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(71) Applicant: **Tschüpp GmbH**
**6014 Luzern (CH)**

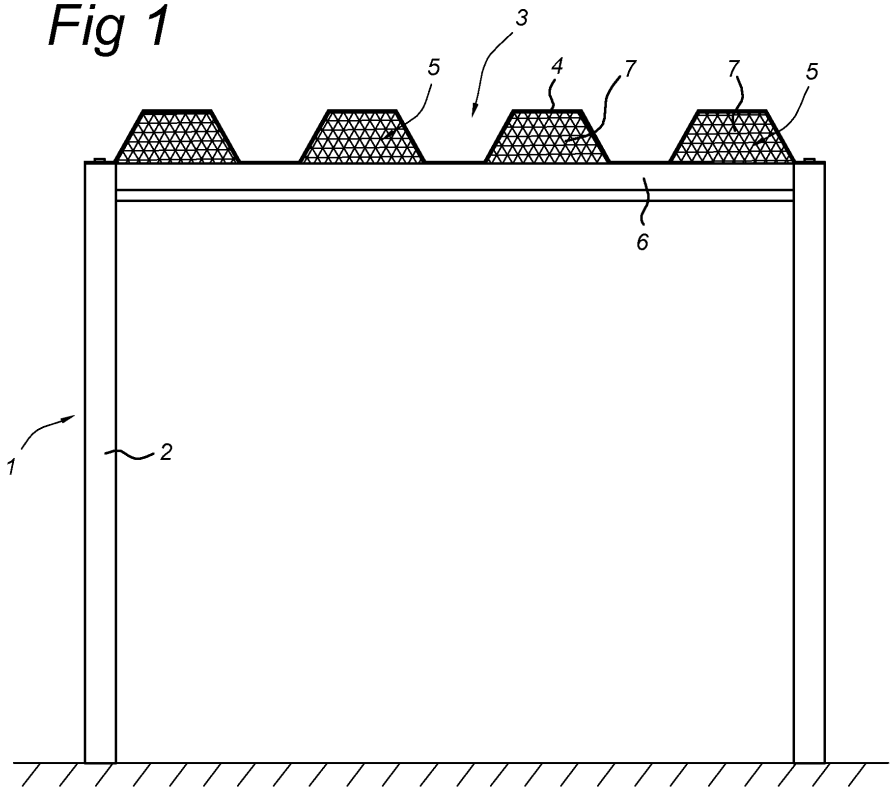
(72) Inventor: **Walboomers, Egon Geert Jan**
**5346 CC Oss (NL)**

(74) Representative: **Swinkels, Bart Willem**
**Nederlandsch Octrooibureau**
**J. W. Frisolaan 13**
**2517 JS Den Haag (NL)**

## (54) Sealing device for a sheet pile profile and method for the fitting thereof

(57) Sealing device for sealing cavities occurring between a sheet pile profile and an adjacent flat boundary surface. The resulting cavities are filled by means of sealing devices which are smaller in size than said cavities to the extent that they can be readily fitted therein. Each sealing device consists of insulating material which is enclosed by packaging. The insulating material is resilient to such a degree that it expands to a larger size when the packaging is removed and comes to lie against the sheet pile profile and the adjacent part. The packaging is preferably fitted as a sleeve and the increase in volume is effected by removing said sleeve while holding the insulating material in place.

Fig 1

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## Description

**[0001]** The present invention relates to a sealing device for sealing the cavity of a sheet pile profile.

**[0002]** A sealing device of this type is known from WO 2008/026923 of the patent proprietor. In the latter, a sealing device is described in which the packaging, together with the insulating material, is subjected to an underpressure so that the insulating material is compacted. At the destination location, in the respective cavity, the underpressure is released by piercing the packaging, as a result of which the insulating material can assume a larger volume, due to its resilience.

**[0003]** Although it has been found that such a system performs very satisfactorily, the packaging has to meet stringent demands, as the underpressure still has to be present in the packaging even after a prolonged storage period, since, if the underpressure gradually decreases, the sealing device will, after some time, no longer be able to be fitted into the respective cavity. In addition, such a packaging is expensive to produce. On the one hand, high demands are imposed on the material of the packaging and, on the other hand, the method of packaging is complicated and requires expensive machines.

**[0004]** US 3,458,966 discloses a method for packaging, for example, insulating material. In this case, a vacuum is applied to a roll or stack of insulating material, as a result of which the volume thereof is reduced, following which a sleeve is fitted around it. In such a way, packaging material can be moved. In this case, the packaging material adapts to the shape of the insulating material.

**[0005]** It is an object of the present invention to provide a sealing device which can be produced inexpensively, can be stored for long periods of time prior to use and can completely fill cavities which are produced by the use of sheet pile profiling or corresponding profiles.

**[0006]** This object is achieved with a sealing device as described above with the features of Claim 1.

**[0007]** According to the present invention, the sleeve-shaped packaging is a dimensionally stable material. This means that it (partially) determines the ultimate shape of the sealing device.

**[0008]** In contrast with the prior art, the first compact shape of the sealing device, that is to say the state in which it is introduced into the respective cavity, is not determined by the application of a vacuum to the packaging, but by the shape of the packaging, that is to say the outer boundary surface thereof. In other words, the maximum volume of the sealed packaging is smaller than the cavity in the sheet pile profile to be filled and the insulating material is incorporated into said packaging under prestress. Releasing the vacuum changes the shape of the packaging, as a result of which the insulating material can assume the second expanded shape and fill the respective cavity.

**[0009]** Changing the shape of the packaging, that is to say increasing its volume, can be achieved by cutting part thereof. However, according to an advantageous embodiment of the present invention, it is provided that the entire packaging is removed from the insulation. This means that after the packaging with insulating material has been fitted in the respective cavity, the packaging is removed from the insulating material while the insulating material is being held, following which the insulating material moves into the desired second expanded shape which fills the cavity.

**[0010]** As has been indicated above, the shape of the packaging limits the volume of the insulating material. It will be understood that this means the shape in the unpressurized state (be that by gas or another medium). In other words, the shape is not achieved by applying an underpressure or overpressure to the packaging, as is known from the prior art, but the shape is determined by the periphery of the (taut) material of the packaging. According to an advantageous embodiment of the present invention, such a dimensionally stable material is a cardboard material. In order to be able to introduce the sealing device, and more particularly the sealing body, it is important that the part which is introduced into the respective space is smaller (in cross section) than the cavity in question. This means that the part of the sealing body which is introduced into the cavity first preferably has to be enclosed by the packaging at its end. In other words, at said end the sealing body must not extend beyond the packaging as this would increase its volume and would render the introduction into the respective cavity more difficult.

**[0011]** With many applications, a more or less sealing insulation will be required. In this case, a resilient insulating material is placed in a flexible container, such as a bag. The volume of the bag is such that it does not hamper the expansion of the insulating material, that is to say the volume of the container is greater than the greatest possible intended volume which is to be filled. This flexible container with insulating material is then compressed into the packaging described above. Said flexible container is not airtight to such a degree that it would hamper compression and expansion.

