(12) UK Patent Application (19) GB (11) 2 438 678 (13) A

(43) Date of A Publication 05.12.2007

(21) Application No: 0610692.6

(22) Date of Filing: 31.05.2006

(71) Applicant(s):
Wrekin Welding & Fabrication Engineering Ltd
(Incorporated in the United Kingdom)
Distribution Centre, Woodlands Road,
Stanton Village, BURTON ON TRENT,
DE15 9TH, United Kingdom

Atlanta Impex Limited
(Incorporated in the United Kingdom)
14 Compton, ASHBOURNE, Derbyshire,
DE6 1DA, United Kingdom

(72) Inventor(s):
Brian Mills
David Henry Edmonds

(74) Agent and/or Address for Service:
Swindell & Pearson
48 Friar Gate, DERBY, DE1 1GY,
United Kingdom

(51) INT CL:
E02D 29/14 (2006.01)

(52) UK CL (Edition X):
N0T CLASSIFIED

(56) Documents Cited:
DE 202005011185 U1 **JP 110029951 A**
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(58) Field of Search:
INT CL **E02D**
Other: **ONLINE:WPI, EPODOC**

(54) Abstract Title: **Surface access assembly**

(57) The surface access assembly, such as a manhole or the like, comprises a frame 12 that defines an opening 28 within which a cover 18 can be received and a removable closure assembly 16 that includes a closure member 30 for closing the opening and a clamping device 32 for clamping the closure member to the frame. The clamping device may comprise a number of arms 34, preferably four, that can be rotated using an actuator between an unlocked position and a locked position where they engage clamping surfaces on the frame. Movement of the arms is preferably limited by stops and an indicator may be provided to show the condition of the clamp device. A seal 14 is preferably included between the closure assembly and the frame. Also claimed is a closure assembly, a frame for a surface access assembly and a method of assembling a surface access assembly.

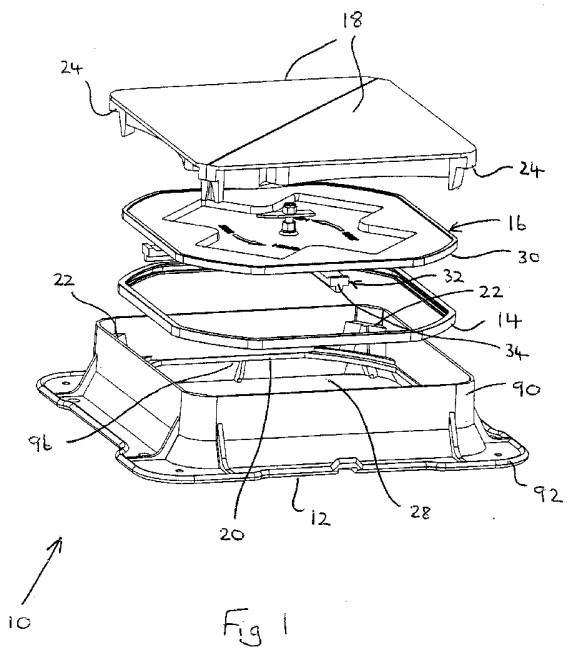

Fig 1

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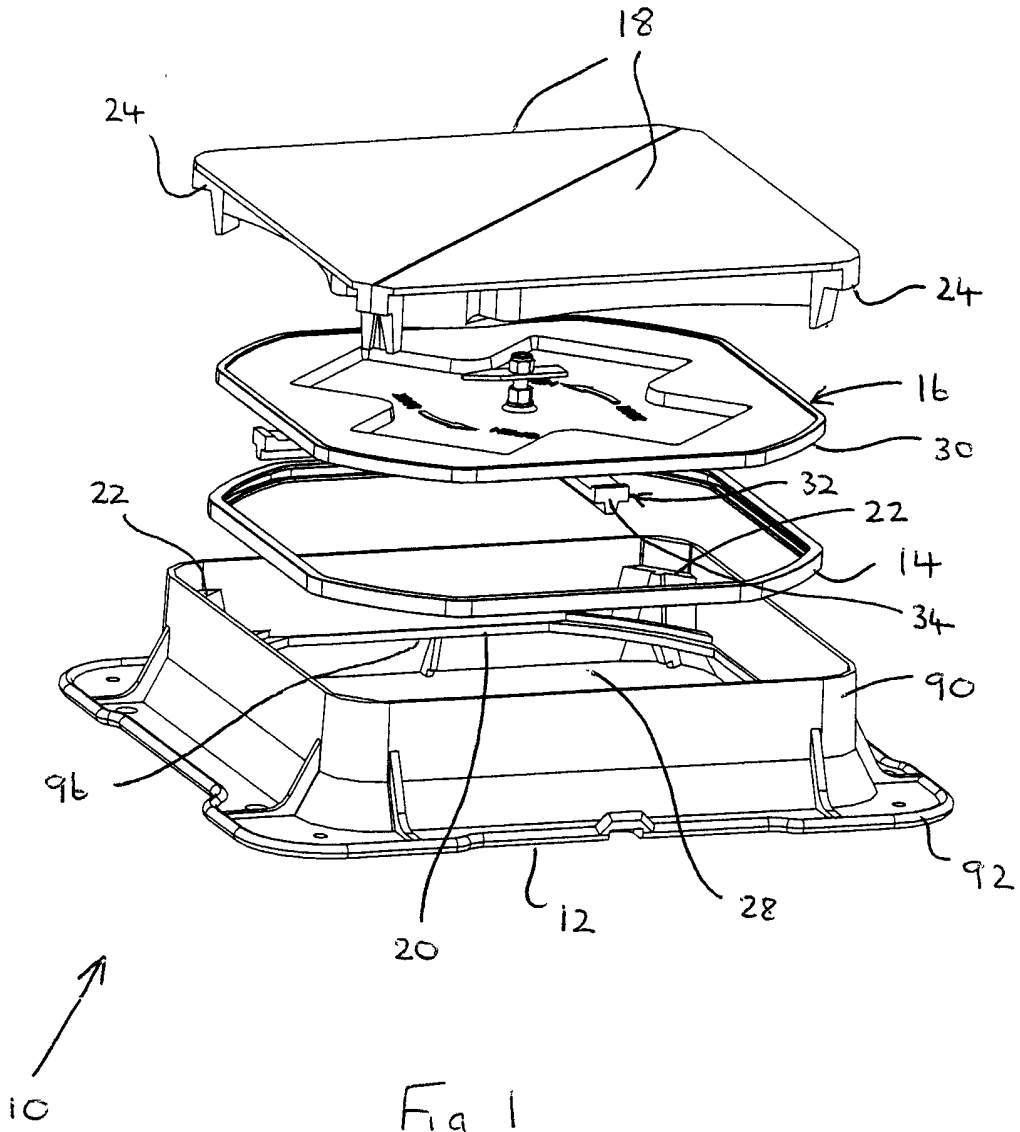

