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Description

This invention relates to waterproofing structures and their use.

Preformed self-adhesive waterproofing structures are known which comprise a sheet like substrate, which typically is of waterproof plastics material, such as polythene or polyethylene, having contiguous therewith a layer of a self adhesive waterproofing material which typically is a bituminous compound such as a mixture of bitumen and rubber.

Such structures are normally supplied in the form of rolls, being flexible, with a release sheet attached to the exposed surface of the self-adhesive compound. The material is applied by unrolling, simultaneously removing the release sheet and brushing the material out so that it entirely contacts the surface being covered. Normally, adjacent strips are lapped with the edge of one overlapping the edge of its neighbour.

In some circumstances such structures can be difficult to apply. For instance, application to vertical surfaces can be difficult due to the fact that the adhesive is very tacky and the material heavy and flexible. Horizontally extending strips of material are often called for on vertical surfaces and the application of these in particular can pose problems.

As mentioned, the known structures typically have a plastic sheet material as the substrate to which the self adhesive membrane is attached. Whether used on horizontal or vertical surfaces these structures, although waterproof, do have mechanical limitations. For instance, in basement construction, the first layer of concrete for the floor is covered with the waterproofing structure. However there may be some time between the application of this covering and subsequently covering the structure with a screed or other flooring substance or with another layer of concrete. During that period the uppermost plastics substrate needs to be protected because tradesmen require access and so foot traffic must be expected. On vertical walls, the waterproofing structure may be applied to the exterior of a subterranean concrete wall. The space between the ground and the wall is subsequently backfilled and the material used for this may include quite sharp aggregate likely to puncture the plastic sheet substrate. Thus, there is a need to protect the substrate and this may presently be done by using a protecting board attached to the plastic substrate sheet using a curable adhesive. Such boards may comprise bitumen impregnated felts optionally provided with filler such as cork. Alternatively the risk is run that the plastic substrate, and perhaps the entire structure, will be ruptured, leading to the possibility of moisture penetration in the future.

GB-A-1230754 discloses inter alia a membrane comprising a support which can be a cellular film and an adhesive layer. The structures can be rolled up. The support is not segmented.

CH-A-503173 shows a structure which is segmented and foldable to some extent, having a continuous back sheet but it has no adhesive, and the segments are solid.

According to a first aspect of the present invention there is provided a structure comprising a membrane of a waterproofing pressure sensitive adhesive material with, contiguous thereto, a layer of relatively rigid covering material, characterised in that the covering material is a twin walled structure with transverse ribs between the walls providing a plurality of channels, and in that the covering material is so arranged and segmented that the structure can be folded at the divisions between the segments.

By "relatively rigid covering material" we mean a material of such stiffness that the structure will not buckle and will not bend very much, under its own weight, for instance if held at one edge, in contrast to the known materials which are easily bent and will droop through a large angle if supported only at the edge. The relatively rigid, covering material has the advantage that it provides, integrally in the waterproofing structure, a strengthening and protecting layer which can withstand satisfactorily foot traffic and the abrasive effects of any backfilling there may be when the material is used at an external or subterranean surface. In addition, structures of the invention are easy to apply.

The adhesive membrane may be reinforced with a high tensile strength reinforcing net, for instance of polypropylene, but glass or other fibre reinforcements are other possibilities.

The division between segments may be complete separation, or just a cut or groove through part of the thickness allowing folding between segments. For instance, a fold line can be created by nip-folding, that is crushing locally along a line.

By arranging the materials so that alternate folds are in opposite directions the structure can be supplied in a concertina folded arrangement, in which it is easily applied to a surface to be covered and protected, the application perhaps being easier than with the more flexible rolls of material which lack the rigid layer. Alternatively, the structure may be rolled up, for instance around a central core, with the adhesive on either the inside or, preferably, the outside. The core diameter will usually be greater than the segment width or order to make such a rolled-up arrangement feasible. Preferably the covering material is lightweight and has a continuous skin in contact with the adhesive membrane. The covering material is a twin-walled material, that is to say a material having two walls spaced apart and connected by a plurality of intermediate transverse ribs which divide the space between the walls into parallel channels, the distance between the two walls being about 2 to 10 mm, or more, preferably about 4 mm such as is used in the second aspect of the invention. The spacings

between the adjacent ribs will normally be similar to the spacing between the walls. Materials of this type, have a very high strength to weight ratio and are very strong against crushing of the two walls, so that a man may jump upon them without crushing the walls together.