**[0012]** The use of a separate flexible container, which may consist of a plastic film material, moreover has the effect that, when moving the flexible container with insulating material out of the packaging, there is no direct contact between the fitter and the insulating material, and the insulating material may therefore be an irritant insulating material, such as mineral wool. Such a flexible container may, for example, be a bag as described above, but may also be configured in any other way in order to completely surround the insulating material.

**[0013]** The packaging may comprise only a sleeve, but it is also possible for it to be provided with closable apertures. In the latter case, the user opens the packaging before he places the sealing device into the respective cavity and he can then, by removing the packaging while holding back the insulating material, change the shape of the insulating material from the first compact shape to the second expanded shape.

**[0014]** The insulating material may be any material which is customary in the prior art. This is understood to include plastic, foam types and the like. Preferably, however, mineral wool is used, such as rock wool or glass wool which can be readily held in the compressed position by means of the packaging.

**[0015]** The mineral wool may be formed as layers on a sealing body. In addition, it is possible to add a material which foams when the temperature increases, such as ceramic foams, which ensure complete sealing in case of fire.

**[0016]** The present invention also relates to the combination of a sheet pile profile, and more particularly to a sheet pile profile and an adjoining support, and a sealing device fitted in the resulting cavity. In this case, the packaging is preferably removed from the sealing device, so that only the insulating material, optionally disposed in a flexible container, rests in the respective cavity. Such cavities do not always have the same shape. During construction, deformations are caused to the profile, as a result of which different volumes have to be filled in each case.

**[0017]** With such a combination, a sealing body projects beyond the cavity at least on one side and there expands further outwards, as it is no longer confined inside the cavity. Thus, a fixed positioning of the sealing body in the cavity is provided and the sealing body will not move from the cavity in the case of a temporary increase in pressure, as occurs when closing doors or in case of fire. With such a combination, the packaging is no longer present and the properties of the packaging are not relevant for the scope of protection of the present patent. In addition, all the above-described embodiment variants can be used.

**[0018]** According to a further aspect, the invention relates to a method for filling the space in the boundary between a building part and a sheet pile profile according to Claim 12. In this case, all the particular embodiments as described above can be used. However, it is also possible to use other insulating materials and other materials for the packaging.

**[0019]** In this case, according to a further variant of the present invention, it is possible to remove the sealing device from the packaging by means of gripping means, such as tongs, and place it into the respective cavity in the compressed state.

**[0020]** The invention will be described below in more detail with reference to exemplary embodiments illustrated in the drawing, in which:

Fig. 1 shows a sheet pile profile provided with a support with cavities filled with insulating material;
Fig. 2 shows a first exemplary embodiment of a sealing device according to the invention during assembly (Fig. 2a, 2b) and in the compact state (Fig. 2c);
Figs. 3a, b show a second embodiment of a sealing device;
Fig. 4 shows how the sealing devices from Figs. 2 and 3 are fitted in the cavity of a sheet pile profile before the packaging is removed;
Fig. 5 shows the situation during removal of the packaging; and
Figs. 6a-e show how fitting is effected using gripping means.

**[0021]** In Fig. 1, a part of a building structure denoted by reference numeral 1 is shown, in this case a hall. It will be understood that the present invention can be used in any situation where cavities occur which have to be filled with insulating material. It will also be understood that Fig. 1 and more particularly the building parts illustrated therein are not drawn to scale.

**[0022]** The building structure 1 is provided with walls 2 supporting a roof 3. The roof consists of a sheet pile profile 4 on top of which insulating material and a roof covering are arranged in a manner which is not illustrated in any more detail. Sheet pile profile 4 rests on a support 6 and in between cavities 5 are delimited which are filled with insulating material. These cavities 5 may differ in volume, since the sheet pile profile used is often a thin-walled profile (0.65 mm) which easily deforms (becomes longer or shorter), as a result of which cavities may be lower and flatter.

**[0023]** It is an object of the present invention to provide a sealing device and method for fitting the insulating material 7.

**[0024]** To this end, Fig. 2 shows a first variant of the sealing device according to the present invention. Fig. 2a shows a portion of insulating material, in this case consisting of mineral wool, which is denoted overall by reference numeral 11. Glass wool or rock wool are mentioned as examples of mineral wool. Preferably, glass wool is used as this has superior hysteresis properties during compression. This is fitted into a flexible container 9 which is in turn fitted inside packaging 10. The volume of flexible container 9 is such that it is at least as large as the volume of the insulating material 11 in its most expanded state. As can be seen from Fig. 2a, the volume of the packaging 12 is smaller than the volume of the container 9 or the volume of the insulating material 11. This means that compression of the insulating material 11 is achieved by the limited dimensions of the periphery of the packaging 12. Fig. 2b diagrammatically shows the introduction of the flexible container 9 filled with insulating material into the packaging 12. It will be understood that, in practice, the introduction of the combination of the insulating material and the flexible container into the packaging can be achieved in any conceivable way. In principle, it is sufficient if the packaging 12 consists of an open-ended sleeve (cylinder part), but it is possible to close this at one or both ends. Finally, the state illustrated in Fig. 2c is arrived at, in which the insulating material 11 with flexible container 9 is accommodated inside the packaging 12 in a compact manner. In this case, preferably no prestress is present in the axial direction, that is to say in the direction of the axis of the cylindrical pack-

aging 12.

**[0025]** Fig. 3a shows a corresponding sealing device which is denoted overall by reference numeral 20. In this case, the packaging 22 is made from a dimensionally stable material. In this case, the volume of the packaging 22 is again smaller in its peripheral direction than the volume of the insulating material 21 and the flexible container 23 provided around it, and the insulating material 21 is therefore accommodated inside the packaging 22 in a compressed state. An opening 24 which may, if desired, be closed by means of a flap (not shown) is also present here. Fig. 3b shows the insulating material in its expanded state without packaging 22.

**[0026]** The material used in the embodiment from Fig. 2 may be a film material which has to have sufficient creepage strength to be able to withstand the pressure force of the insulating material 11 for a prolonged period of time. For the variant from Fig. 3, a hard material, such as cardboard, may be chosen. By using cardboard, the packaging may form the insulating material into a shape. As a result thereof, no high demands are imposed on the shape of the insulating material, as long as it can completely fill the respective cavity when it is moved out of the packaging.

**[0027]** Fig. 4 shows how the sealing devices 10 and 20, respectively, are placed inside the cavity 5 of a sheet pile profile. With the dimensionally stable embodiment as illustrated in Fig. 3, the packaging has to be slightly smaller along its entire periphery than the outer boundary of the cavity 5. With the non-dimensionally stable variant as illustrated in Fig. 2, the packaging 12 may be larger than the dimension of the cavity in a certain direction, but this problem can be overcome by compressing it when it is introduced into said cavity. If a readily sliding material, such as insulating material, is used, this forms no obstacle to fitting a sealing device.