Fig 1

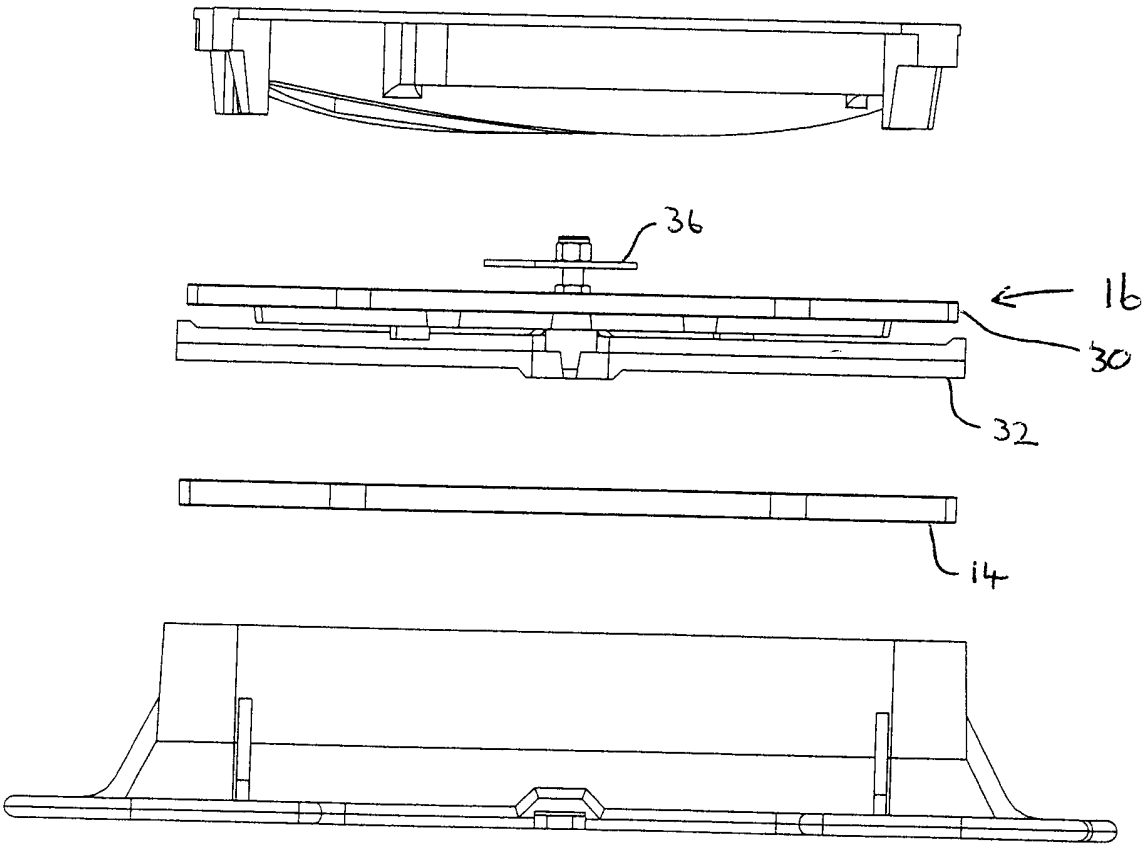

Fig 2

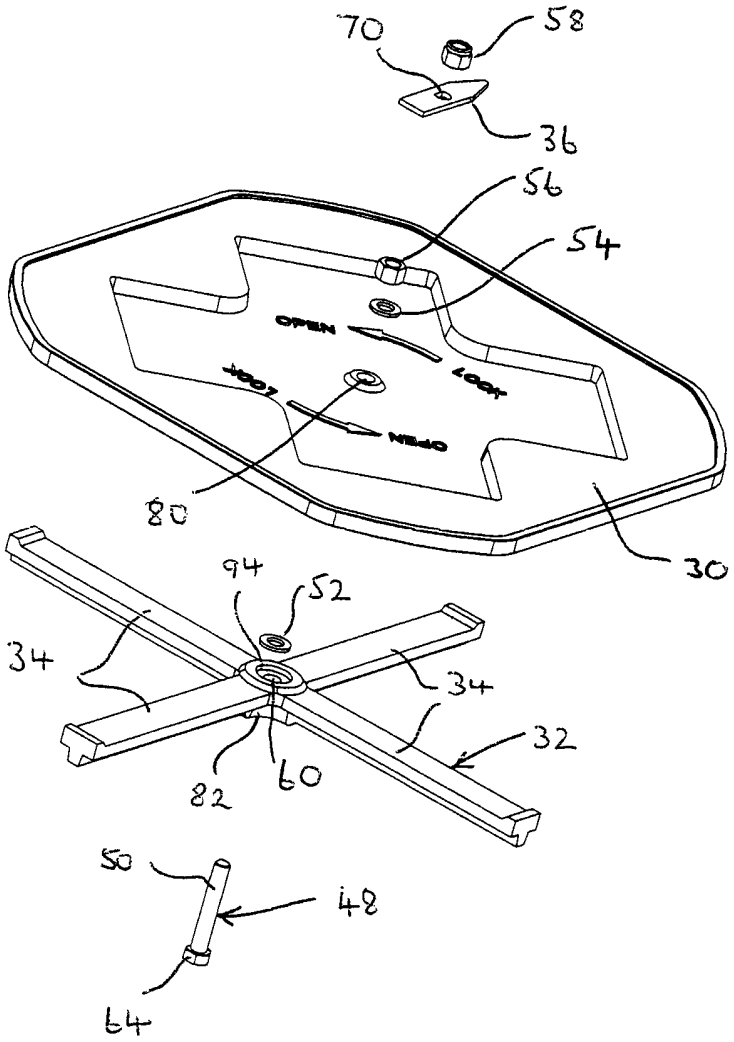
70
58
36
56
54
OPEN
LOCK
LOCK
OPEN
80
30
94
52
34
34
32
82
60
50
48
64

