



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
16.07.2008 Bulletin 2008/29

(51) Int Cl.:
E02D 29/14^(2006.01)

(21) Application number: **07255045.2**

(22) Date of filing: **24.12.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

(72) Inventors:
• **Cox, Martin**
Melton Mowbray
Leicestershire LE14 3RE (GB)
• **Pendleton, Alan Jack**
Leicestershire LE13 0FP (GB)

(30) Priority: **22.12.2006 GB 0625707**

(74) Representative: **Powell, Timothy John et al**
Potter Clarkson LLP
Park View House
58 The Ropewalk
Nottingham NG1 5DD (GB)

(71) Applicant: **Saint-Gobain Pipelines Plc**
Stanton-by-Dale
Ilkeston
Derbyshire DE7 4QU (GB)

(54) **Anti-skid surface for access covers**

(57) In the field of surface access covers there is a need for a surface access cover that exhibits a greater degree of skid resistance than conventional surface access covers.

A surface access cover comprises a cover substrate (10) having one or more upstanding walls (11) extending

from an in-use upper face of the substrate (10), the upper face comprising a resin (13) bonded to the substrate (10) using a primer (14), the resin (13) comprising partly-embedded aggregate particles (12) protruding therefrom, a substantial proportion of the aggregate particles (12) protruding above the upper edges of the one or more upstanding walls (11) to form the engaging surface (15).

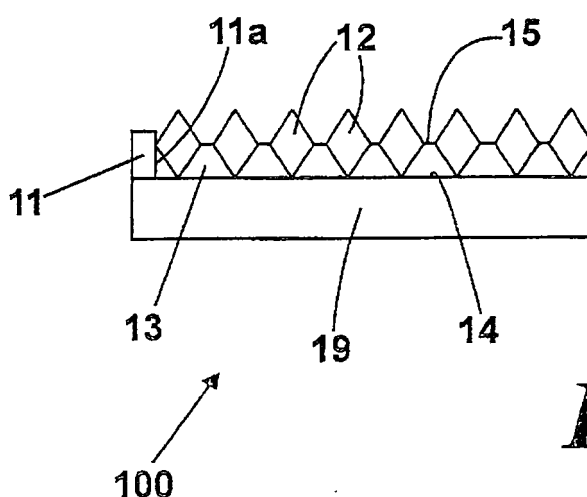


Fig. 1

Description

[0001] This invention relates to a surface access cover; a method of making the same; and a surface access assembly including such a cover.

[0002] Surface access covers are commonly used to cover access apertures (such as but not limited to man-holes) for e.g. sewer, water, electrical, gas or telecommunications systems. They are usually located in roadway, pavement, yard or garage surfaces although their use is not limited to these areas.

[0003] Typically in order to support such covers a frame having a peripheral flange is secured in a medium of aggregate and cement. The flange is embedded in the cement and aggregate mix (or another bonding medium). The frame defines an upstanding wall the uppermost extent of which is, in use, flush with the adjacent roadway etc. surface. Consequently the frame defines an aperture within the surface.

[0004] The upstanding wall includes supports for one or more surface access covers that are removably insertable therein so as to close the aperture. The covers are usually shaped to minimise the risk that they will fall into the aperture on removal.

[0005] The covers themselves usually are cast iron; or they are fabricated or otherwise formed from steel. Cast iron covers constitute the overwhelming majority of covers installed in the United Kingdom.

[0006] Cast iron access covers have been highly successful for numerous reasons: they are robust, hard wearing, weatherproof and cheap to manufacture, transport, install and replace. The mass of a cast iron access cover assists in firmly seating the cover in the frame.

[0007] Despite the foregoing advantages of cast iron covers, one potential disadvantage of all cover types relates to the potential slipperiness of their exposed (herein "engageable") surfaces. This can lead to accidents.

[0008] In the case of access covers installed in pavement surfaces the skid resistance of the cover differs from that of the surrounding pavement. A pedestrian walking from the pavement material onto the access cover may find it difficult to accommodate the resulting unexpected change in the coefficient of friction and may slip.