**[0028]** Starting from this situation, in Fig. 5 the packaging 22 is removed by pulling said packaging 22 off while holding back the insulating material 11 by pushing it against the flexible container 9 using the hand 27. The packaging 22 is moved by the hand 28 in the direction of the arrow 26. As a result of the flexible container, the user is not in direct contact with the insulating material and the insulating material 21 will expand to fill the shape of the cavity 5 as it is no longer hampered by the flexible container 23 inside which it was arranged.

**[0029]** In Fig. 5, the insulating material 11 can be brought to the expanded state in a similar manner by removing the packaging 10 by pulling the packaging 10 which is configured as a sleeve. This leaves the insulating material 11 and the flexible container 9 surrounding the latter behind.

**[0030]** Instead of completely removing the packaging, it is also possible to cut the packaging using a knife or scissors. However, the required operations have to take place after the sealing device has been fitted in the position illustrated in Fig. 4. Such a removal or separation of the packaging is possible by fitting it with a removable strip. When such a strip which runs in the longitudinal direction of the packaging is removed, the respective packaging walls are separated. By allowing a part of the strip to protrude outwards in a state as illustrated in Fig. 4, it can be pulled, resulting in complete separation of the packaging and allowing the insulating material to expand to its desired final size. It will be understood that many other variants are possible for changing the shape of the packaging and more particularly the peripheral volume thereof, as a result of which the insulating material is free to revert to its original state.

**[0031]** Figs. 6a-e show a further variant of the invention. As is the case with the previous embodiments, a packaging 22 with insulating material 21 contained therein is present.

**[0032]** Now, a gripping device or tongs 35 are provided which, in the present example, consist of two fingers 34 coupled to one another and two fingers 36 coupled to one another. By operating the handles 37, these fingers 34 and 36 can be moved towards one another or away from one another.

**[0033]** As can be seen from Fig. 6b, the fingers of these tongs 35 are introduced into the packaging 22. In this case, the distances between the fingers 34 and 36, respectively, are chosen such that they correspond to the length of the top side and bottom side, respectively, of the packaging 22. During the introduction according to Fig. 6b, the tongs are as much as possible in the open position, that is to say fingers 34 and 36 are situated as much as possible on the separating surface between packaging 22 and insulating material 21. Subsequently, the tongs are squeezed, resulting in further compression of the insulating material 21 which can then be removed from the packaging 22 in a simple manner.

**[0034]** As is illustrated in Fig. 6b, the insulating material 21 is fitted inside the cavity 5 in the compressed state, together with the tongs. Subsequently, the tongs 35 are released and moved back out of the cavity 5. As a result of the tongs being released, the insulating material 21 will come to lie against the wall of the cavity 5 and not move along with the tongs. In addition, as a result of the tongs being released, the cross section of the portion of the insulating material which is designated by reference numeral 40 and extends beyond the cavity 5 will expand to a size beyond the size of the cross-sectional dimension of the cavity 5. As a result thereof, the insulating body 21 is locked in further and prevented from moving out of the cavity together with the tongs 35. On the opposite side of the cavity, a corresponding enlargement of the volume, that is to say the cross-sectional dimension being larger than that of the cross section of the cavity 5, may take place if the length of the insulating material 21 is sufficient. In this way, the insulating material can be fixed with respect to the cavity 5 in one or two directions. This prevents the insulating material from being blown out of the cavity in case of an increase in pressure on one side of the building structure. Due to the fact that the insulating material 21 is resilient, it is possible to ensure that it con-

stantly lies against the sheet pile profile and the support 6 under all circumstances. This means that changes in volume resulting from changes in temperature do not pose a problem and do not result in detachment of the insulating material 21.

**[0035]** By means of the present invention, it is possible to provide a packaging for insulating material which does not have to be gas-tight, but by means of which the insulating material can still be prestressed as a result of the smaller volume thereof in at least one peripheral direction. By piercing the packaging in any suitable way, the compressed insulating material can expand and fill the respective cavity as desired. In this case, an increase in volume of 15-30 and more particularly 20-25% can be achieved.

**[0036]** Upon reading the above, those skilled in the art will immediately be able to think of variants which are within the scope of the attached claims and are obvious after reading the above description.

## Claims

1. Sealing device (10, 20) for sealing the cavity (5) of a sheet pile profile (4), comprising a sealing body (11, 21), wherein said sealing body comprises a resilient insulating material which is prestressed into a first compact shape (Fig. 2a, Fig. 3 a) and arranged inside a sleeve-shaped packaging (12, 22) which surrounds the insulating material, wherein said insulating material adopts a second, expanded shape which is complementary to the shape of a sheet pile profile during fitting when said prestress ceases (Fig. 2b, Fig. 3b), wherein said packaging (12, 22) comprises a material part which holds the insulating material in said first shape as a result of the size of said packaging, which material part encloses the insulating material part in a sleeve-like manner and comprises an exit opening (14, 24) for the insulating material, **characterized in that** said packaging comprises a dimensionally stable material which determines the shape of the insulating material.

2. Sealing device according to Claim 1, wherein said packaging comprises a cardboard material.

3. Sealing device according to one of the preceding claims, wherein the length of said sleeve-shaped packaging corresponds at least to the length of said insulating material.

4. Sealing device according to one of the preceding claims, wherein said packaging (12, 22) comprises a removable closure.

5. Sealing device according to one of the preceding claims, wherein a flexible container (9, 23) is arranged around said insulating material.

6. Sealing device according to Claim 5, wherein the maximum volume of said flexible container (9, 23) is larger than the maximum volume of said insulation.

7. Sealing device according to one of the preceding claims, wherein the insulating body comprises glass wool.

8. Sealing device according to one of the preceding claims, wherein said sealing body comprises a layered material.

9. Sealing device according to one of the preceding claims, wherein said sealing body comprises a material which expands upon an increase in temperature.

10. Combination comprising a sheet pile profile (4) and a straight boundary surface (6) between which a space (7) is defined, and a sealing body (11, 21) made of mineral wool, which sealing body is arranged in said cavity under prestress and extends beyond said space (7) on one side and there assumes a larger cross section than said space (7).

11. Combination according to Claim 10, wherein said sealing body comprises the sealing body according to one of Claims 1-9.

12. Method for filling the cavity in the boundary between a building part and a sheet pile profile (4) comprising providing a sealing device (10, 20) for sealing said cavity (5), wherein said sealing device comprises a sealing body (11, 21), wherein said sealing body comprises a resilient insulating material which is prestressed into a first compact shape (Fig. 2a, Fig. 3a) and arranged inside a packaging (12, 22) which surrounds the insulating material, wherein said insulating material adopts a second, expanded shape which is complementary to the shape of said sheet pile profile when said prestress ceases (Fig. 2b, Fig. 3b), wherein said packaging (12, 22) comprises a material part which holds the insulating material in said first shape as a result of the size of said packaging, which material part encloses the insulating material part in a sleeve-like manner and comprises an exit opening (14, 24) for the insulating material, arranging said sealing device in said space (5), releasing the prestress caused by the packaging (12, 22) in keeping said insulating material in place.

