response for longer rather than giving a rapid bloom. Moreover, this bleeding effect from the secondary retainer causes a much longer radar reflective cloud to be formed over a greater distance and aircraft contamination is less likely.

The chaff cartridge of the present invention is designed to operate in the temperature limits of  $-54^{\circ}\text{C}$  to  $+95^{\circ}\text{C}$  and therefore the squib sealing sleeve is suitably a polyurethane material and the secondary retainer a PVC or polycarbonate material.

Although the invention has been described by way of example with reference to a preferred embodiment it will be understood that modifications may be made whilst being within the scope of the present invention. Thus the secondary retainer may not completely encapsulate the chaff but may be a channel; the secondary retainer may comprise two hinged parts; the piston may form one end of the secondary retainer and the end cap may form the other end of the secondary retainer. If desired, there may be more than one secondary retainer within the primary retainer.

The chaff cartridge of the present invention may be used with known dispenser units and mounted in banks of 30 at, for example, two or four positions on an aircraft. The chaff dispenser may be of any other form although in the present invention it is shown as a cartridge of

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rectangular cross-section.

CLAIMS

1. A chaff dispenser comprising a primary retainer, a chaff payload within the primary retainer, a pyrotechnic charge and piston means disposed between the pyrotechnic charge and the chaff payload characterised in that the  
5 chaff payload is contained in one or a plurality of secondary retainers whereby, on actuation, the secondary retainer or retainers and the chaff payload therein are ejected from the primary retainer.
2. A chaff dispenser according to claim 1 wherein the  
10 secondary retainer or retainers encapsulate the chaff payload and comprise two separable parts.
3. A chaff dispenser according to claim 2 wherein the two separable parts are hinged together.
4. A chaff dispenser according to any one of claims 1  
15 to 3 wherein the piston means is separate from the secondary retainer or retainers.
5. A chaff dispenser according to any one of claims 1 to 4 wherein the dispenser is a cartridge having first and second ends and includes means for sealing the first end  
20 of the primary retainer, said means being separate from the secondary retainer.
6. A chaff cartridge according to claim 5 wherein the pyrotechnic charge is at the second end and the cartridge includes sealing means about the pyrotechnic charge.

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7. A chaff cartridge according to claim 5 wherein the sealing means at said first end of the primary retainer comprises a separate end cap including a plug portion seated within said first end and sealing against the primary retainer.
8. A chaff dispenser according to any one of the preceding claims wherein the chaff payload is wrapped in a wrapping material.
9. A method of dispensing radar reflective chaff ejected from a chaff dispenser comprising packaging the chaff within a retainer, ejecting the chaff and retainer from the cartridge and dispersing the chaff from the ejected retainer subsequent to ejection.
10. A method according to claim 9 comprising wrapping the chaff in a suitable wrapping material and ejecting the wrapped chaff within the retainer.

