

(19)



(11)

EP 2 811 076 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
10.12.2014 Bulletin 2014/50

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

(21) Application number: **14171672.0**

(22) Date of filing: **09.06.2014**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME

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(30) Priority: **07.06.2013 GB 201310227**

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(54) Ground surface access assemblies

(57) A ground surface access assembly (10) includes a cover (16), a frame (12) defining an opening (14) in which the cover (16) is receivable and a hinge mounting (22) for mounting the cover (16) to the frame

(12) in or over the opening (14). The frame (12) includes a wall member (18) which extends around the opening (14).

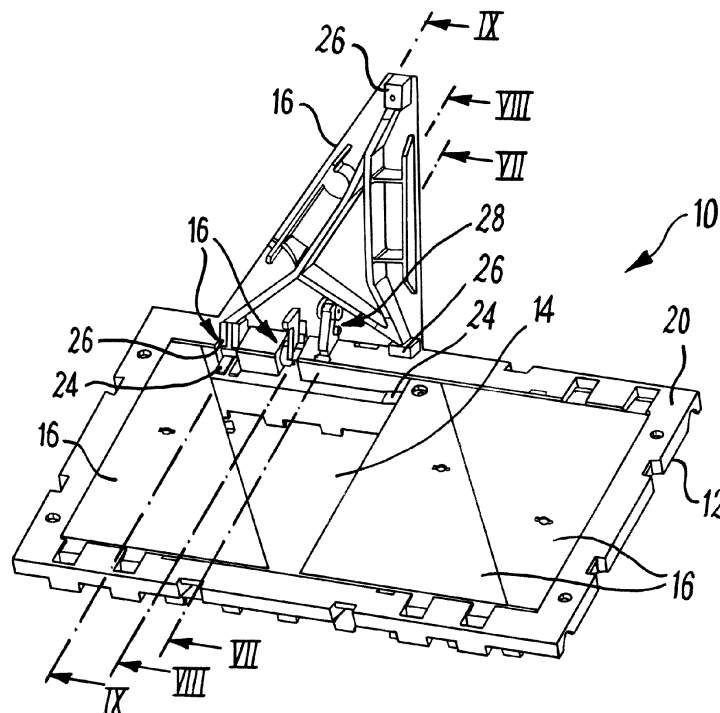


Fig. 1

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Description

[0001] The present invention relates to ground surface access assemblies.

[0002] Conventionally, ground surface access assemblies comprise a frame defining an opening and a cover mountable to the frame in the opening which is openable to permit access to underground services. Such assemblies must conform to regulatory standards when used in trafficked situations. The regulatory standards, such as European Standard EN 124, specify a testing regime primarily based around compression testing through a load plate. The highest specification products are now usually formed of ductile iron because of its superior strength to weight ratio and non-catastrophic failure mode.

[0003] Despite advances made in material technology and product design, the weight of the covers remains a health and safety issue, since the covers must be removed or opened to gain access to the underground services. It is known to use relatively crude hinges to enable the covers to be rotated rather than lifted. However, conventional hinges have suffered a number of disadvantages. In use, conventional hinges are prone to clogging with dirt and corrosion products. This is mitigated by making the hinge parts a slack fit together. The slack fit is also necessary to ensure that the cover three point mountings are not compromised. However, paradoxically, the slack fit can, in fact, permit a greater degree of dirt ingress and trapping to occur.

[0004] When a hinged cover of a conventional access assembly is in an open position, it is common practice to use a prop or stay (which may be any convenient length of suitable material to hand, such as a length of wood) to prevent unintended closure of the cover. However such makeshift props or stays can be unsuitable, or be broken or knocked and dislodged during use.

[0005] Of increasing concern is the time taken to open access covers. In some circumstances, only very limited time is available to open the covers, check the underground services and close the covers before, for example, lane closure protocols come into force, which considerably increase maintenance costs.

[0006] In this specification, the terms inner, outer, inwardly and outwardly, when used in relation to the frame, are used with respect to the opening, which is inward of the frame, and the terms upward and downward are used in relation to the in use orientation of a ground surface access assembly, in which downward means down into the ground.

[0007] According to a first aspect of the present invention, there is provided a ground surface access assembly, the assembly including a cover, a frame defining an opening in which the cover is receivable and a hinge mounting for mounting the cover to the frame in or over the opening.

[0008] Possibly, the frame includes a wall member which extends around the opening and a substantially planar surface flange which extends outwardly from an

in use upper part of the wall member.