[0009] This problem of coefficient of friction differences also arises in access covers that are traversed by vehicles, e.g. in roadways. In such installations the problem is exacerbated as vehicular traffic wears the engaging surface of the access cover and polishes it to a shiny, slippery condition.

[0010] Motorcycles and bicycles are particularly vulnerable to such slippery surfaces, especially when the roadway is wet, muddy or coated with leaves.

[0011] There is therefore a need for surface access covers that exhibit a greater degree of skid resistance.

[0012] WO 02/094540 proposes an anti-skid surface for a metal (iron) access cover. This skid resistant surface, which forms the tread pattern, comprises a layer of fibre reinforcement and a layer of mineral material. The

two layers are bound together by a resin matrix. This document teaches the use of a reinforcement layer of glass fibre composite to provide the bond between the tread pattern and the surface access cover.

5 **[0013]** A disadvantage of this arrangement is that the resin matrix tends in use to part from the metal surface. WO02/094540 document does not suggest any solution to this problem.

10 **[0014]** A further disadvantage is that the mineral material is substantially entirely embedded within the resin matrix. This anti-slip surface does not have any aggregate particles which are used to form the undulations in the engageable surface. Consequently the skid resistance achieved is poor.

15 **[0015]** JP 200190097 relates to a surface access cover. This document discloses the use of aggregate particles, but there is no suggestion that these might increase the roughness of an engageable surface in order to provide skid resistance. The teachings of this document relate to the capping of castellations by a wear resistant coating layer. JP 200190097 suggests only that the solid aggregate particles are used to strengthen/reinforce a wear-resistant resin.

20 **[0016]** JP 100252088 relates to a surface access cover in which binder/aggregate particles are used to form a decoration and do not form an in-use engageable surface. This document teaches that the aggregate particles should be kept away from engagement with a user to prevent wearing of the hard aggregate.

30 **[0017]** JP 200096593 provides aggregate particles which protrude beyond an adhesive/resin layer 4. The aggregate particles form an in-use engageable surface as the resin layer is used to bond the lower halves of the aggregate particles.

35 **[0018]** GB 2399585 relates to a surface access cover in which a resin forms the engageable surface.

[0019] In none of the aforementioned prior art arrangements is any attempt made to deal with a phenomenon of vehicle wheels plucking or peeling of part or all of a layer of resin / aggregate mix from a substrate to which it is bonded. Thus there is a need for improvements in this regard.

40 **[0020]** Furthermore there is no attempt in the prior art to optimise the substrate for the purpose of improving the performance and service life of a cover.

45 **[0021]** According to a first aspect of the invention there is provided a surface access cover comprising a cover substrate having one or more upstanding walls extending from an in-use upper face, the upper face having a resin bonded thereto using a primer, the resin having a plurality of partly embedded aggregate particles protruding therefrom above the upper edges of the one or more upstanding walls to form an engaging surface of the cover.

50 **[0022]** The use of the aggregate particles to form the engaging surface increases the surface roughness of the cover. Furthermore, the or each upstanding wall protects lower portions of the aggregate particles and thus reduces the effect of plucking of aggregate particles, for ex-

ample, by a vehicle running over the engaging surface.

[0023] The arrangement according to the first aspect of the invention is particularly suited to surface access cover designs in which the resin depth equals the depth of the upstanding walls.

[0024] It is possible in accordance with the first aspect of the invention for the depth of the resin layer to be less than the depth of the upstanding walls while the aggregate particles protrude beyond the in-use uppermost extent of the walls. It is however more probable that depending on the depth of the resin layer in such a case such protrusion is not possible. Therefore according to a second aspect of the invention there is provided a surface access cover comprising a cover substrate having one or more upstanding walls extending from an in-use upper face, the upper face having a resin bonded thereto using a primer, the resin having a plurality of partly embedded aggregate particles protruding therefrom to a level at or below one or more upper edges of the one or more upstanding walls to form an engaging surface of the cover.