13. Method according to Claim 12, wherein the release of said prestress comprises removing said packaging from said insulating material.

14. Method according to Claim 13, wherein said packaging (12, 22) is sleeve-shaped and comprises openings situated opposite one another, wherein

said insulating material is held back by an opening during removal of said packaging and emerges from said packaging through the other opening.

**15.** Method according to one of Claims 12-14, comprising introducing gripping means into the packaging, using these to compress the insulating material and removing the insulating material from the packaging, followed by introducing said insulating material in the compressed state in the boundary between said building part and the sheet pile profile (4) using the gripping means and removing the gripping means.

Fig 1

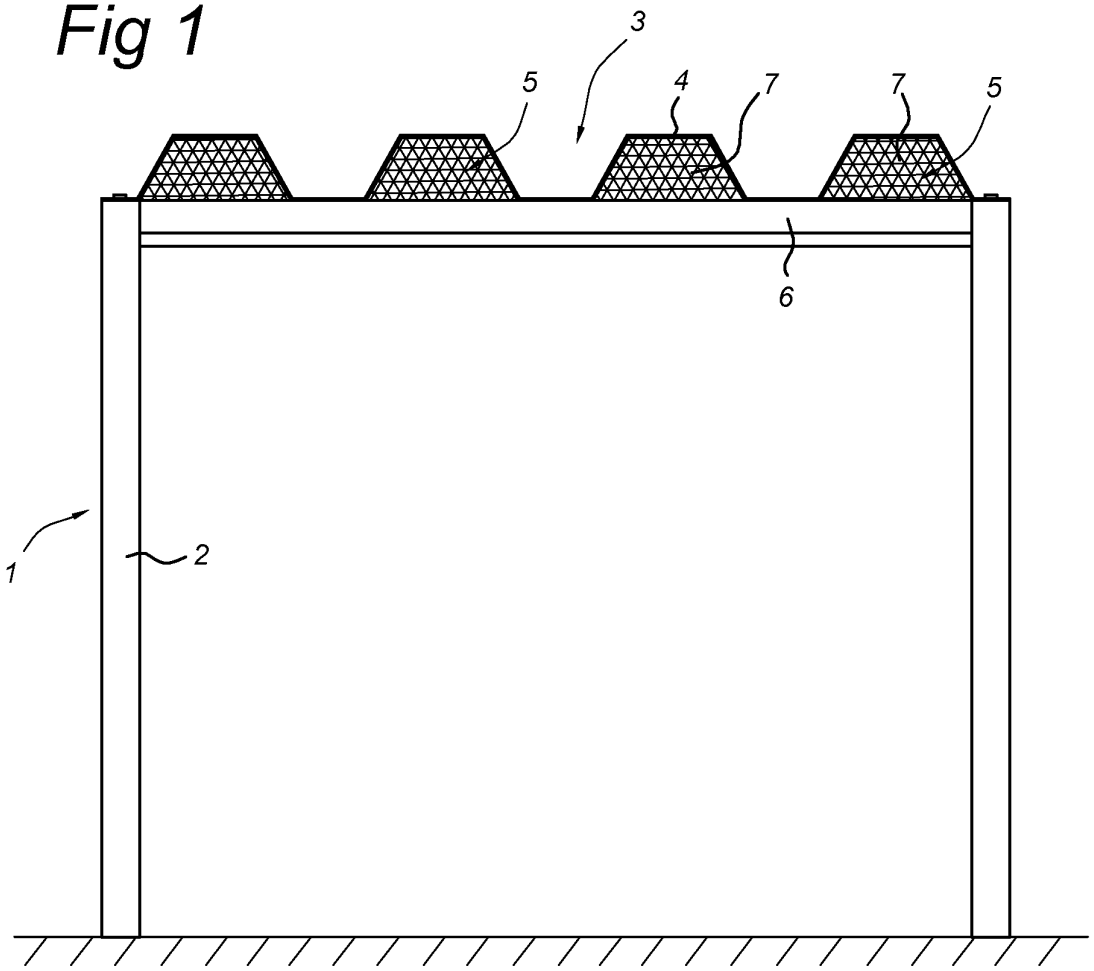



Fig 2a

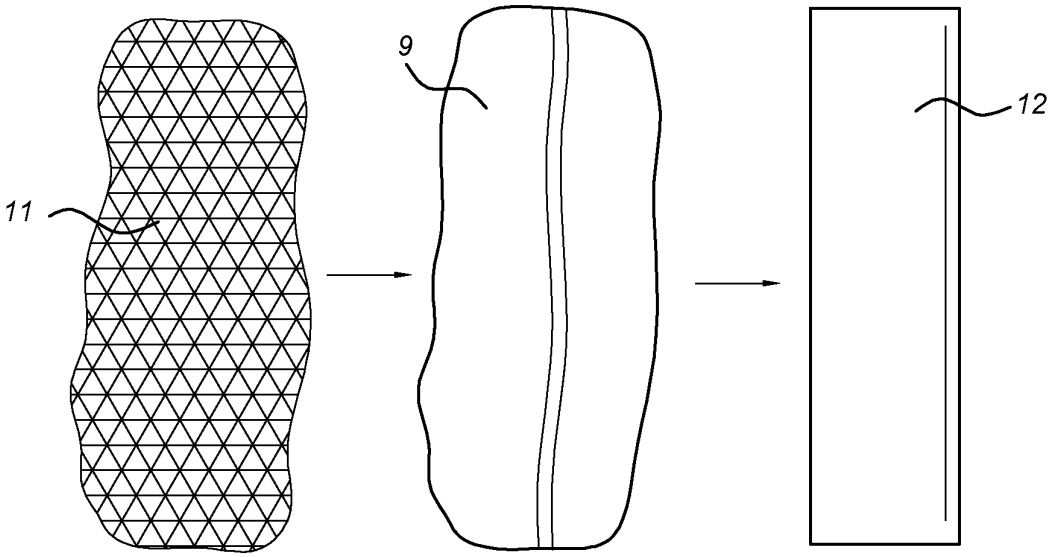


Fig 2b

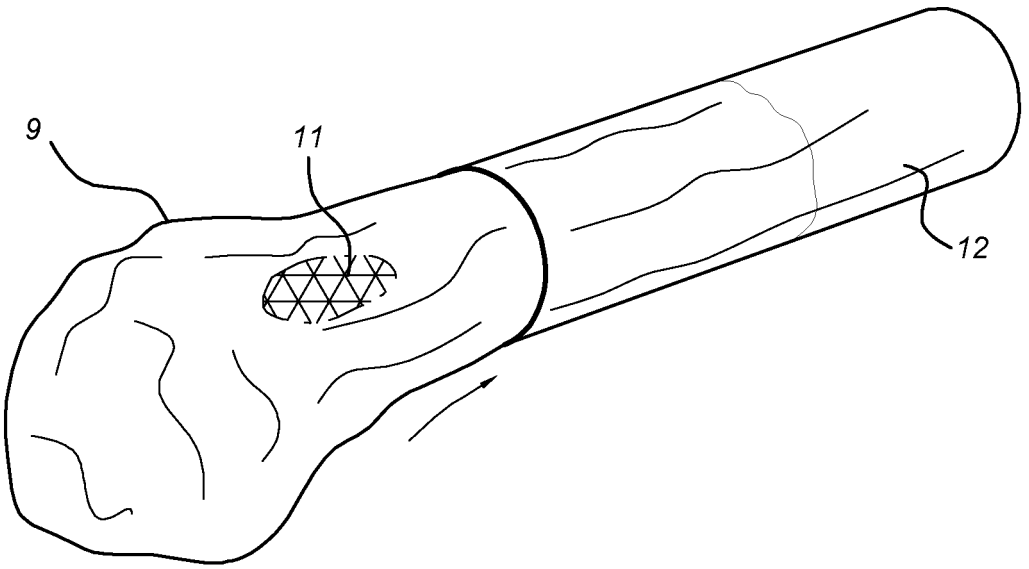



Fig 2c

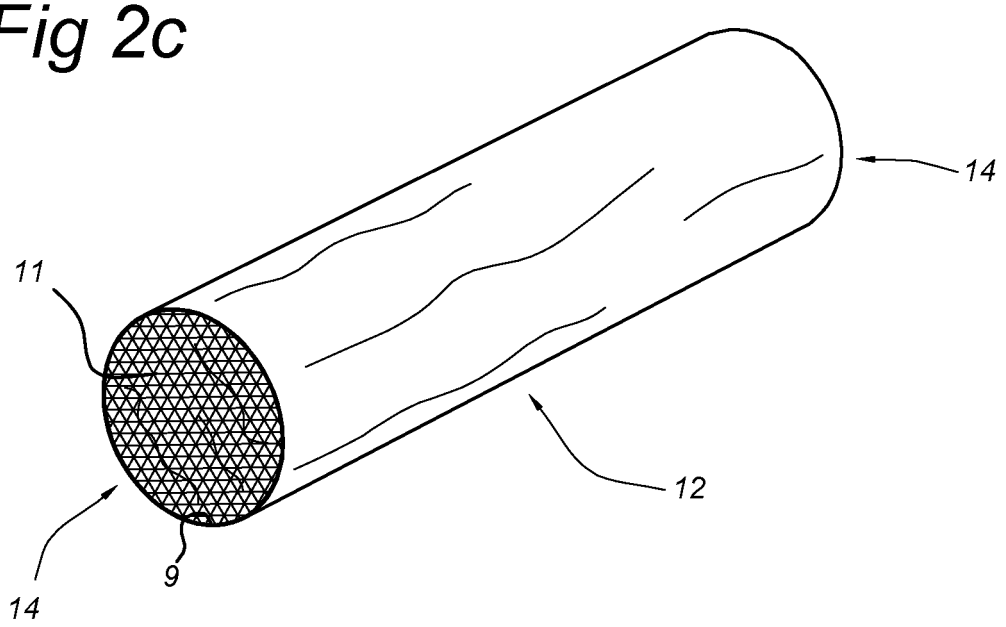


Fig 3a

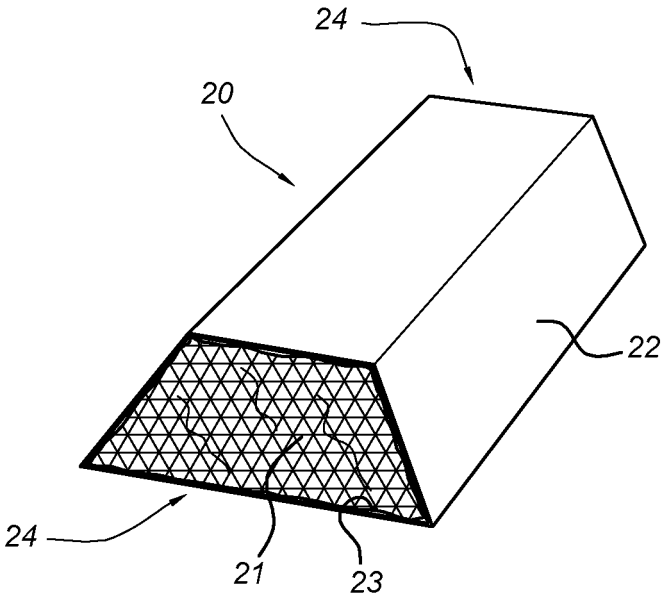



Fig 3b