With this covering material, to allow the folding to occur at each foldline one of the walls may be slit, so that the other one remains continuous, and the folding takes place along the line of that one of the parallel channels which is thus opened. The membrane may be outside the fold if the outer wall is slit, and inside the fold if the inner one is slit. To ensure that the pressure sensitive adhesive membrane is capable of withstanding folding, particularly when it is on the outside of a fold line in the concertina formation, it may be reinforced with a high tensile strength reinforcing net layer, for instance a sheet or for instance of polypropylene, but glass or other fibre woven or nonwoven reinforcements are other possibilities. Reinforcement can also help with lap jointing. In addition, in order better to ensure continuity of covering material, a continuous film can be applied between the self adhesive membrane and the relatively rigid covering material. Alternatively, such a film could be intermittently applied, for instance beneath the covering material in the region of each fold line.

For the pressure sensitive adhesive membrane it is possible to use membranes of adhesive material which enable the structures when pressed by normal hand pressure against for instance a concrete surface, without any prior treatment of the membrane or the concrete, to remain stuck thereto. Alternatively, adhesives which require prior surface treatment e.g. with a primer, can be used. Suitably the membrane of adhesive is 0.5 to 3 or 4 mm. thick but in certain circumstances a thickness down to 0.25 mm thick may be employed. Below that thickness secure adhesion and integrity of the waterproofing membrane may not be maintained.

Bituminous adhesives are generally suitable for the membrane and may be formed of natural or synthetic rubber, virgin or reclaimed, blended into bitumen to provide a smooth mix. The ratio by weight of bitumen to rubber is preferably from 80:20 to 95:5 especially about 90:10. Other types of adhesive composition could be used. Generally, suitable compositions of adhesive have softening temperatures measured by the Ring and Ball method of 70 to 130°C.

A removable paper or other coating is normally required on structures of the invention to cover the surface of the adhesive membrane remote from the rigid covering sheet. This can be siliconised paper or another release sheet.

When applied to an exterior vertical surface a still further function may be performed by structures according to the invention. This is achieved if the exterior wall of the relatively rigid covering sheet is rendered at least to a small extent perforated allowing access to drainage passages or paths within the relatively rigid material. This will allow land water to penetrate into this sheet and drain downwards, for instance through the parallel channels, out of contact with the exterior of the wall. To this end, if the twin walled covering sheet is employed the exterior wall can be penetrated at intervals so as to allow access to the parallel channels, the perforations being thermally or mechanically made, the source of heat being electrical or by flame.

With the twin walled parallel channel covering material, impregnation with foam could be employed by an extrusion process.

Adjacent structures of the invention can be lap jointed. To this end, part or all the rigid covering along one on both edges involved in the lap joint can be removed so that the lap joint does not stand proud of the remainder. Alternatively double sided adhesive waterproofing tape, applied in a pattern where the edges of material will be, can be pre-positioned on the surface to be covered with no need then to provide an edge free of rigid covering. Such a tape can also be used beneath adjacent sections of structure of the invention which are inclined to each other, e.g. at the bottom of a wall and on an adjacent floor. Such tape should be thin in order to avoid bending the rigid covering.

In order that the invention may be more clearly understood the following description is given by way of example only with reference to the accompanying drawings in which:

Figure 1 is a top plan view of a structure according to the invention;

Figure 2 is a side view of the structure of Figure 1, shown schematically with normally contiguous parts spaced apart for each of understanding;

Figure 3 illustrates schematically a concertina-folded structure of the invention;

Figure 4 is an illustration of the location of structures according to the invention in one possible situation;

Figure 5 shows a detail of structure edges in a lap joint;

Figures 6 and 7 are views similar to Figure 2 of alternative embodiments of structure of the first aspect of the invention;

Figure 8 is a detail of structure edges at another type of joint;

Figure 9 is a perspective view of another embodiment including two further optional features of structures of the invention; and

Shown in Figure 1 is a structure 10 having in this instance six segments such as 13 separated by fold lines 11 and having margins 12 of reduced thickness. The structure, as shown in Figure 2, comprises a self-adhesive membrane 20 typically of bituminous rubber material, and the six segments shown at 21 are

formed from a continuous twin walled sheet with upper and lower walls 22 and 23 separated by a plurality of parallel transverse walls 24 which define a plurality of parallel channels in the material. A release sheet is shown at 25.