[0025] Conveniently, in order to avoid puddling of rain-water on the cover, one or more of the upstanding walls and/or the substrate includes formed therein a drainage aperture. By "*drainage aperture*" is of course any partial or complete perforation that serves to permit the draining away from the surface access cover of eg., rain - or other water accumulated thereon. Such apertures therefore include, but are not limited to, notches and/or recesses formed in the free edges of the upstanding walls, as well as perforations in the walls away from the edges.

[0026] Preferably approximately half the height of each of a substantial proportion of the aggregate particles protrudes in use above the height of the or each upstanding wall.

[0027] It is also preferable that approximately half of the in-use lower portion of each protruding aggregate particle is embedded within the resin.

[0028] Conveniently the depth of the resin is less than or equal to the height of the or each upstanding wall, or adjacent a said upstanding wall is less than or equal to the said height. As a result the wall(s) protect the resin against certain kinds of wear. Also, during manufacture of the covers the upstanding walls can act to limit the amount of resin contained in the cover.

[0029] Alternatively the depth of the resin is between about 50% and 100% the height of the or each upstanding wall either over the whole area of the resin, or in the vicinity of a said wall that is adjacent the resin. Thus, the resin does not extend above the adjacent wall and is protected from wear but still is of a sufficient depth to bond a substantial lower portion of each embedded aggregate particle.

[0030] Conveniently one or more of the upstanding walls forms an outer perimeter of the cover. The edge of the cover is thus protected by the upstanding wall(s) and the resin/aggregate particle mix is protected against wear/plucking by a vehicle.

[0031] In a preferred embodiment of the invention the upstanding walls may define a plurality of discrete engaging surfaces separated by one or more, further upstanding walls. Rather than one continuous engaging surface, the surface access cover may have a number of discrete engaging surfaces.

[0032] The primer may be selected from the group comprising solvent-based or waterbased rust-inhibiting primers such as but not limited to "resin-in-solvent" primers, reactive resin primers and emulsion primers.

[0033] The resin may be selected from the group comprising methacrylates especially methyl methacrylates, thermoplastics, epoxy resins, extended epoxy resins, modified epoxy resins, polyurethanes, modified polyurethanes and polyesters.

[0034] The aggregate particles may be selected from the group comprising one or more of Criggon, a speckled white and green albitised dolerite; bauxite (especially calcined bauxite); foundry slag; granite; aluminium oxides; glasses; and similar materials.

[0035] Preferably the aggregate particles range in size from 0.5mm to 2mm when measured in their longest direction.

[0036] The in use upper face of the substrate may be generally flat. The cover may be a non-castellated cover (ie. a cover whose in-use uppermost face omits so called "*chequers*" or other embossments, recesses and surface features) in which the engaging surface is substantially a single plane. Thus, the cover does not have a castellated profile, in which the raised castellated regions are prone to increased wear.

[0037] Possibly in light of the foregoing the arrangement of JP 200190097 is inutile. This is because the document discloses castellations or chequers, on the surface of a manhole cover, that are covered by a resin / aggregate mix; and recesses between the chequers that omit such a covering. In practice this is very difficult if not impossible to achieve. Known techniques for applying a resinous material would in the case in question result in thin layers of the resin on the tops of the chequers, and thick pools of the resin in the intermediate recesses.

[0038] This construction would be impractical since the chequers, being the parts of the cover most frequently and aggressively engaged by vehicle wheels, would have comparatively thin resin layers that would wear away quickly. Following such wearing the pools of resin in the recesses would serve to lessen the height differential that is an aim of including the chequers and recesses. Thus after minimal use the JP 200190097 arrangement (if constructed according to known methods) could have a worse skid resistance characteristic than a cover omitting any kind of resin / aggregate covering.

[0039] Moreover JP 200190097 appears not to describe any method by which a partial coating (which lies on the chequers but not in the recesses) may be achieved.

[0040] The substrate may be metal, especially iron (or steel) and even more particularly cast iron. In a preferred

embodiment of the invention is substrate is ductile iron.

[0041] The resin may be chosen to have a sufficient flexibility to inhibit cracking under operating loading but be resistive to rocking of aggregate particles embedded therein. The flexibility of the resin may be in a range that is generally the same as the flexibility of the metal of the cover.