Fig 3

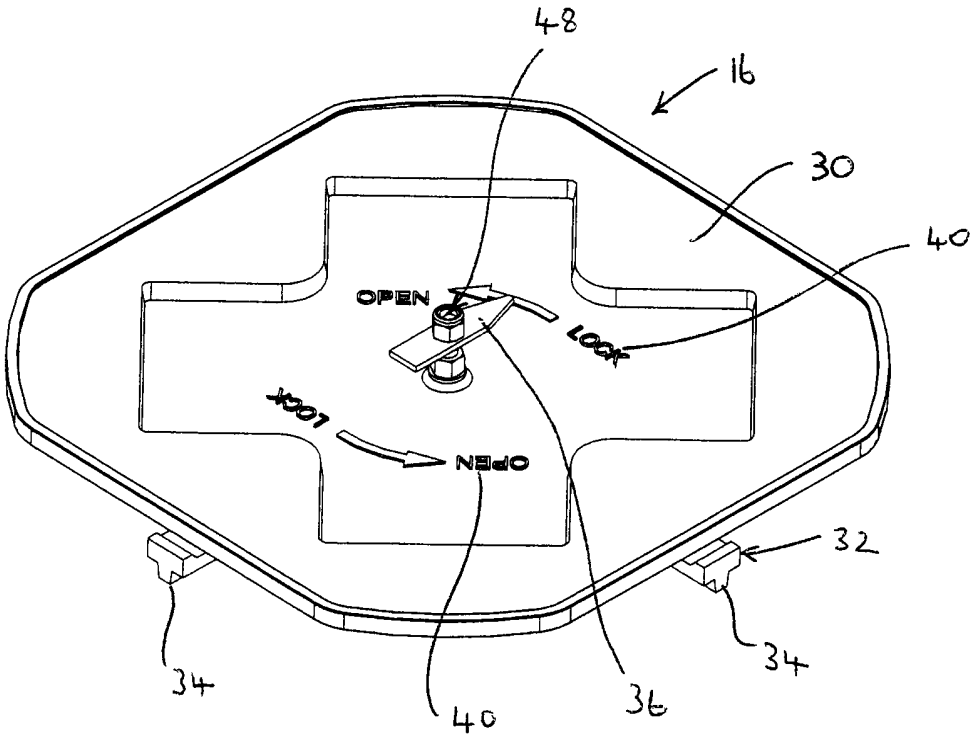

Fig 4

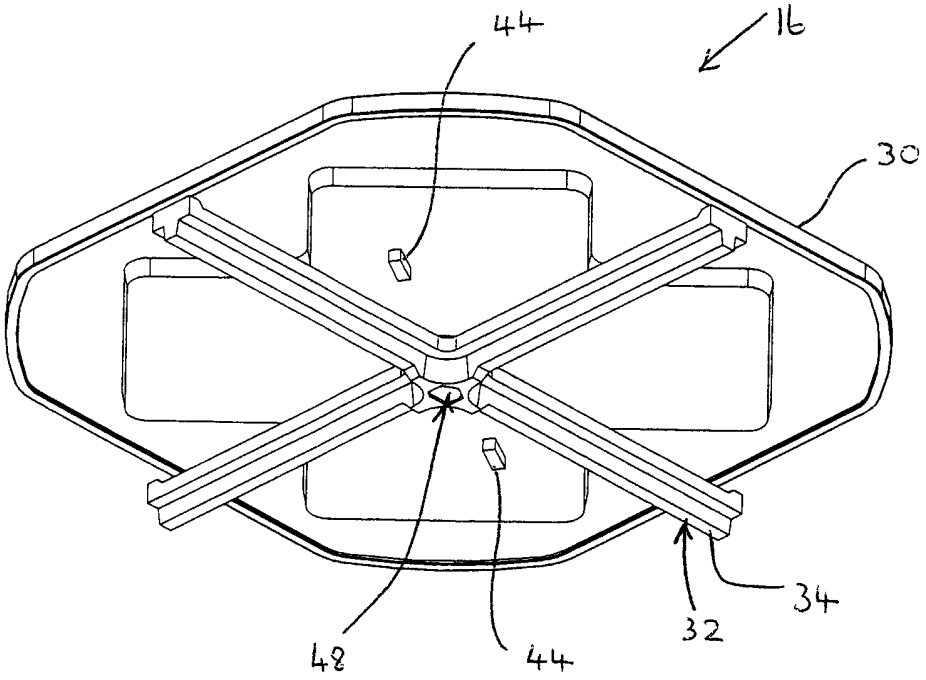

Fig 5

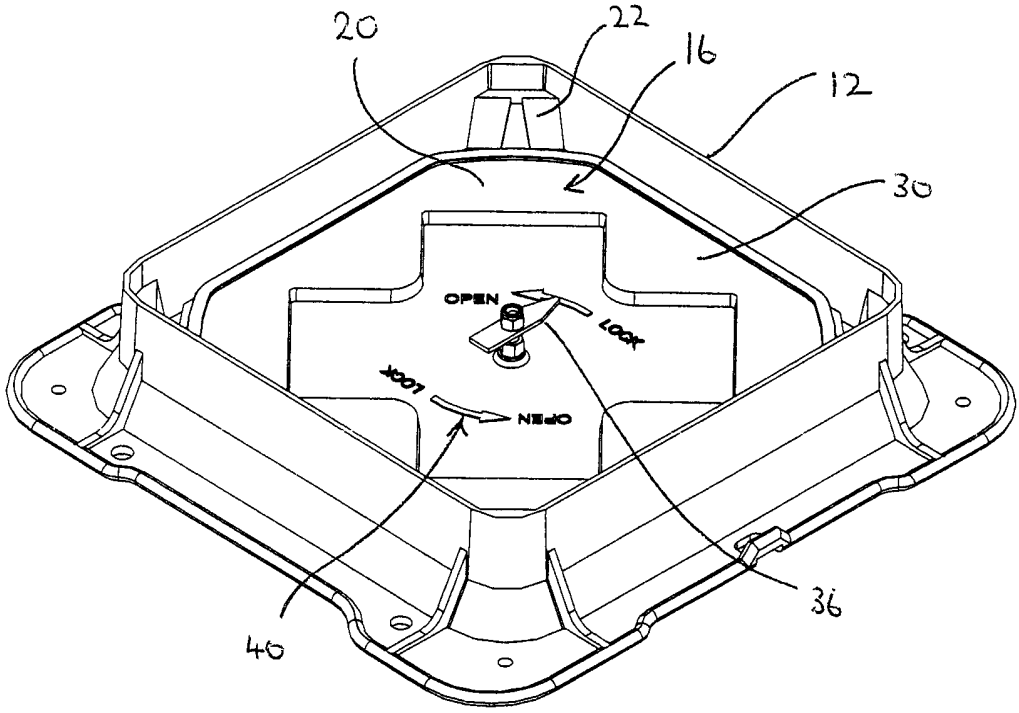