[0009] Possibly, the frame includes three frame mountings, the cover includes three cover mountings, and the assembly is arranged so that, in an in use under load closed condition, each of the three cover mountings locates on a different one of the frame mountings to provide the cover with a three point non rock mounting.

[0010] Possibly, the cover is movable between an open and a closed condition. Possibly, the cover includes a lock, for retaining the cover in the open condition. Possibly, the lock is moveable between a free condition and a captive condition. Possibly, as the cover is moved to the open condition, the lock automatically moves to the captive condition, in which the lock prevents the cover moving from the open condition.

[0011] Possibly, to move the cover from the open condition to the closed condition, the lock must be moved manually by a user from the captive condition to the free condition.

[0012] Possibly, the lock includes a latch member. Possibly, the lock includes a pivot mounting for mounting the latch member to an underside in use of the cover. Possibly, the pivot mounting permits the latch member to move pivotally relatively to the cover. Possibly, in the free condition, the latch member moves under gravity.

[0013] Possibly, the assembly defines a latch retaining pocket, in which, in the captive condition, the latch member is received.

[0014] Possibly, the latch retaining pocket is defined by the surface flange, a first retaining projection projecting upwardly from the surface flange and a second retaining projection projecting from the cover.

[0015] Possibly, the hinge mounting defines a hinge passage, which may be substantially circular in section, and may extend substantially along a straight line, and may be defined by parts of the frame and parts of the cover.

[0016] Possibly, the hinge mounting includes a hinge pin assembly, which in an assembled condition may locate in the hinge passage, and may locate in both at least one part of the passage defined by the frame and at least one part of the passage defined by the cover.

[0017] The hinge pin assembly may include a pin member, and may include a pin sleeve member. The pin sleeve member may define a longitudinal passage in which the pin member may locate in an assembled condition, so that in the assembled condition, the pin sleeve (or parts thereof) are located between the pin member and the frame and the pin member and the cover.

[0018] The pin sleeve member may be formed of a substantially non-corrodable material, which may be resiliently deformable. The pin sleeve member may be formed of a plastics material, and may be formed of nylon. The pin member may be formed of a substantially non or low corrodable material, such as stainless steel.

[0019] The assembly may include a plurality of covers. The assembly may include a plurality of spaced hinge mountings, and may include a plurality of hinge mount-

ings for the or each cover, and may include a pair of spaced hinge mountings for the or each cover. Possibly, the hinge passages of the hinge mountings for the or one cover are substantially aligned. Possibly, the hinge passages of the hinge mountings on any one side of the frame are substantially aligned.

[0020] Each cover may include a lock.

[0021] Possibly, the or each hinge passage is formed by drilling. Possibly, during drilling, the or each cover is clamped to the frame in the closed condition, and the parts of the hinge passage in the frame parts and the cover parts are formed in the same drilling operation. Possibly, the hinge passages of the hinge mountings for the or one cover are formed in the same drilling operation.

[0022] Possibly, the or each cover and the frame are formed by moulding, and may be formed of metal by casting, and may be formed of ductile iron.

[0023] According to a second aspect of the present invention, there is provided a method of mounting a cover to a frame of a ground surface access assembly, the method including providing a ground surface access assembly, the assembly including a cover, a frame defining an opening in which the cover is receivable and a hinge mounting for mounting the cover to the frame in or over the opening.

[0024] Possibly, the ground surface access assembly includes any of the features described in any of the preceding statements. Possibly, the method includes any of the steps described in any of the preceding statements.

[0025] 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 view from above and one side of a ground surface access assembly, with three covers in a closed condition and one cover in an open condition;

Fig. 2 is a side view of the assembly of Fig. 1;

Fig. 3 is a perspective view from below and the one side of the assembly of Fig. 1;

Fig. 4 is a perspective view from above and one side of a frame of the assembly, with all of the covers removed;

Fig. 5 is a perspective view from below of a pair of the covers of the assembly;

Fig. 6 is a relatively enlarged perspective detail view of a part of the assembly shown in Fig. 1;

Fig. 7 is a side sectional view of part of the assembly as indicated by the section line VII in Fig. 1, showing a lock in a captive condition;

Fig. 8 is a side sectional view of part of the assembly as indicated by the section line VIII in Fig. 1, showing a hinge mounting with the cover in the open condition;

Fig. 9 is a side sectional view of part of the assembly as indicated by the section line IX in Fig. 1, showing another hinge mounting with the cover in the open condition;

Fig. 10 is a schematic side view of part of another assembly; and

Fig. 11 is a perspective view of still another assembly.