[0042] The resin may be chosen such that the resin moves as a whole with the surface access cover under operating loading conditions.

[0043] Therefore the resin flexibility may be chosen to be related to the flexibility of the underlying substrate.

[0044] The cover is in practical embodiments designed for vehicular wear, including wear caused by motor vehicles such as motorbikes, lorries and cars, and in such embodiments includes features facilitating its insertion into and removal from a cover frame by an authorised user in a *per se* known manner. The substrate may be formed from casting a metal or by a process of fabrication.

[0045] According to a third aspect of the invention there is provided a method of making a surface access cover, the surface access cover comprising a cover substrate having one or more upstanding walls extending from an in-use upper face of the substrate, the method comprising the steps of:

- a) cleaning contaminants from an upward face of the cover substrate;
- b) applying a primer layer to at least part of the cleaned surface;
- c) applying a resin over the primer layer to a depth equal to or less than the height of the or each upstanding wall;
- d) applying aggregate particles to the resin such that the aggregate particles are partly embedded into the resin;
- e) allowing the resin to cure whereupon the protruding aggregate particles form an engageable surface of the cover.

[0046] Preferably step d) of the method includes inserting the particles into the resin so as to extend beyond the in-use upper edges of the upstanding walls. Alternatively step d) may include inserting the particles into the resin so as to extend to a level below one or more upper edges of the one or more upstanding walls. In the latter case the method of the invention may optionally include the step of forming at least one drainage aperture in one or more of the upstanding walls.

[0047] The one or more said upstanding (e.g. perimeter) walls may in preferred embodiments define one or more inner faces. Optionally such inner faces may be cleaned. Primer may be applied to the in-use upper face of the cover body and to one or more said inner faces of one or more of the (e.g. perimeter) upstanding walls. Although the tops of one or more of the upstanding walls may in accordance with the invention be cleaned, generally in the interests of avoiding waste there is no need

intentionally to apply primer to the cleaned top surfaces. This is because there is no need to cause resin to adhere to these top surfaces although in practical embodiments of the invention some covering of the top edges may occur as a result of the resin pouring / spraying process used.

[0048] Optionally the method includes the step of, before step (e), applying a force to the aggregate particles, although in a preferred embodiment the particles are dropped under gravity into the resin.

[0049] The aggregate particles preferably are evenly distributed in the resin over the upper surface of the cover. An aim of the method is to avoid regions of the resin having no aggregate particles embedded partly in them.

[0050] Excess resin resulting from the manufacturing method may be scraped off the cover before the application of the aggregate particles occurs. Excess particles which do not become embedded may be removed prior to use of the cover.

[0051] In a practical embodiment of the method of the invention the thickness of the resin layer is in the range 1 - 2mm, with 1.5mm preferred; the height of the upstanding walls is in the range 1 - 3mm, with 2mm preferred; and the height of the aggregate particles is in the range 0.2mm - 7mm, with 3mm preferred.

[0052] The resin layer may be applied by hand or using a machine.

[0053] According to a fourth aspect of the invention there is provided a surface access assembly comprising a frame defining a peripheral flange having upstanding therefrom one or more walls defining an aperture, at least one said wall including one or more supports for a cover that is removably securable therein; and a surface access cover as described or claimed herein, or manufactured by a method as described or claimed herein, received in the said aperture.

[0054] Preferably the surface access assembly is installed adjacent a (road/pavement) surface; has the peripheral flange of its frame embedded in a bonding medium contained by the surface; and has an edge of the flange/cover upstanding wall generally coterminous with the surface.

[0055] In a preferred assembly according to the invention the skid resistance value of the in-use engageable surface of the cover body approximately matches or exceeds the skid resistance value of the surface adjacent which the assembly is installed.

[0056] There now follows a description of preferred embodiments of the invention, by way of non-limiting example, with reference being made to the accompanying drawings in which:

Figure 1 shows a side elevational, cross-sectioned view of a surface access cover according to one embodiment of the invention;

Figure 2 shows a plan view of one embodiment of a surface access cover according to one embodiment of the invention.