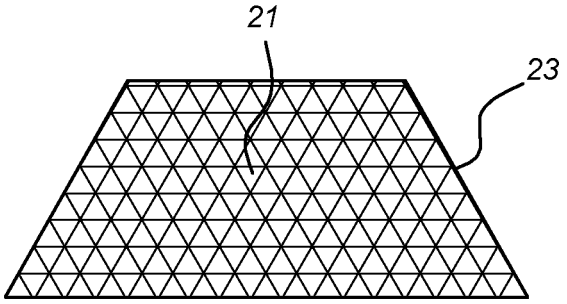


Fig 4

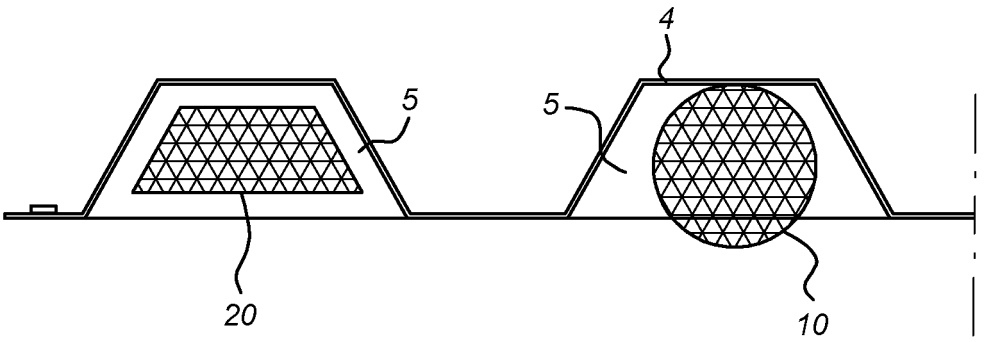



Fig 5

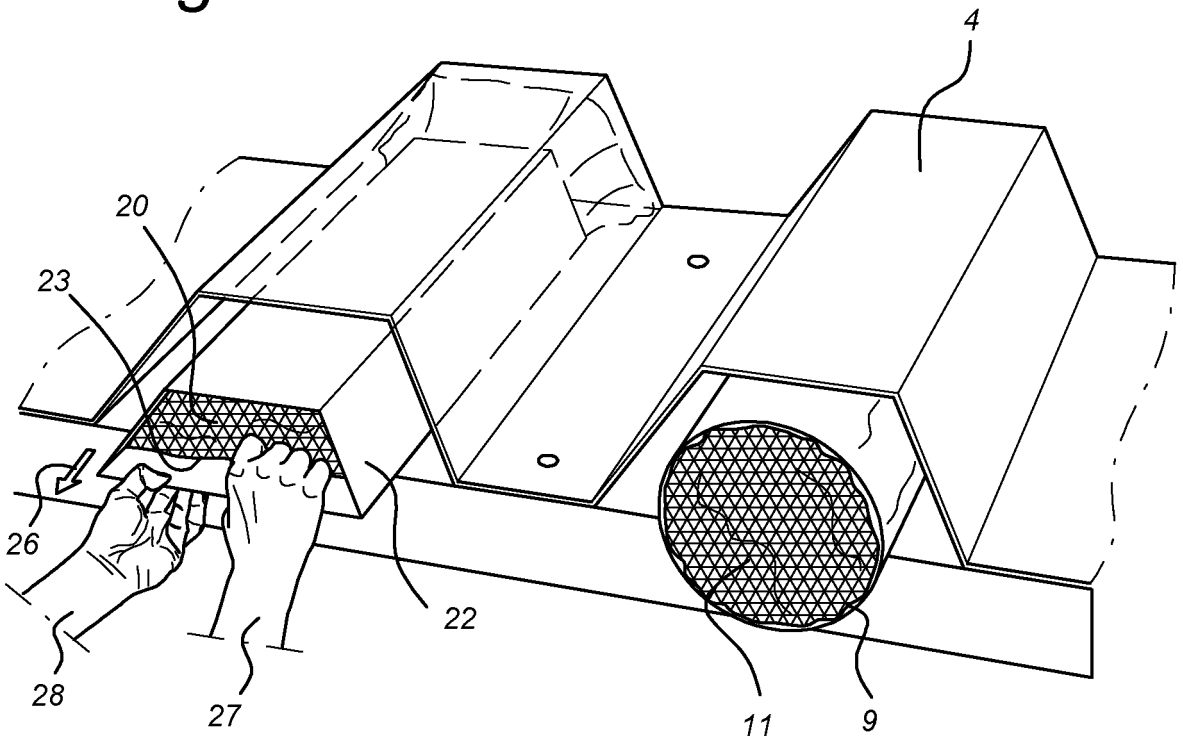


Fig 6a

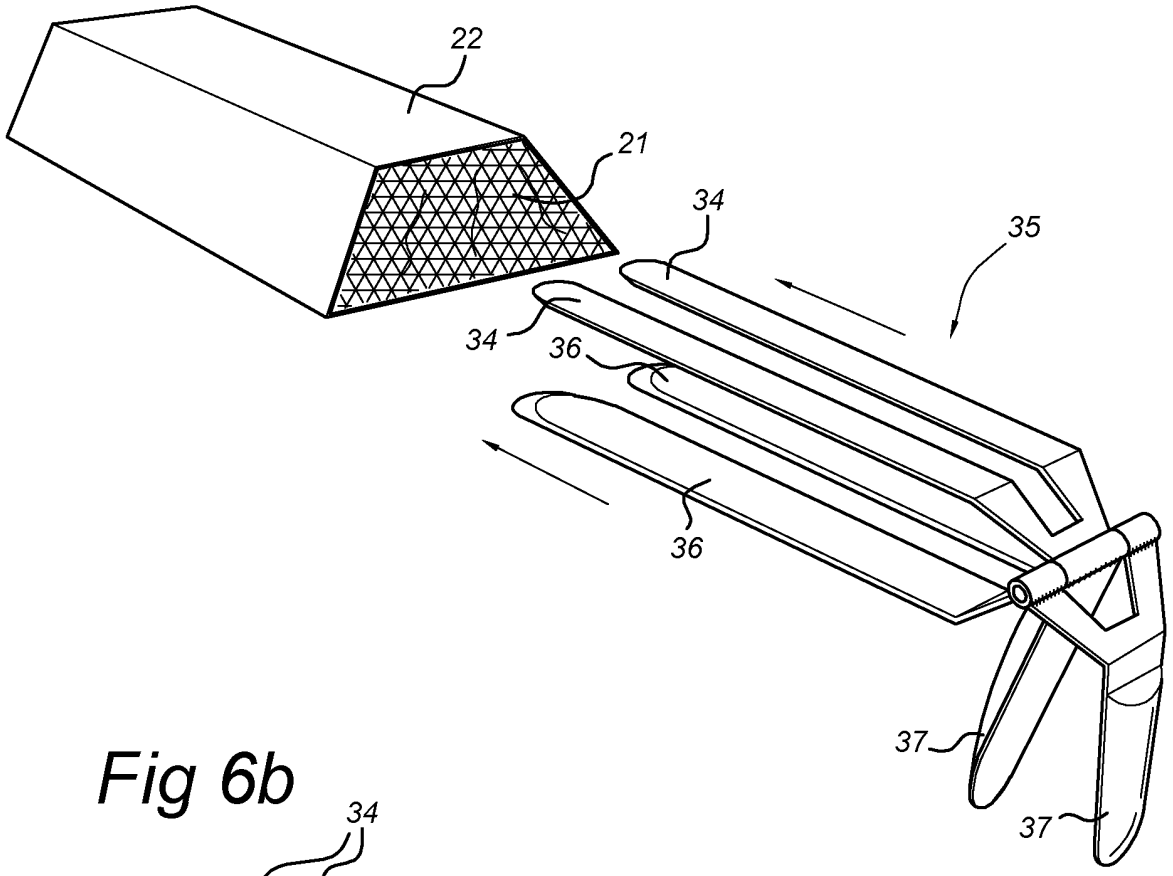



Fig 6b

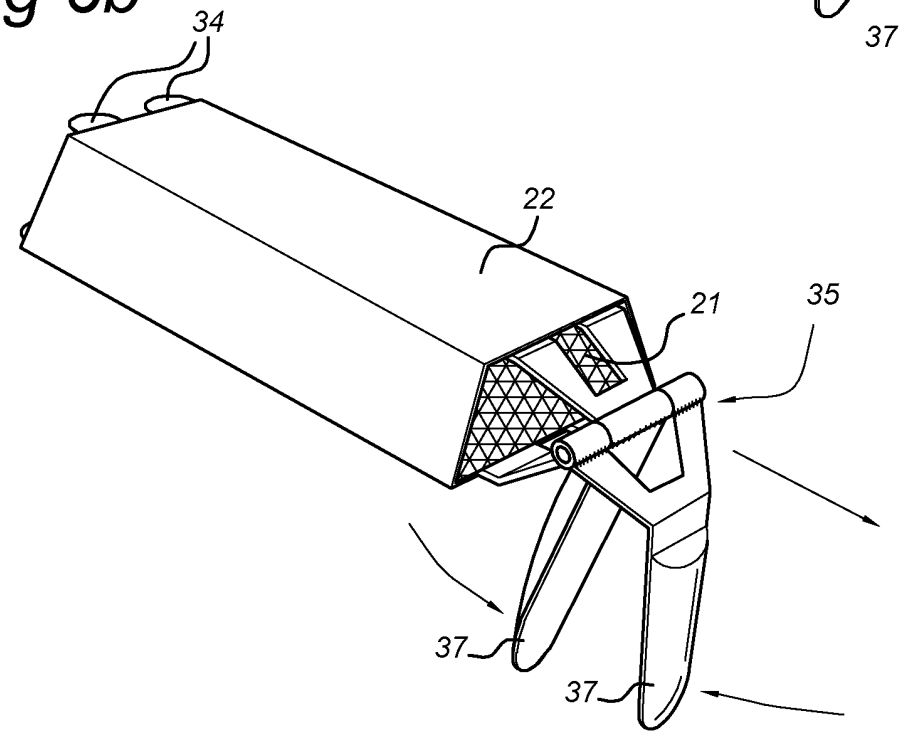


Fig 6c

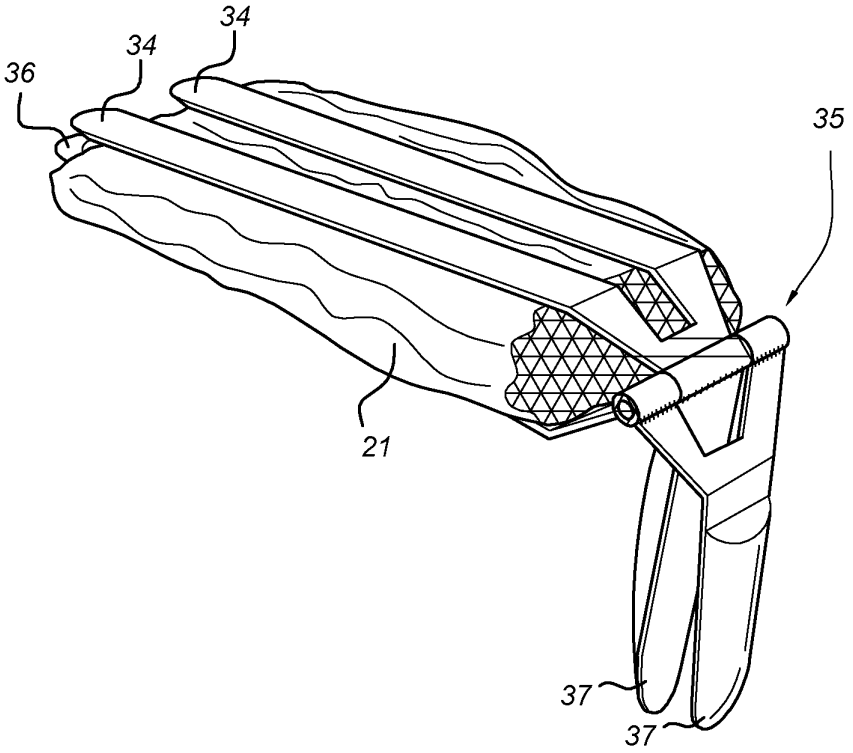



Fig 6d

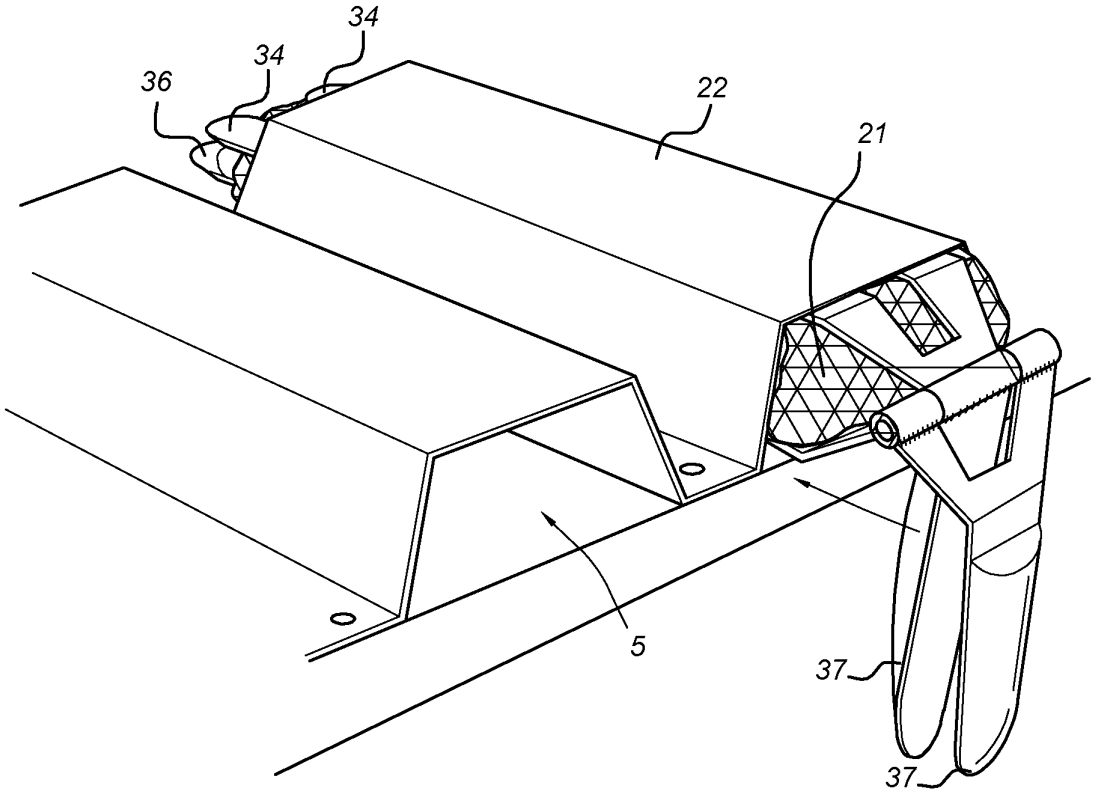
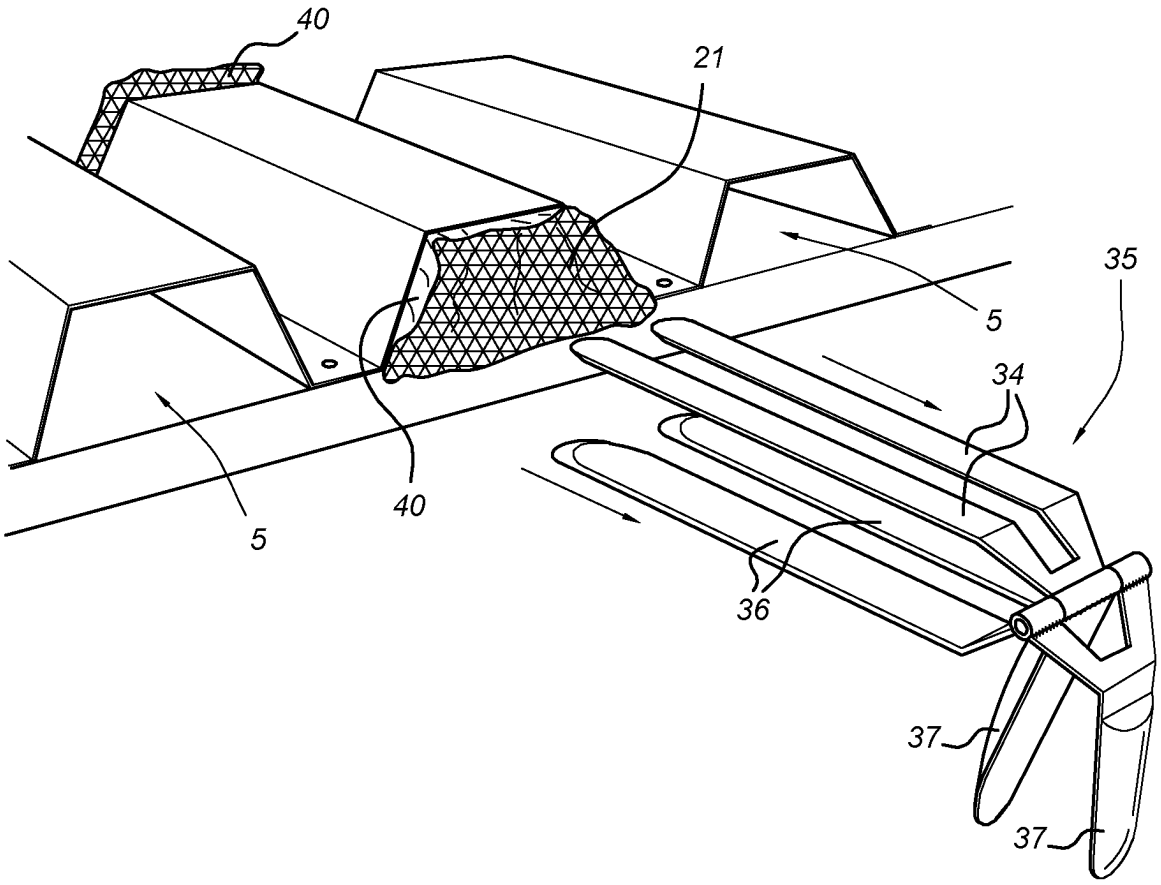