At the fold lines the outer wall 22 or the inner wall is interrupted such that folding can take place. Folding is such as to open up the cut, i.e. the adhesive membrane is on the inside of the fold when the cut is in the outer wall. Folding can be performed so as to give a roll of material or in the manner shown in Figure 3 in a concertina fold. The structure can be applied by removing the release sheet 25, not shown in Fig. 3, successively from the folded segments of the self adhesive material 20. Alternatively the folds instead of being in alternate directions could all be in the same direction with a view to forming a roll comprising a plurality of segments of the structure and which can be unwound as it is layed.

A suitable twin walled material is of polypropylene, 2 to 10 mm, preferably about 4 mm thick. It is laminated to the bitumen compound which can have a reinforcing mesh within it, which is particularly important to give it reinforcement at the folds. This material is very strong, it can readily withstand foot traffic and indeed can withstand impact from quite sharp objects without collapsing or puncturing so that the waterproofing function is maintained under all normal circumstances. The material offers a continuous sheet substrate in immediate contact with the adhesive membrane 20. Application can be easier than with the prior art rolls, as it is more easy to align each segment correctly before placing it in contact with the surface to be covered. A result of the channel formation is that any leakage due to a defect in the membrane does not spread laterally.

A drainage facility can be introduced by perforating the outer wall 22 so as to allow access to the channels between the transverse walls 24. This is particularly useful in vertical exterior applications. Perforation can be with hot pins to melt material away. Other forms of relatively rigid material can also be adapted to give a drainage facility. Such applications are illustrated in Figure 4, which shows a vertical wall 42 and a horizontal blinding layer 43 of a basement structure arranged in a dug out portion of the ground. On the exterior of the vertical wall 42 is secured a structure 40 according to the invention which thus has the effects of waterproofing, mechanically protecting and draining land water from the adjacent surface of the concrete. Above the horizontal bottom wall or blinding layer 43 is also applied a structure 41 according to the invention to provide a waterproofing function, while being protected against damage whilst work proceeds before and in preparation for laying a layer of concrete thereon. Folding may also be achieved by omitting parts of the covering material between segments thereof as shown in Figure 7. These resulting gaps can then be covered by a scrim or mesh 81 to keep particles away from the membrane, 82 and the scrim or mesh could be stretched or squashed as appropriate on folding. In this case a continuous film 83 is between membrane and segments, with a suitable adhesive system employed to retain the covering material on the film 83.

Reverting to Figure 1, on each edge of the structure is a margin of reduced thickness 12. In Figure 5 is shown on an enlarged scale a lap joint between the edges of adjacently laid structures of the invention. In the left hand structure the upper wall 22 of the membrane is terminated a short distance from the edge of the self adhesive membrane 20 although the lower wall 23 of the membrane continues right up to that edge. The edge of the right hand structure laps over, and is similar in construction.

The invention extends to methods of waterproofing surfaces by applying a covering of a plurality of structures according to either aspect of the invention, with or without lap jointing between them.

Figure 6 shows an embodiment with the rigid material 70 cut to form segments in alternate faces, so as to facilitate concertina type folding as shown in Figure 3. Beneath cuts on the side adjacent the membrane, here shown at 71, are provided elastic film strips 72, adhered to the membrane and desirable also adhered to the rigid material by a suitable adhesive system, to ensure maintainance of moisture-proofness.

Figure 8 shows use of a double sided adhesive strip 90 on a concrete surface 91 where adjacent structures 92 of the invention meet; such structures in this case do not have edges free of rigid covering material.

To assist in detailing at complicated places a liquid applied waterproofing compound can be used.

As an alternative to the above arrangement where the channels in the relatively rigid material are transverse to the length of the structure, embodiments of the invention may provide the channels parallel to that length. Thus, as shown in Figure 9 there is a structure of the invention comprising a self adhesive bituminous substrate 100 and, contiguous thereto, a layer of rigid material 101 which has channels 102 defined between side walls, which channels are parallel to the length of the structure. The embodiment also illustrates another feature of the invention, which is that the fold lines between adjacent segments of the material 101 are provided by compressing the material, e.g. with a nip-roller or the like, rather than by cutting. Such nip-folding can be performed either transverse to or longitudinally of the channels where the relative rigid material is of the channel structure shown.