[0057] A first embodiment surface access cover 100 according to the invention is shown cross section in Figure 1. In isometric view, it would be the shape of a circular disc. In the UK and continental Europe, square and rectangular shapes are often used. A further embodiment is shown in Figure 2.

[0058] The surface access cover 100 comprises a metal (eg. cast iron) cover substrate 10 having secured on an in-use upper surface thereof a primer layer 14. The surface of the substrate 10 adjacent the primer layer 14 is substantially free from embossments and recesses. It is flat over the major part of its extent.

[0059] The primer layer 14 has secured to its upper surface a resin layer 13 having partly embedded therein a plurality of aggregate particles 12. The lower portions of the aggregate particles 12 rest on the primer layer 14, being the parts of the particles that are embedded in the resin 13. Upper portions of the aggregate particles 12 protrude upwardly beyond the upper boundary of the resin layer 13 in order to define an engageable surface 15 of the access cover 100, although as noted herein in other embodiments of the invention the particles may protrude to a level below the upper edge(s) of the upstanding wall(s), over part or all of the extent of the resin. In cases in which the level of the resin is below the upper edges of the walls at least in the vicinity of the walls one or more of the upstanding walls may have formed therein at least one drainage aperture for the purpose of preventing puddling of rain - or other water on the cover.

[0060] The substrate 10 includes a continuous wall 11 upstanding therefrom at one edge. In this embodiment, the wall 11 substantially defines the perimeter of the upper surface of cover 100 and also of the resin layer 13. The height/depth of the resin 13 is less than the height of the upstanding wall 11. The upper portions of the particles 12 (approximately 50% of the height of the particles) protrude beyond the upper edge of the wall 11.

[0061] In the further embodiment of manhole cover 100' shown in Figure 2, a number of discrete engaging surfaces 15 are defined by respective upstanding walls 11 which extend from the centre outwardly towards the perimeter of the cover 100'. Other patterns of upstanding walls giving rise to different, plural engaging surface regions 15 are of course possible within the scope of the invention.

[0062] The depths of the various layers and dimensions and shape of the access covers are variable within the scope of the invention.

[0063] The primer layer 14 may be selected from the group comprising solvent-based rust-inhibiting primers, or any of the other primer types disclosed herein as being suitable.

[0064] The resin layer 13 may be a methyl methacrylate resin, which is sufficiently flexible to resist cracking under loading, or any of the other resin types disclosed herein as being suitable.

[0065] The aggregate particles 12 range in size from 0.2mm - 7mm (with 1.4mm - 3mm being the preferred

range in the case of UK installations) when measured in their longest dimension.

[0066] The aggregate particles 12 may be foundry slag; Criggion; bauxite, especially calcined bauxite; granite; gravels, aluminium oxides; glasses; and any of a range of similar materials.

[0067] The method of manufacturing the access cover 100 of Figure 1 includes the steps of, after forming the substrate 10 (e.g. by casting from iron or fabricating from steel) including the upstanding walls 11: cleaning contaminants from a surface of a substrate 10; applying a primer layer 14 to at least part of the scavenged surface, (e.g. by brushing, spraying or pouring); applying a resin 13 to the primer layer 14 (including to the "inner" faces of the upstanding walls exemplified by numeral 11 a); applying aggregate particles 12 to be embedded within the resin 13 such that the lower portions of the aggregate particles 12 are as shown embedded within the resin 13 and the upper portions protrude above the upper edges of the upstanding walls 11, and allowing the resin 13 to cure. As a result a substantial proportion of the aggregate particles 12 define an upper, engaging surface of the cover, whereby the resin layer serves as a binder for the particles and is not itself exposed to eg. vehicle tyres which may cause wear.

[0068] The depth of resin layer 13 in the embodiments shown equals the height of the upstanding walls 11 but in other embodiments the depth of the resin layer 13 may be less than the wall height. The walls 11 need not be all of the same height; and the depth of the resin layer 13 need not be invariant from place to place about the cover 100. During manufacture of the cover 100 the walls 11 limit the depth to which the resin is poured or otherwise applied. Forces may be applied manually or mechanically (e.g. by means of a roller) to increase the depth to which the lower portions of the particles 12 are embedded in the resin layer 13.