Fig 6e



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# EUROPEAN SEARCH REPORT

Application Number
EP 11 17 8278

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
| X | US 3 458 966 A (DUNBAR SIDNEY G ET AL) 5 August 1969 (1969-08-05) * the whole document * | 1-3,5-9 | INV. E04D13/16 |
| X | FR 2 831 645 A1 (SAINT GOBAIN ISOVER [FR]) 2 May 2003 (2003-05-02) * page 14, last paragraph; claim 12; figure 6 * | 1-4,7-9 | |
| X | WO 2004/103821 A1 (KNAUF INSULATION SA [BE]; VANTILT PIERRE [BE]) 2 December 2004 (2004-12-02) * claim 1; figures 1, 3 * | 1-3,7-9 | |
| X | US 2008/087557 A1 (EVANS MICHAEL E [US] ET AL EVANS MICHAEL [US] ET AL EVANS MICHAEL E [U) 17 April 2008 (2008-04-17) * figures * | 1-3,7-9 | |
| X | EP 1 479 844 A1 (ISO CHEMIE GMBH [DE]) 24 November 2004 (2004-11-24) * figures * | 10,11 | TECHNICAL FIELDS SEARCHED (IPC) E04D |
| A | WO 2008/026923 A1 (TCHUEPP GMBH [CH]; BERLEE ANTHONIE BERNARDUS [NL]; BORRA HANS ANTONIUS) 6 March 2008 (2008-03-06) * figures * | 1,10,12 | |

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 25 November 2011 | Demeester, Jan |

CATEGORY OF CITED DOCUMENTS

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1 EPO FORM 1503 03.82 (P04C01)

## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 11 17 8278

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25-11-2011

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| US 3458966 A | 05-08-1969 | NONE | |
| FR 2831645 A1 | 02-05-2003 | BR 0211163 A | 10-08-2004 |
| | | FR 2831645 A1 | 02-05-2003 |
| | | PL 200572 B1 | 30-01-2009 |
| WO 2004103821 A1 | 02-12-2004 | AT 338687 T | 15-09-2006 |
| | | AU 2004240781 A1 | 02-12-2004 |
| | | BE 1015523 A3 | 03-05-2005 |
| | | CN 1795123 A | 28-06-2006 |
| | | DE 602004002303 T2 | 19-04-2007 |
| | | DK 1633630 T3 | 08-01-2007 |
| | | EP 1633630 A1 | 15-03-2006 |
| | | ES 2271901 T3 | 16-04-2007 |
| | | HK 1085445 A1 | 08-12-2006 |
| | | JP 2007505015 A | 08-03-2007 |
| | | KR 20060011883 A | 03-02-2006 |
| | | PT 1633630 E | 29-12-2006 |
| | | US 2006196799 A1 | 07-09-2006 |
| | | WO 2004103821 A1 | 02-12-2004 |
| US 2008087557 A1 | 17-04-2008 | CA 2604395 A1 | 16-04-2008 |
| | | US 2008087557 A1 | 17-04-2008 |
| EP 1479844 A1 | 24-11-2004 | DE 20307960 U1 | 30-09-2004 |
| | | EP 1479844 A1 | 24-11-2004 |
| WO 2008026923 A1 | 06-03-2008 | AT 454513 T | 15-01-2010 |
| | | CA 2662302 A1 | 06-03-2008 |
| | | DK 2057325 T3 | 12-04-2010 |
| | | EP 2057325 A1 | 13-05-2009 |
| | | ES 2339185 T3 | 17-05-2010 |
| | | JP 2010502903 A | 28-01-2010 |
| | | NL 2000204 C2 | 04-03-2008 |
| | | PT 2057325 E | 09-04-2010 |
| | | US 2010021246 A1 | 28-01-2010 |
| | | WO 2008026923 A1 | 06-03-2008 |

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


- WO 2008026923 A **[0002]**
- US 3458966 A **[0004]**