Fig 6

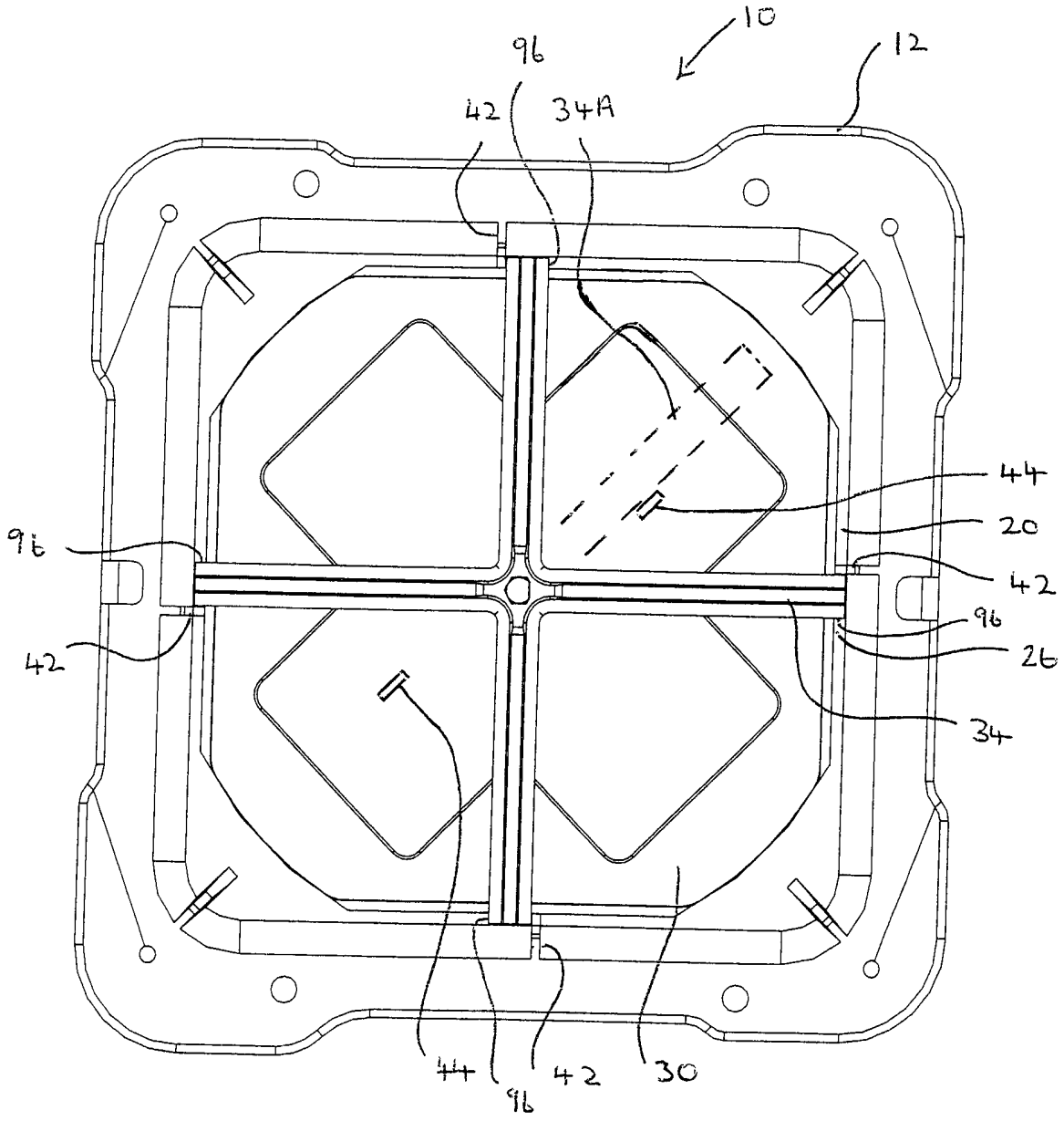

Fig 7

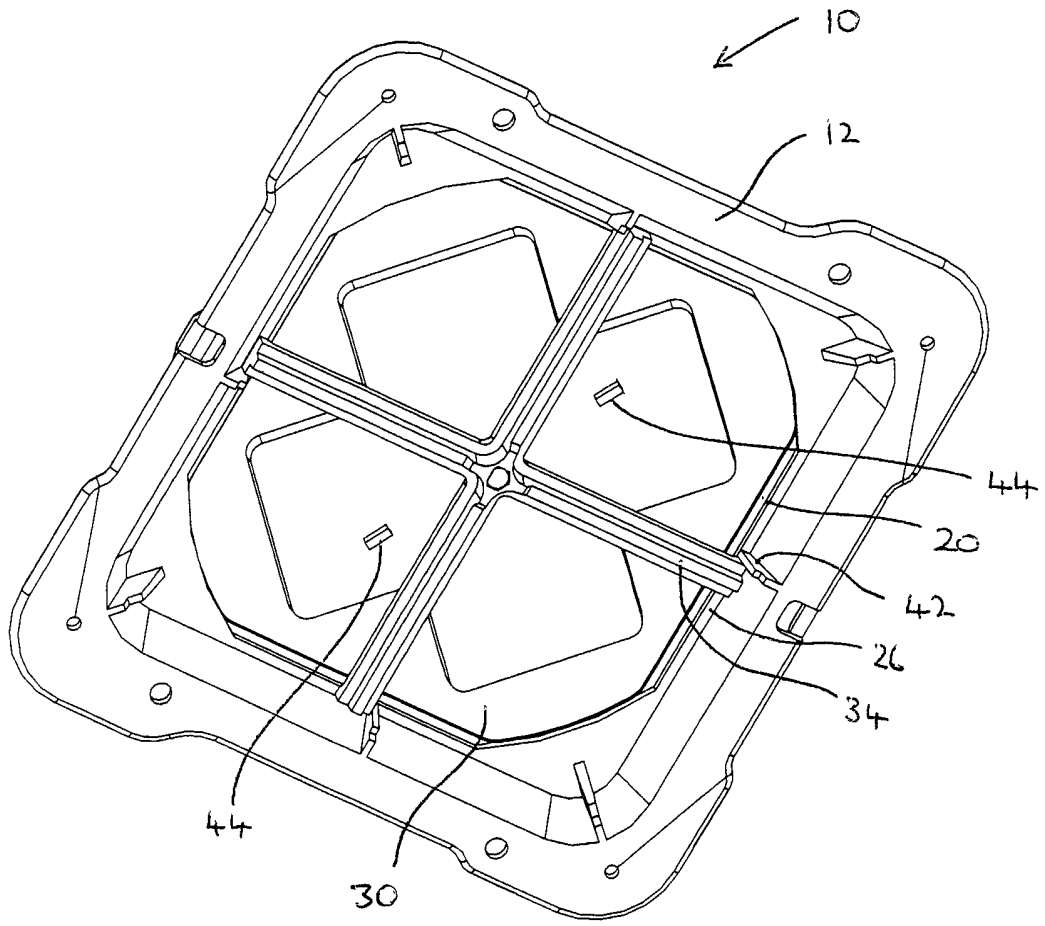

Fig 8

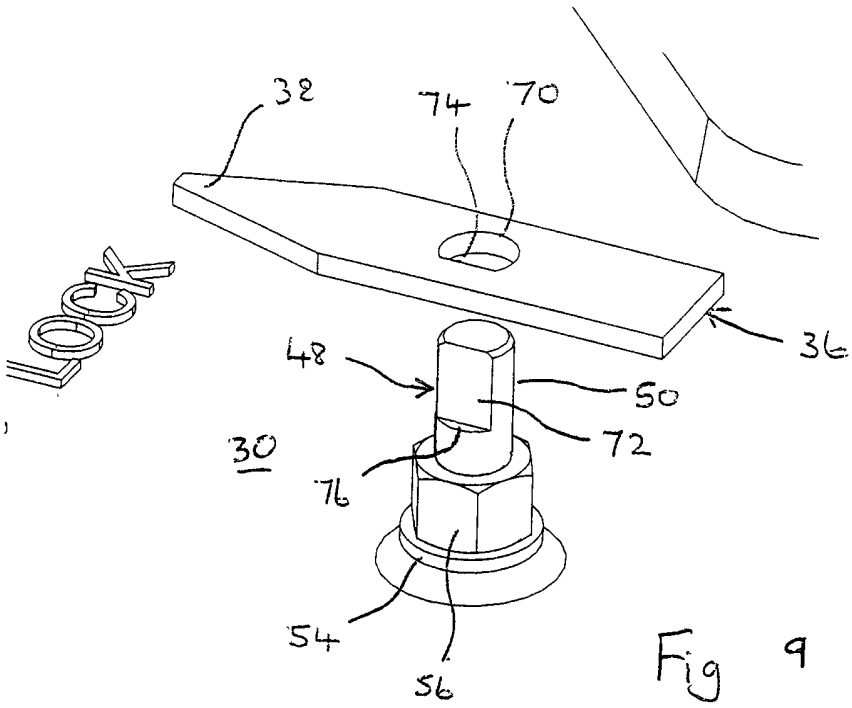