Neu eingereicht / Newly filed  
Nouvellement déposé

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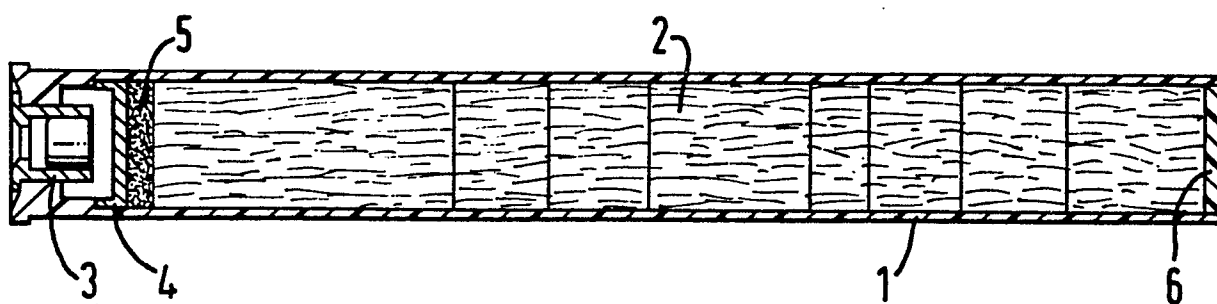
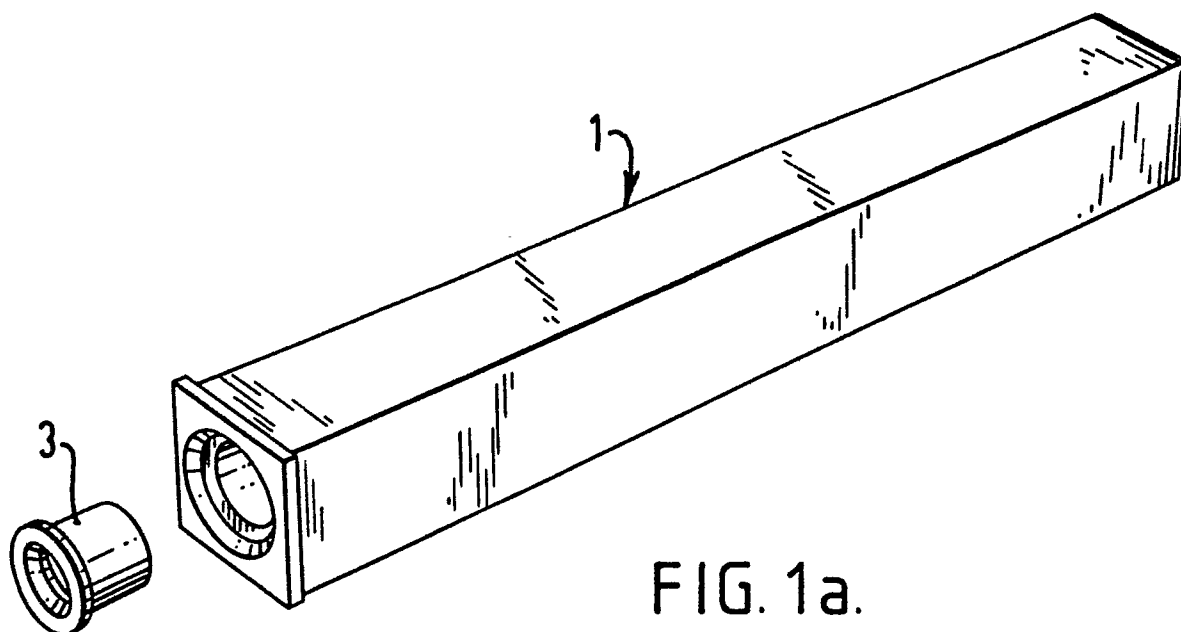


FIG. 1b.

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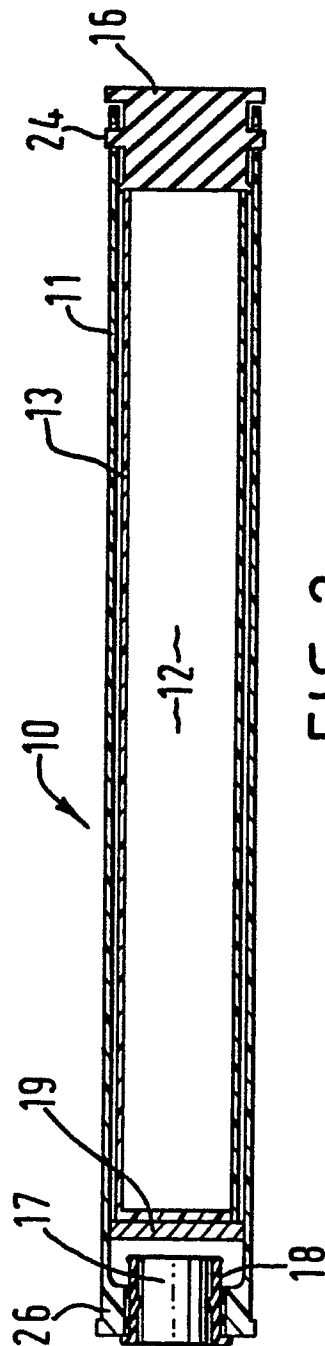


FIG. 2.

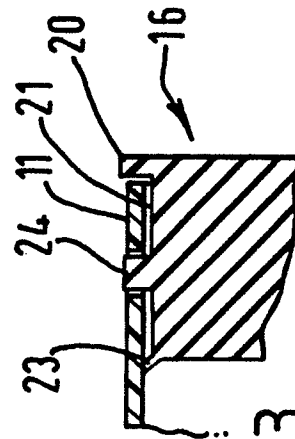


FIG. 3.

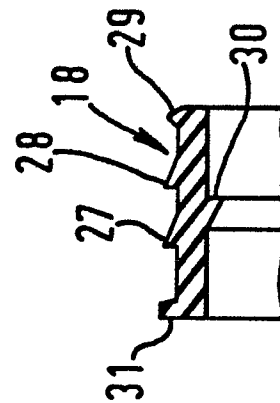


FIG. 4.