Embodiments such as that of Figure 9 can also include, where applicable, features of other embodiments described above.

Embodiments with the channels extending longitudinally have the advantages that continuous length manufacture may be easier, water is not drained from the channels into the main, longitudinal, lap joints, interchange of liquid flow between channels is easier at the fold lines, and with vertical surfaces, vertical positioning of the structures gives vertical channels, as is of course desired for drainage.

It is possible for structures of the invention to be assembled on site rather than be factory made. Thus, a separate membrane having perhaps a substrate of plastics material can, in certain cases, be applied first to a surface to be protected and the remainder of the structure can be applied as a separate item subsequently and be adhered in place, for instance by an adhesive which it carries.

Claims

1. A structure comprising a membrane (20, 71, 82) of a waterproofing pressure sensitive adhesive material with, contiguous thereto, a layer of relatively rigid covering material (21, 70), characterised in that the covering material is a twin walled structure with transverse ribs (24) between the walls (22, 23)providing a plurality of channels, and in that the covering material is so arranged and segmented that the structure can be folded at the divisions (11) between the segments (13).

2. A structure according to claim 1, wherein the structure is foldable in opposite directions at adjacent divisions (11) so as to be foldable in concertina folded arrangement.

3. A structure according to claim 1, wherein the divisions are such that the structure can be rolled up.

4. A structure according to claim 1, 2 or 3 wherein the covering material (28) offers a continuous sheet (23) on the side adjacent the self adhesive membrane (20).

5. A structure according to any preceding claim wherein the covering material is continuous and grooved or cut at the divisions.

6. A structure according to any preceding claim the rein the divisions between the segments are filled or covered with scrim or mesh (81).

7. A structure according to any preceding claim wherein there is a film (83) between the membrane and segments.

8. A structure according to any one of claims 1 to 6 including a film material (72) between the membrane and segments in the regions of separation between segments.

9. A structure according to any preceding claim including a reinforcement in the membrane.

10. A structure according to any preceding claim wherein the channels are parallel to the length of the structure.

11. A structure according to any one of claims 1 to 9, wherein the channels are parallel to the width of the structure.

12. A structure according to any preceding claim wherein the walls are cut to form divisions between the segments.

13. A structure according to any preceding claim wherein the outer walls of the covering material (21, 70) are perforated.

14. A structure according to any preceding claim wherein the channels contain foam.

15. A structure according to any preceding claim wherein the covering material is of foam segments.

16. A structure according to any preceding claim wherein the covering material is 2 to 10 mm thick, preferably about 4 mm thick.

17. A structure according to any preceding claim wherein the ribs are about as far apart as the outer walls of the covering material.

18. A structure according to any preceding claim wherein the covering material is of reduced thickness along one or both edges such that a lap joint may be made.

19. A method of waterproofing a surface by applying thereto a plurality of structures according to any preceding claim.

Patentansprüche

1. Struktur, die eine Dichtungsschicht (Membran) (20, 71, 82) aus einem wasserdichten Haftklebermaterial mit einer daran angrenzenden Schicht aus relativ starrem Abdeckungsmaterial (21, 70) umfaßt, dadurch gekennzeichnet, daß das Abdekkungsmaterial eine doppelwandige Struktur mit eine Vielzahl von Kanälen bildenden Querrippen (24) zwischen den Wänden (22, 23) ist und

das Abdeckungsmaterial so angeordnet und segmentiert ist, daß die Struktur an den Unterteilungen (11) zwischen den Segmenten (13) gefaltet werden kann.

2. Struktur nach Anspruch 1, die an benachbarten Unterteilungen (11) in entgegengesetzten Richtungen faltbar ist, so daß sie zu einer ziehharmonikaförmigen gefalteten Anordnung gefaltet werden kann.

3. Struktur nach Anspruch 1, bei der die Unterteilungen derart sind, daß die Struktur aufgerollt werden kann.

4. Struktur nach Anspruch 1, 2 oder 3, bei der das Abdeckungsmaterial (28) auf der an die selbstklebende Dichtungsschicht (20) angrenzenden Seite eine kontinuierliche Schicht (23) darbietet.