[0069] During curing of the resin 13 the walls 11 retain the resin layer 13 on the access cover. Depending on the precise access cover design, the walls 11 can also prevent ingress of uncured resin into keyways and similar such features of the access cover, during manufacture.

[0070] The resins 13 which are used in preferred embodiments are reactive resins i.e. they cure from the liquid to the solid phase by addition of a catalyst.

[0071] A pedestrian may encounter a surface access cover 100 of the invention in a pavement installation. The "skid resistance value" (SRV) - a measure used in the roadway industry in the UK - of the in use engageable surface of the access cover 100 will in the preferred embodiment approximately match or exceed the SRV of the pavement. The pedestrian walking from the pavement onto the access cover 100 will easily accommodate any minor change in the coefficient of friction. In this way, the pedestrian is much less likely to slip and lose his footing.

[0072] A driver, (motorcycle) rider or cyclist is likely to encounter a surface access cover 100 according to the invention in a roadway, yard or garage installation. An

access cover of this type will have a SRV that closely matches the SRV of the road, etc. surface. Each tyre of the vehicle will encounter substantially the same, uniform coefficient of friction. As a result the vehicle will react in a uniform and expected manner under acceleration, braking and/or cornering. The driver or rider will not experience an unnerving sensation as one tyre skids on a surface that is considerably less skid resistant than the adjacent surface.

[0073] In preferred embodiments of the invention the surface access cover 100 has a skid resistance value (SRV) (that is measured using an established testing technique) in the range 45 to 80.

[0074] A pavement surface typically has a SRV in the range 45 to 55. A roadway or vehicle yard surface might typically have a SRV in the range 55 to 60. The approximate matching of the SRV of the surface access cover with the SRV of the surrounding surface provides for a desired degree of skid resistance. This is particularly important in pavement installations where too high a degree of skid resistance could constitute a trip hazard.

[0075] The following is textual information that appeared in Figure 1 of the drawings of the application as originally filed:

- Perimeter upstand allows enough depth for the correct resin depth to be applied, whilst ensuring there is no unprotected edge for wear of the resin or plucking of aggregates under wheel load, but is less than the height of the aggregate particles so that the peaks are above the ironwork to provide the wearing surface and optimum skid resistance.
- Aggregate particles
- Safetrack HW resin
- Ductile iron surface.

Claims

1. A surface access cover comprising a cover substrate having one or more upstanding walls extending from an in-use upper face, the upper face having a resin bonded thereto using a primer, the resin having a plurality of partly embedded aggregate particles protruding therefrom above the upper edges of the one or more upstanding walls to form an engaging surface of the cover.
2. A surface access cover comprising a cover substrate having one or more upstanding walls extending from an in-use upper face, the upper face having a resin bonded thereto using a primer, the resin having a plurality of partly embedded aggregate particles protruding therefrom to a level at or below one or more upper edges of the one or more upstanding walls to form an engaging surface of the cover.
3. A cover according to Claim 2 wherein one or more

of the upstanding walls includes formed therein at least one drainage aperture.

4. A cover according to Claim 1, wherein the cover is arranged such that approximately half the height of a substantial portion of the aggregate particles protrude above the height of the or each upstanding wall.
5. A cover according to Claim 1 or Claim 4, wherein the depth of the resin is less than or equal to the height of the or each upstanding wall.
6. A cover according to any preceding claim, wherein the depth of the resin adjacent a said upstanding wall is less than or equal to the height of the said upstanding wall.
7. A cover according to any preceding claim, wherein the depth of the resin adjacent a said upstanding wall is substantially equal to the height of the said upstanding wall.
8. A cover according to any preceding claim, wherein the depth of the resin is between about 50% and 100% of the height of the or each upstanding wall.
9. A cover according to any preceding claim, wherein the depth of the resin adjacent a said upstanding wall is between about 50% and 100% of the height of the said upstanding wall.
10. A cover according to any preceding claim, wherein one or more of the upstanding walls form an outer perimeter of the cover.
11. A cover according to any preceding claim, wherein a number of the upstanding walls define a plurality of discrete engaging surfaces separated by one or more, further upstanding walls.
12. A cover according to any preceding claim, wherein the primer is selected from the group comprising solvent-based or water-based, rust-inhibiting primers.
13. A cover according to Claim 10 wherein the primer is or includes a "resin-in-solvent" primer, a reactive resin primer and/or an emulsion primer.
14. A cover according to any preceding claim, wherein the resin is selected from the group comprising methacrylates especially methyl methacrylates, thermoplastics, epoxy resins, extended epoxy resins, modified epoxy resins, polyurethanes, modified polyurethanes and polyesters.
15. A cover according to any preceding claim, wherein the aggregate particles are selected from the group comprising one or more of foundry slag; Criggon;