Fig 9

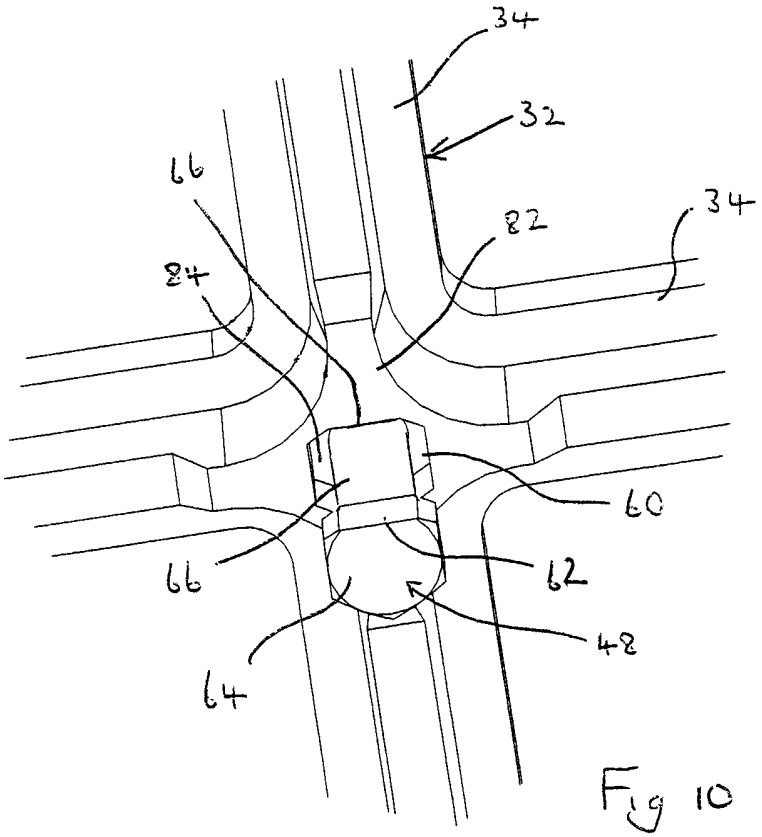

Fig 10

SURFACE ACCESS ASSEMBLIES

The present invention relates to surface access assemblies.