5. Struktur nach einem der vorhergehenden Ansprüche, bei der das Abdeckungsmaterial kontinuierlich ist und an den Unterteilungen eingekerbt oder eingeschnitten ist.

6. Struktur nach einem der vorhergehenden Ansprüche, bei der die Unterteilungen zwischen den Segmenten gefüllt oder mit Gaze (Scrim) oder Gewebe (81) bedeckt sind.

7. Struktur nach einem der vorhergehenden Ansprüche, bei der zwischen der Dichtungsschicht (Membran) und dem Segmenten eine Folie (83) vorhanden ist.

8. Struktur nach einem der Ansprüche 1 bis 6, die zwischen der Dichtungsschicht (Membran) und dem Segmenten in den Trennungsbereichen zwischen den Segmenten ein Folienmaterial (72) aufweist.

9. Struktur nach einem der vorhergehenden Ansprüche, die in der Dichtungsschicht (Membran) eine Verstärkung enthält.

10. Struktur nach einem der vorhergehenden Ansprüche, bei der die Kanäle parallel zur Länge der Struktur verlaufen.

11. Struktur nach einem der Ansprüche 1 bis 9, bei der die Kanäle parallel zur Breite der Struktur verlaufen.

12. Struktur nach einem der vorhergehenden Ansprüche, bei der die Wände eingeschnitten sind, um zwischen den Segmenten Unterteilungen zu bilden.

13. Struktur nach einem der vorhergehenden Ansprüche, bei der die äußeren Wände des Abdeckungsmaterials (21, 70) perforiert sind.

14. Struktur nach einem der vorhergehenden Ansprüche, bei der die Kanäle Schaum enthalten.

15. Struktur nach einem der vorhergehenden Ansprüche, bei der das Abdeckungsmaterial aus Schaumsegmenten besteht.

16. Struktur nach einem der vorhergehenden Ansprüche, bei der das Abdeckungsmaterial 2 bis 10 mm, vorzugsweise etwa 4 mm dick ist.

17. Struktur nach einem der vorhergehenden Ansprüche, bei der die Rippen ungefähr so weit voneinander entfernt sind wie die äußeren Wände des Abdeckungsmaterials

18. Struktur nach einem der vorhergehenden Ansprüche, bei der das Abdeckungsmaterial entlang einem Rand oder beiden Rändern eine verringerte Dicke aufweist, so daß eine Überlappungsverbindung gebildet werden kann.

19. Verfahren zur Abdichtung einer Oberfläche gegen Wasser, indem darauf eine Vielzahl von Strukturen gemäß einem der vorhergehenden Ansprüche aufgebracht wird.

Revendications

1. Structure comprenant une membrane (20, 71, 82) en un matériau adhésif, imperméable à l'eau, réagissant à une pression avec, contiguë à celle-ci, une couche en un matériau couvrant relativement rigide (21,70), caractérisée en ce que le matériau couvrant est une structure à paroi double avec des nervures transversales (24) entre les parois (22, 23) réalisant une pluralité de canaux, et en ce que le matériau couvrant est disposé et segmenté de telle sorte que la structure peut être pliée aux divisions (11) entre les segments (13).

2. Structure selon la revendication 1, dans laquelle la structure peut être pliée en des directions opposées aux divisions adjacentes (11) de façon à être pliable suivant un agencement plié en accordéon ou en concertina.

3. Structure selon la revendication 1, dans laquelle les divisions sont telles que la structure peut être enroulée.

4. Structure selon la revendication 1, 2 ou 3, dans laquelle le matériau couvrant (28) offre une feuille

continue (23) sur le côté adjacent à la membrane auto-adhésive (20).

5. Structure selon l'une des revendications précédentes, dans laquelle le matériau couvrant est continu et rainuré ou coupé aux divisions.

6. Structure selon l'une des revendications précédentes, dans laquelle les divisions entre les segments sont remplies ou couvertes de mousseline ou de maille (81).

7. Structure selon l'une des revendications précédentes, dans laquelle il y a un film ou pellicule (83) entre la membrane et les segments.

8. Structure selon l'une des revendications 1 à 6 comprenant un matériau formant pellicule ou feuille (72) entre la membrane et les segments dans les régions de séparation entre les segments.