bauxite, especially calcined bauxite; granite; gravels; aluminium oxides; glasses; and any of a range of similar materials.

16. A cover according to any preceding claim wherein the aggregate particles range in size from 0.5mm to 2mm when measured in their longest direction. 5
17. A cover according to any preceding claim, wherein the in-use upper face of the substrate is generally flat. 10
18. A cover according to any preceding claim, wherein the resin is arranged to move as a whole with the surface access cover under operating loading conditions. 15
19. A cover according to Claim 1, wherein the resin flexibility is related to the flexibility of the underlying substrate. 20
20. A method of making a surface access cover, the surface access cover comprising a cover substrate having one or more upstanding walls extending from an in-use upper face of the substrate, the method comprising the steps of: 25
 - a) cleaning contaminants from an upper face of the cover substrate;
 - b) applying a primer layer to at least part of the cleaned surface; 30
 - c) applying a resin over the primer layer to a depth equal to or less than the height of the or each upstanding wall;
 - d) applying aggregate particles to the resin such that the aggregate particles are partly embedded into the resin; 35
 - e) allowing the resin to cure whereupon the protruding aggregate particles form an engageable surface of the cover. 40
21. A method according to Claim 20 wherein the step d) includes inserting the particles into the resin so as to extend beyond the in-use upper edges of the upstanding walls. 45
22. A method according to Claim 20 wherein step d) includes inserting the particles into the resin so as to extend to a level below one or more upper edges of the one or more upstanding walls. 50
23. A method according to Claim 22 including the step of forming at least one drainage aperture in one or more of the upstanding walls.
24. A surface access assembly comprising a frame defining a peripheral flange having upstanding therefrom one or more walls defining an aperture, at least one said wall including one or more supports for a

cover that is removably securable therein; and a surface access cover as described or claimed herein, or manufactured by a method as described or claimed herein, received in the said aperture.

25. A surface access assembly as claimed in Claim 24, wherein the surface access assembly is installed adjacent a surface; the peripheral flange of its frame is embedded in a bonding medium contained by the surface; and an edge of at least one upstanding wall is generally coterminous with the surface.