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Nouvellement déposé

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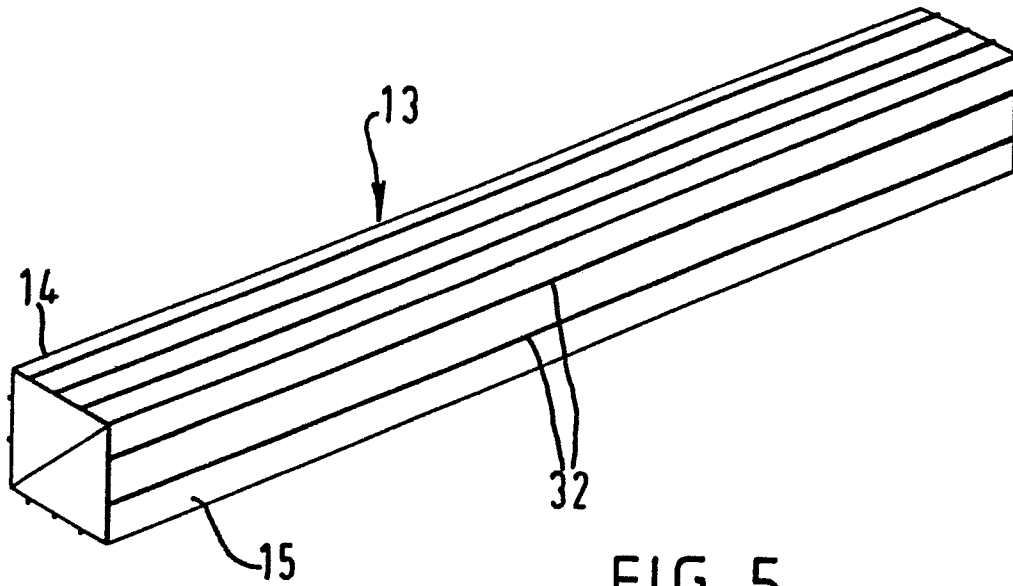


FIG. 5.

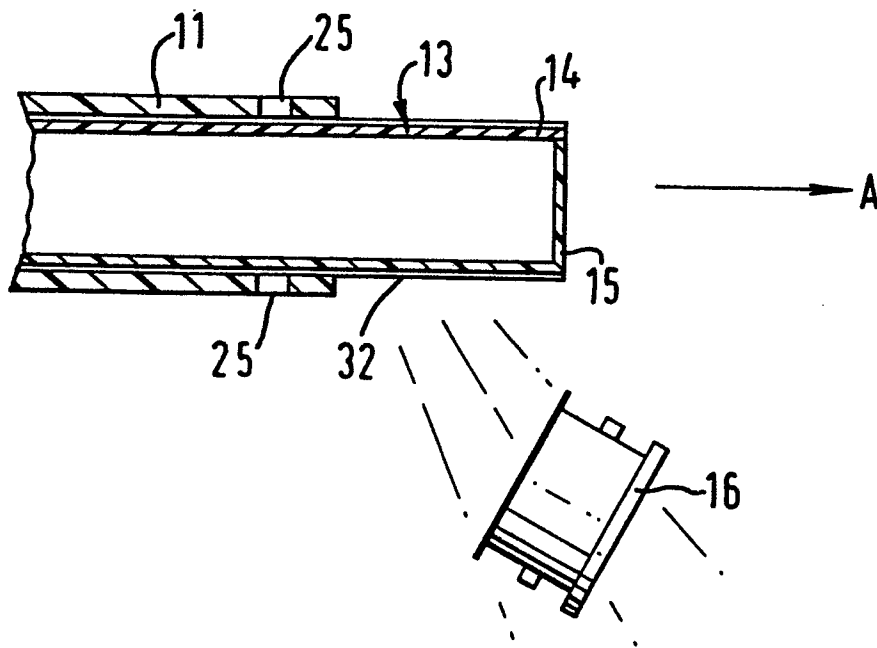
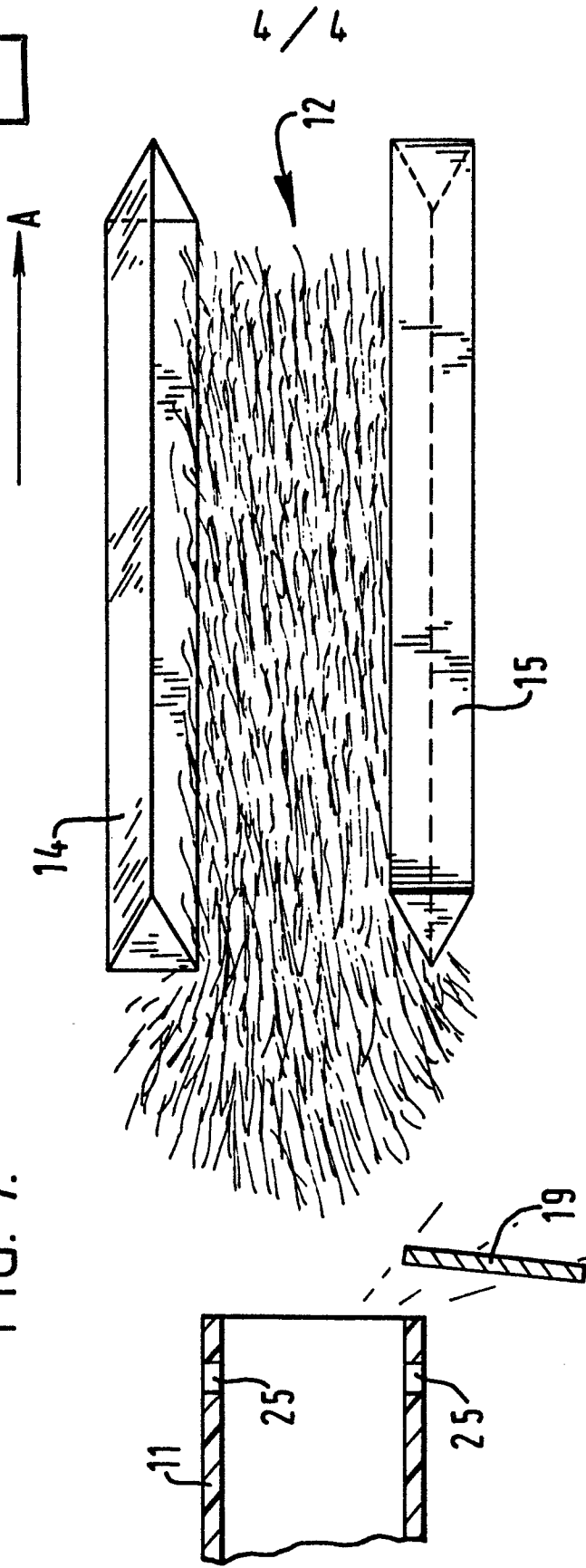