Surface access assemblies such as manhole covers generally include a frame defining an opening on which a cover or covers is mounted. The cover can be removed to permit access to underground services. In some areas, problems can be caused in storm conditions by the leakage of water past the cover into the underground services. Various means of sealing surface access assemblies have been proposed, but invariably add to the cost and complexity of the surface access assembly, and provide different levels of sealing integrity. Usually, in deciding which level is most appropriate for a particular situation, a user has to make a choice before installing the assembly. Thus, often surface access assemblies are overspecified, a higher level of sealing integrity being chosen than is necessary. In addition, providing different levels of sealing integrity requires manufacturers to offer a greater variety of products, increasing costs.

According to a first aspect of the present invention, there is provided a surface access assembly, the assembly including a frame, the frame defining an opening in which a cover is receivable, the assembly including a removable closure assembly, the closure assembly including a closure member for closing the opening and clamping means for clamping the closure member to the frame.

Possibly, the clamping means include a clamp member, which may be rotatable between an open condition and a lock condition.

Possibly, in an assembled condition the clamp member substantially extends across the opening in the lock condition. The clamp member may include a plurality of arms, and may include four arms.

Possibly, the clamping means include an actuator, which may be operable to rotate the clamp member.

Possibly, the frame includes a mounting on which in an assembled condition the closure member is mounted.

Possibly, the clamp member applies a clamping force to the frame, and may apply a clamping force to a clamping surface of the frame. Possibly, the clamp member applies a clamping force to a plurality of clamping surfaces, which may be spaced around the opening, and may be equi-spaced around the opening.

Possibly, the assembly includes stop means for limiting the rotation of the clamp member. Possibly the stop means limit rotation to an angle which is at most substantially half of the angle subtended between neighbouring arms, and may be substantially at most 45°.

Possibly, the clamping means includes adjustment means for adjusting the clamping force of the closure member to the frame. Preferably, the adjustment means permit adjustment of the spacing between the clamp member and the closure member.

Possibly, the clamping means includes an indicator for indicating the condition of the clamp member.

Possibly, the surface access assembly includes a seal member, which may seal between the closure assembly and the frame. Possibly, the seal member seals between the closure member and the mounting. Possibly, the seal member is formed of a resilient material.

According to a second aspect of the present invention, there is provided a closure assembly for a surface access assembly, the surface

access assembly including a frame defining an opening in which a cover is receivable, the closure assembly including a closure member for closing the opening and clamping means for clamping the closure member to the frame.

Possibly, the closure assembly is as described above in any of the preceding statements.

According to a third aspect of the present invention, there is provided a frame for a surface access assembly, the frame defining an opening in which a cover is receivable, the surface access assembly including a removable closure assembly, the closure assembly including a closure member for closing the opening and clamping means for clamping the closure member to the frame.

Possibly, the frame is as described above in any of the preceding statements.

According to a fourth aspect of the present invention, there is provided a method of assembling a surface access assembly, the surface access assembly including a frame defining an opening in which a cover is receivable and a removable closure assembly, the closure assembly including a closure member for closing the opening and clamping means for clamping the closure member to the frame, the method including the steps of positioning the closure assembly in the frame and actuating the clamping means to clamp the closure member to the frame.

Possibly, the assembly is as described above in any of the preceding statements.

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

Fig 1 is a perspective exploded view from one side and above of a surface access assembly;

Fig 2 is an exploded view from one side of the assembly of Fig 1;

Fig 3 is a perspective exploded view from one side and above of a closure assembly;

Fig 4 is a perspective view from one side and above of the closure assembly of Fig 3;

Fig 5 is a perspective view from one side and below of the closure assembly of Fig 4;

Fig 6 is a perspective view from one side and above of the surface access assembly of Fig 1 without covers;

Fig 7 is a view from below of the access assembly of Fig 1;

Fig 8 is a perspective view from one side and below of the assembly of Fig 7;

Fig 9 is a perspective view of a detail of the closure assembly of Fig 3; and

Fig 10 is a perspective view of another detail of the closure assembly.

Fig 1 shows a surface access assembly 10, including a frame 12 defining an opening 28. The frame 12 comprises upstanding side walls 90, with a flange 92 extending outwardly from a lower part of the side walls 90. Within the opening 28, the frame 12 includes an inwardly projecting mounting in the form of a lip 20 which extends around the inside of the side walls 90.

The frame 12 is substantially square in plan, and includes corner mountings 22 which project inwardly at each corner.

Four first stop projections 42 project downwardly in use from the underside of the mounting lip 20, one first stop projection 42 located adjacent to but offset from the midpoint of each side wall 90.

The frame 12 could be manufactured by casting, and could be manufactured of a material such as grey iron or ductile iron.

The surface access assembly 10 includes a seal member 14, which is continuous, and could be in the form of a loop or a ring, and could be arranged to correspond to the inside of the side walls 90, for example by moulding. The seal member 14 could be formed of a resilient material, which could be a plastics material, and could desirably be neoprene. The seal member 14 could be arranged to deform easily under a compressive load. For example, the seal member 14 could be hollow, and could be tubular or could have a C section shape.

The surface access assembly 10 includes a closure assembly 16, the closure assembly 16 as shown in Figs 3 to 5 including a substantially planar closure member 30 and a clamp member 32, the clamp member 32 being in plan in the form of a cross, having four arms 34 which extend equally radially from a hub 82. The hub 82 defines a clamp hole 60. The closure member 30 defines a closure hole 80.

The closure assembly 16 includes an actuator in the form of an actuator member 36 which is substantially planar and defines an actuator hole 72 therethrough. The actuator member 36 includes a pointed end 38.

The closure assembly 16 includes a connector member 48 generally in the form of a bolt which in an assembled condition extends through the clamp

hole 60, the closure hole 80 and the actuator hole 70. The connector member 48 includes an enlarged head 64 and a shank 50. The clamp hole 60 includes a head receiving part 84 in which the head 64 is receivable and a shank receiving part (not visible) in which the shank 50 is receivable, the head receiving part 84 being enlarged relative to the shank receiving part, so that in the assembled condition the connector member 48 is received within the clamp hole 60 so that the outer surface of the head 64 is substantially flush with the outer surface of the hub 82.

The head 64 is shown in more detail in Fig 10. The head 64 is similar to a conventional hexagonal head, except that one of the points of the hexagon has been flattened to form an extra, relatively large first engaging face 62. The clamp hole 60 is correspondingly shaped, having one relatively large second engaging face 66 so that the head 64 can only fit into the clamp hole 60 in one orientation.