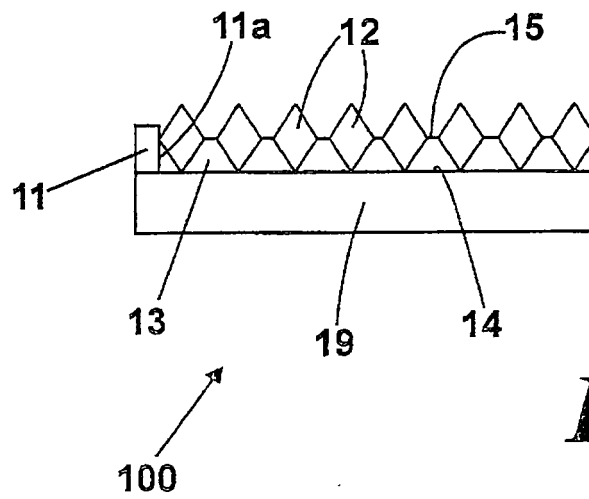


Fig. 1

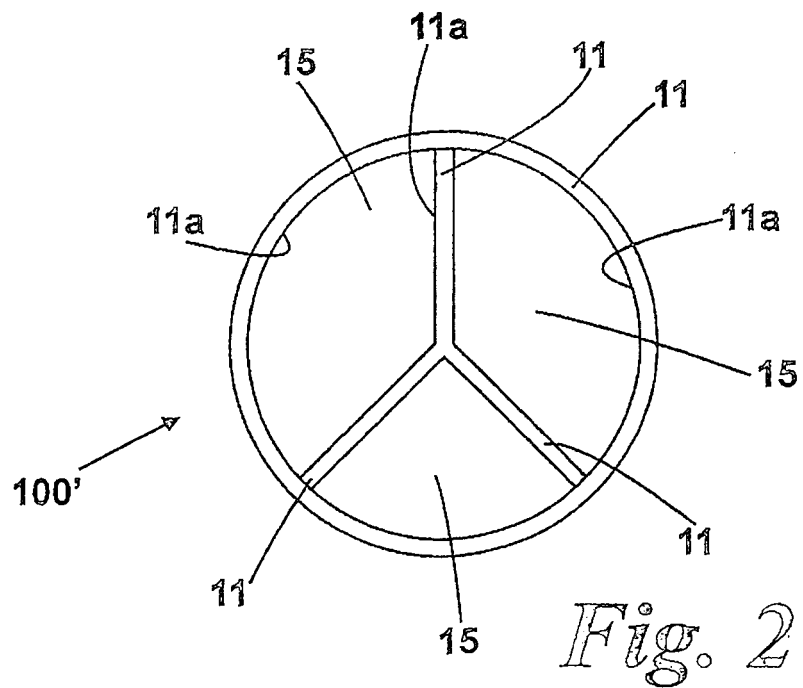


Fig. 2



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 25 5045

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	JP 10 252088 A (NIPPON CHIYUUTETSUKAN KK) 22 September 1998 (1998-09-22) * abstract *	2,3,6-25	INV. E02D29/14
Y	EP 1 460 184 A (SAINT GOBAIN PONT A MOUSSON [FR]) 22 September 2004 (2004-09-22) * paragraph [0078] - paragraph [0136]; figures 1,2,4 *	2,3,6-25	
A	JP 2000 096593 A (RIKEN CORUNDUM CO LTD; OKAMOTO IND INC; ASABA SEISAKUSHO KK) 4 April 2000 (2000-04-04) * abstract *	1-25	
A	WO 02/094540 A (NEWTON JOHN REGINALD [GB]) 28 November 2002 (2002-11-28) * page 5, paragraph 5 - page 8 *	1-25	
A	WO 91/12090 A (HARVISON ERIC JOSEPH [GB]) 22 August 1991 (1991-08-22) * the whole document *	1-25	TECHNICAL FIELDS SEARCHED (IPC)
A	DE 20 2005 018663 U1 (CHEN LI HUAN [TW]) 26 January 2006 (2006-01-26) * the whole document *	1-25	E02D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 5 June 2008	Examiner Geiger, Harald
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 T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

1
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 07 25 5045

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

05-06-2008

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 10252088 A	22-09-1998	JP 3470010 B2	25-11-2003
EP 1460184 A	22-09-2004	GB 2399585 A	22-09-2004
JP 2000096593 A	04-04-2000	NONE	
WO 02094540 A	28-11-2002	CA 2447194 A1	28-11-2002
		EP 1387758 A1	11-02-2004
		US 2004247830 A1	09-12-2004
WO 9112090 A	22-08-1991	AU 7237791 A	03-09-1991
		CA 2075908 A1	15-08-1991
		DE 69119584 D1	20-06-1996
		DE 69119584 T2	16-01-1997
		EP 0515445 A1	02-12-1992
		GB 2242144 A	25-09-1991
		US 5380549 A	10-01-1995
DE 202005018663 U1	26-01-2006	NONE	

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 02094540 A [0012] [0013]
- JP 200190097 B [0015] [0015] [0037] [0038] [0039]
- JP 100252088 B [0016]
- JP 200096593 B [0017]
- GB 2399585 A [0018]