FIG. 6.

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Nouvellement déposé

FIG. 7.



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European Patent  
Office

# EUROPEAN SEARCH REPORT

0246368

Application number

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                          |                                                | EP 86302371.9                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|----------------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Citation of document with indication, where appropriate, of relevant passages                                                                            | Relevant to claim                              | CLASSIFICATION OF THE APPLICATION (Int Cl 4) |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | FR - A1 - 2 436 363 (SOCIETE E. LACROIX-TOUS ARTIFICES)<br>* Pages 3-6; fig. 2-4 *                                                                       | 1,2,4-7,9                                      | F 41 J 9/12                                  |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | US - A - 4 517 896 (ALAIN A. BILLARD; ANDRE R. SANTALUCIA)<br>* Column 1, line 40 - column 2, line 50; column 3, line 34 - column 6, line 19; fig. 4-6 * | 1,4,5,7,9                                      |                                              |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | GB - A - 2 154 716 (DIEHL GMBH & CO)<br>* Page 1, line 116 - page 2, lines 4,35-79; fig. *                                                               | 1,2,4,5,7,9                                    |                                              |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | US - A - 4 031 828 (LAVERNE J. LARSON)<br>* Totality *                                                                                                   | 1,4-7,9                                        |                                              |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                          | 8,10                                           | TECHNICAL FIELDS SEARCHED (Int Cl 4)         |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | GB - A - 2 075 155 (DIEHL GMBH & CO)<br>* Totality *                                                                                                     | 5-7,9                                          | F 41 J 9/00<br>F 42 B 13/00                  |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                          |                                                |                                              |
| Place of search<br>VIENNA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                          | Date of completion of the search<br>11-09-1987 | Examiner<br>KALANDRA                         |
| <p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone<br/>Y : particularly relevant if combined with another document of the same category<br/>A : technological background<br/>O : non-written disclosure<br/>P : intermediate document</p> <p>T : theory or principle underlying the invention<br/>E : earlier patent document, but published on, or after the filing date<br/>D : document cited in the application<br/>L : document cited for other reasons<br/>&amp; : member of the same patent family, corresponding document</p> |                                                                                                                                                          |                                                |                                              |