Fig 9 shows the other end of the shank 50 from the head 64. The other end of the shank 50 is generally circular in cross-section, and includes a flattened portion which forms a third engaging face 72. The actuator hole 70 is corresponding shaped, being generally circular in cross-section but having a flat portion which forms a fourth engaging face 74. The third engaging face 72 extends from the end of the shank 50 to a shoulder 76.

The closure assembly 16 is assembled as follows. The head 64 of the connector member 48 is located in the head receiving part 84 of the clamp hole 60 so that the first engaging face 62 abuts the second engaging face 66. A first washer 52 locates on the shank 50 where the shank 50 extends out of the clamp hole 60 in a recess 94 defined by the hub 82. The closure member 30 is located over the clamp member 32 so that the shank 50 extends through the closure hole 80. A second washer 54 is located over the shank 50. The shank 50 is threaded, and a first nut 56 threadably engages the shank 50,

although at this stage the first nut 56 is not tightened so that the clamp member 32 is movable relative to the closure member 30.

The actuator member 36 is then located on the end of the shank 50 so that one surface of the actuator member 36 abuts the shoulder 76 and the third engaging face 72 abuts the fourth engaging face 74. The actuator member 36 can be located to the shank 50 in one of two opposite orientations. The end of the shank 50 is threaded, and a second nut 58 is mounted to the shank 50 and tightened against the actuator member 36 to retain the actuator member 36 in position on the shank 50 against the shoulder 76.

In the assembled condition, the closure assembly 16 appears as shown in Figs. 1, 2, 4 and 5. The engagement of the first and second engaging faces 62, 66 and third and fourth engaging faces 72, 74 means that the actuator member 36 is fixed in one of two predetermined orientations relative to the clamp member 32, and as the actuator 36 is moved, the clamp member 32 moves correspondingly. The first nut 56 is not tightened at this stage, so that the actuator member 36, the connector member 48 and the clamp member 32 are movable relative to the closure member 30.

The closure member 30 includes markings 40 located on an in use upper face, which indicate the lock and open positions of the clamp member 34 when in the assembled condition in the frame 12. The markings 40 are in duplicate to permit assembly of the actuator member 36 in either orientation. A pair of second stop projections 44 extend downwardly from an in-use underside of the closure member 30, the second stop projections 44 preventing further rotation of the clamp member 32 relative to the closure member 30. In an open condition, the actuator member 36, the clamp member 32, the markings 40 and the second stop projections 44 are arranged so that the pointed end 38 of the actuator member 36 points to the marking 40 indicating "open". In this position, two of the arms 34 abut the second stop

projections 44 as indicated in Fig. 7 by dotted lines showing one of the arms 34A. The pointed end 38 of the actuator member 36 thus forms an indicator for indicating the condition of the clamp member 32.

The surface access assembly 10 is assembled as follows. The seal member 14 is positioned on the mounting lip 20. The closure assembly 16 is inserted into the opening 28 with the clamp member 32 in the open condition, so that the arms 34 of the clamp member 32 are orientated along the diagonals of the frame 12. In this position, the clamp member 32 can pass through the opening defined by the mounting lip 20.

The closure member 30 is located on the seal member 14, the weight of the closure assembly 16 compressing the seal member 14. An operator then rotates the actuator member through approximately 45° from the open condition to a lock condition in which the arms 34 of the clamp member 32 extend substantially towards the midpoints of the sides 90 of the frame 12. The rotation of the clamp member 32 is stopped by the abutment of the ends of the arms 34 against the first stop projections 42. In this position, the ends of the arms 34 are located underneath the mounting lip 20.

The angle of rotation is substantially half of the angle subtended between neighbouring arms 34. In this example, the angle subtended between neighbouring arms is approximately 90°, and the angle of rotation is substantially 45°, this angle being limited by the first and second stop projections 42, 44, which thus form stop means.

The operator then tightens the first nut 56 against the closure member 30, drawing the clamp member 32 towards the closure member 30 so that each end of each arm 34 locates against a clamping surface 96 (indicated in Fig 1) on the underside of the mounting lip 20. The first nut 56 is further tightened so that the clamp member 32 applies a clamping force against each clamping surface 96, clamping the closure member 30 to the seal member 14.

The first nut 56 as shown in the drawings could be tightened by a tool such as a spanner, or could be provided with projections such as wings to allow hand tightening.

With the closure assembly 16 locked in position, the covers 18 can be mounted in the frame 12, the corner projections 24 of the covers 18 locating on the corner mountings 22.

Disassembly is essentially the reverse of the above. The covers 18 are removed from the frame 12, and the first nut 56 loosened so that the actuator member 36 and clamp member 32 are free to rotate relative to the closure member 30 and frame 12. The actuator member 36 is then moved from the lock position to the open position, moving the clamp member 32 so that the arms 34 are again aligned along the diagonals of the frame 12. The closure assembly 16 can then be lifted out of the frame 12 to permit access to underground services through the opening 28.

Positioning of the closure assembly 16 is thus relatively quick and simple. In the example, the four clamping surfaces 96 are equi-spaced, so that the clamp member 32 provides an even clamping force, compressing the seal member 14 evenly around the mounting lip 20, ensuring integrity of sealing. The closure member 16 can be provided as an assembled unit, reducing the risk of parts being lost. A clear indication of the condition of the clamp member 32 is provided, allowing an inspector to check the condition of the assembly quickly and easily. The tightening of the first nut 56 along the shank 50 permits the clamp member 34 to be spaced from the closure member 30 as required to accommodate manufacturing and casting tolerances, permitting inter-changeability of closure assemblies 16 with different frames 12. The threaded shank 50 and the first nut 56 thus provide adjustment means for adjusting the spacing of the clamp member 34 from the closure member 30 and for adjusting the clamping force of the closure member 30 to the frame 12. The resilient seal member 14 permits

unevennesses in the closure member 30 and mounting lip 20 to be accommodated.

The clamp member 32 could be formed integrally. The clamp member 32 and closure member 30 could be formed of a relatively rigid but resilient material, for example, ductile iron, and could be formed by casting.