9. Structure selon l'une des revendications précédentes, comprenant un renforcement dans la membrane.

10. Structure selon l'une des revendications précédentes, dans laquelle les canaux sont parallèles à la longueur de la structure.

11. Structure selon l'une des revendications 1 à 9, dans laquelle les canaux sont parallèles à la largeur de la structure.

12. Structure selon l'une des revendications précédentes, dans laquelle les parois sont coupées pour former des divisions entre les segments.

13. Structure selon l'une des revendications précédentes, dans laquelle les parois externes du matériau couvrant (21, 70) sont perforées.

14. Structure selon l'une des revendications précédentes, dans laquelle les canaux contiennent de la mousse.

15. Structure selon l'une des revendications précédentes, dans laquelle le matériau couvrant est constitué par des segments de mousse.

16. Structure selon l'une des revendications précédentes, dans laquelle le matériau couvrant a une épaisseur de 2 à 10 mm, de préférence une épaisseur d'environ 4 mm.

17. Structure selon l'une des revendications précédentes, dans laquelle les nervures sont espacées à peu près autant que les parois externes du matériau couvrant.

18. Structure selon l'une des revendications précédentes, dans laquelle le matériau couvrant a une épaisseur réduite le long d'un ou des deux bords de façon à permettre la réalisation d'un joint à recouvrement.

19. Procédé pour rendre étanche à l'eau une surface en appliquant sur celle-ci une pluralité de structures selon l'une des revendications précédentes.

Fig.1.

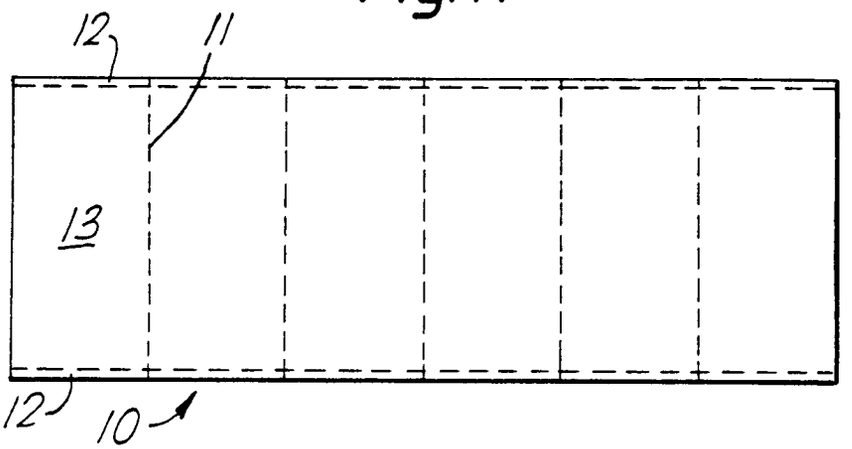

Fig.2.

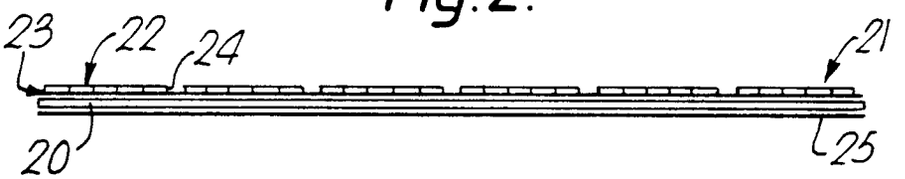

Fig.3.

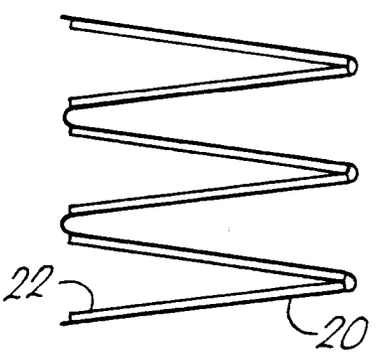

Fig.4.