It will be noted that the closure assembly 16 is independent of the covers 18 and in particular, the covers 18 are not required to bear down on the closure member 30 to compress the seal member 14. The arrangement of the present invention requires the frame 12 to be provided with a suitable mounting lip 20 and preferably also first stop projections 42. Such features are relatively simple to provide in a frame formed by casting, so that these features could be provided within, for example, all of the frames which are installed in a particular area, whether or not the designer has identified a need for surface access assemblies which can be fully sealed. The decision as to whether to install the closure assembly can then be made in the light of local conditions experienced, and if necessary closure assemblies can be retrospectively fitted to frames already installed. Thus the surface access assembly of the present invention provides the user with a frame which can be used without a closure assembly and to which a closure assembly can later be fitted if necessary.

Various other modifications may be made without departing from the scope of the invention. The shape and configuration of the various components shown are examples only and each component could be of any suitable shape and configuration. For example, the frame could be triangular or circular in plan, with an appropriately shaped opening defined by the mounting lip. The clamp member 32 could be different in shape and configuration. For example the clamp member could have a different number of arms.

There is thus provided a surface access assembly which permits the fitting of a closure assembly to provide sealing of the opening. The closure assembly can be simply and quickly mounted and demounted within the frame and provides simple and accurate indication of the condition of the clamp member so that it can be ensured that the closure assembly is installed correctly and will provide the sealing required in use.

Whilst endeavouring in the foregoing specification to draw attention to those features of the invention believed to be of particular importance it should be understood that the Applicant claims protection in respect of any patentable feature or combination of features hereinbefore referred to and/or shown in the drawings whether or not particular emphasis has been placed thereon.

CLAIMS

1. A surface access assembly, the assembly including a frame, the frame defining an opening in which a cover is receivable, the assembly including a removable closure assembly, the closure assembly including a closure member for closing the opening and clamping means for clamping the closure member to the frame.

2. An assembly according to claim 1, in which the clamping means include a clamp member.

3. An assembly according to 2, in which the clamp member is rotatable between an open condition and a lock condition.

4. An assembly according to claim 3, in which in an assembled condition the clamp member substantially extends across the opening in the lock condition.

5. An assembly according to any of claims 2 to 4, in which the clamp member includes a plurality of arms.

6. An assembly according to claim 5, in which the clamp member includes four arms.

7. An assembly according to any of claims 2 to 6, in which the clamping means include an actuator, which is operable to rotate the clamp member.

8. An assembly according to any of the preceding claims, in which the frame includes a mounting on which in an assembled condition the closure member is mounted.

9. An assembly according to claim 2 or any claim dependent thereon, in which the clamp member applies a clamping force to the frame.

10. An assembly according to claim 9, in which the clamp member applies a clamping force to a clamping surface of the frame.

11. An assembly according to claim 10, in the clamp member applies a clamping force to a plurality of clamping surfaces, which are spaced around the opening.

12. An assembly according to claim 11, in which the clamping surfaces are equi-spaced around the opening.

13. An assembly according to claim 2 or any claim dependent thereon, in which the assembly includes stop means for limiting the rotation of the clamp member.

14. An assembly according to claim 13 when dependent on claim 5 or any claim dependent thereon, in which the stop means limit rotation to an angle which is at most substantially half of the angle subtended between neighbouring arms.

15. An assembly according to claim 14, in which the angle is substantially at most 45°.

16. An assembly according to any of the preceding claims, in which the clamping means includes adjustment means for adjusting the clamping force of the closure member to the frame.

17. An assembly according to claim 16 when dependent on claim 2 or any claim dependent thereon, in which the adjustment means permit adjustment of the spacing between the clamp member and the closure member.

18. An assembly according to claim 2 or any claim dependent thereon, in which the clamping means includes an indicator for indicating the condition of the clamp member.

19. An assembly according to any of the preceding claims, in which the surface access assembly includes a seal member, which seals between the closure assembly and the frame.

20. An assembly according to claim 19 when dependent on claim 8 or any claim dependent thereon, in which the seal member seals between the closure member and the mounting.

21. An assembly according to claims 19 or 20, in which the seal member is formed of a resilient material.

22. A closure assembly for a surface access assembly, the surface access assembly including a frame defining an opening in which a cover is receivable, the closure assembly including a closure member for closing the opening and clamping means for clamping the closure member to the frame.

23. A closure assembly according to claim 22, in which the closure assembly is as defined in any of claims 1 to 21.

24. A frame for a surface access assembly, the frame defining an opening in which a cover is receivable, the surface access assembly including a removable closure assembly, the closure assembly including a closure member for closing the opening and clamping means for clamping the closure member to the frame.

25. A frame according to claim 24, in which the frame is as defined in any of claims 1 to 21.

26. A method of assembling a surface access assembly, the surface access assembly including a frame defining an opening in which a cover is receivable and a removable closure assembly, the closure assembly including a closure member for closing the opening and clamping means for clamping the closure member to the frame, the method including the steps of positioning the closure assembly in the frame and actuating the clamping means to clamp the closure member to the frame.

27. A method according to claim 26, in which the assembly is as defined in any of claims 1 to 21.

28. A surface access assembly substantially as hereinbefore described and with reference to the accompanying drawings.

29. A closure assembly substantially as hereinbefore described and with reference to the accompanying drawings.

30. A frame substantially as hereinbefore described and with reference to the accompanying drawings.

31. A method substantially as hereinbefore described and with reference to the accompanying drawings.

32. Any novel subject matter or combination including novel subject matter disclosed herein, whether or not within the scope of or relating to the same invention as any of the preceding claims.

Application No: GB0610692.6 **Examiner:** Mr Charles Jarman

Claims searched: 1-32 **Date of search:** 25 September 2007

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-13, 16, 17, 19-27	US1191432 A (JONES) See whole document.
X	1-6, 8-13, 16, 17, 22-27	JP11029951 A (SHOWA EC KK) See whole document.
X	1-3, 5, 8-10, 13, 16, 17, 19-27	US3973856 A (GAGLIOTI) See whole document.
X	1, 2, 8-12, 16, 19-27	DE202005011185 U1 (BOHATSCH ET AL) See whole document.
X	1-12, 22-27	US6739796 A (DEL NERO ET AL) See whole document.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category	P	Document published on or after the declared priority date but before the filing date of this invention
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

Worldwide search of patent documents classified in the following areas of the IPC

E02D

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC

International Classification:

Subclass	Subgroup	Valid From

Subclass	Subgroup	Valid From
E02D	0029/14	01/01/2006