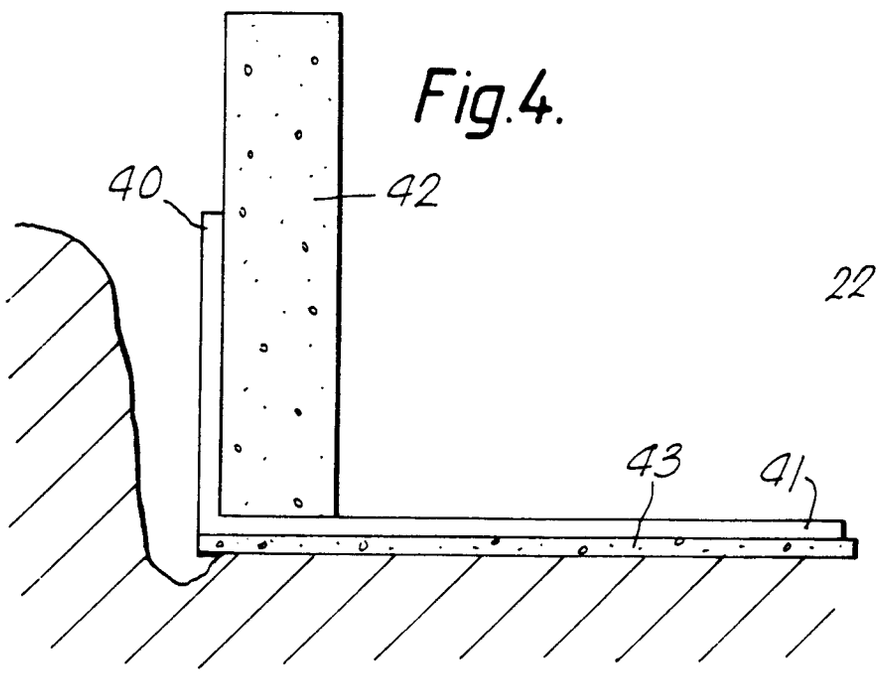

Fig. 5.

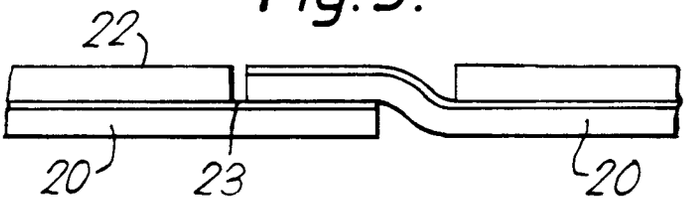

Fig. 6.

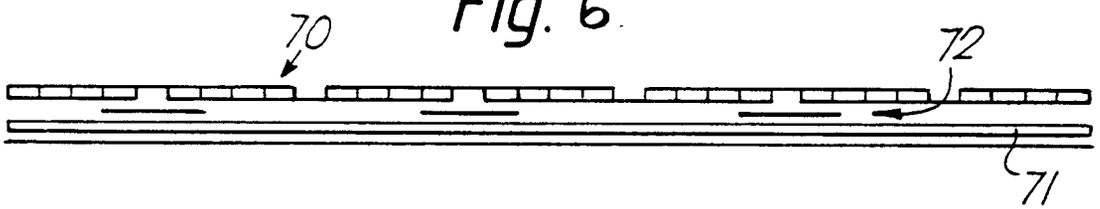

Fig. 7.

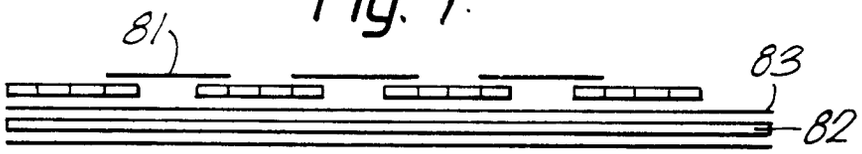

Fig. 8

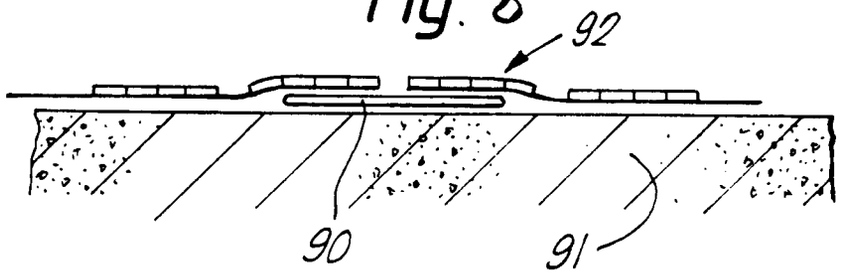

Fig. 9.