Figures 1 to 9 show a ground surface access assembly 10, the assembly 10 including, in this example, four covers 16, a frame 12 defining an opening 14 in which the covers 16 are receivable and hinge mountings 22 for mounting the covers 16 to the frame 12.

[0026] The frame 12 includes a wall member 18 which extends around the opening 14. In this example, the wall member 18 is cranked in cross sectional profile and includes an in-use substantially vertical lower part 62, an in-use substantially horizontally outwardly extending mid part 64 and an in use substantially vertical upper part 66. The clear opening 14 is thus defined by the lower part 62.

[0027] The frame 12 includes a substantially planar surface flange 20 which extends in use substantially horizontally outwardly from the upper part 66 of the wall member 18.

[0028] The frame 12 includes three frame mountings 24 for each cover 16. Each cover 16 includes three cover mountings 26. The assembly 10 is arranged so that, in an in use under load closed condition, each of the three cover mountings 26 for each cover 16 locates on a different one of the frame mountings 24 to provide each cover 16 with a three point non rock mounting.

[0029] The frame mountings 24 are located on the mid part 64.

[0030] At the hinge mountings 22, the frame 12 defines hinge recesses 70 which extend outwardly from the opening 14. Each hinge recess 70 is defined by part of the mid part 64 which forms a base wall, and by part of the upper part 66, which forms side walls to the recess. Each recess 70 forms an opening in the surface flange 20.

[0031] Each cover 16 is movable between an open and a closed condition. Referring to Fig. 2, in the open condition, the surface of each cover 16 subtends an included angle of about 110° with the surface flange 20. In this condition, each cover 16 locates against and is supported by angled retaining surfaces 56, seen most clearly in Figs 8 and 9. The angled retaining surfaces 56 are formed as chamfers on the inward facing sides of the upper parts 66 of the wall member 18 in the hinge recesses 70. The angled retaining surfaces 56 subtend an angle of about 110° with the mid part 64.

[0032] Each cover 16 includes a lock 28, for retaining the cover 16 in the open condition. The lock 28 is moveable between a free condition and a captive condition.

[0033] The lock 28 includes a latch member 60. The lock 28 includes a pivot mounting 30 for mounting the latch member 60 to an underside in use of the respective cover 16. The pivot mounting 30 permits the latch member 60 to move pivotally relatively to the respective cover 16. In the free condition, the latch member 60 moves

under gravity.

[0034] The assembly 10 defines a latch retaining pocket 32, in which, in the captive condition, the latch member 60 is received. The latch retaining pocket 32 is defined by the surface flange 20, a first retaining projection 34 projecting upwardly from the surface flange 20 and a second retaining projection 36 projecting inwardly from the respective cover 16.

[0035] Referring to Fig. 7, the latch member 60 comprises a body 76. The pivot mounting 30 is located at or towards one end of the body 76. The pivot mounting 30 could be of any convenient type. As shown, the pivot mounting 30 comprises a pair of spaced pivot supports 82 extending from the underside of the cover 16 and a pivot pin 84 extending along a pivot passage defined by the pivot supports 82 and the body 76.

[0036] At the other end of the body 76, the latch member 60 is in the form of a foot, having an outward facing projecting heel 72 and an inward facing projecting tapering toe 74. The heel 72 defines a heel recess 78 with the body 76. The toe 74 defines a toe recess 80 with the body 76.

[0037] In use, the lock 28 operates as follows. In the closed condition, the latch member 60 is in the free condition and is free to move in accordance with gravity. Referring to Figs 3 and 5, in the closed condition the latch members 60 extend downwardly from the underside of the covers 16.

[0038] As one of the covers 16 is raised, the latch member 60 pivots and the latch member 60 automatically locates into the captive condition in the latch retaining pocket 32. In this condition, the heel 72 abuts against the underside of the cover 16 and the second retaining projection 36 and the heel recess 78 receives the second retaining projection 36. There is a relatively small amount of clearance between the toe 74 and the first retaining projection 34 which permits a relatively small degree of movement of the cover 16. After this movement, the cover 16 is prevented from further movement from the open condition and towards the closed condition by the abutment of the toe 74 against the first retaining projection 34.

[0039] To move the cover 16 to the closed condition, the cover 16 is moved back against the retaining surfaces 56. The relatively small clearance mentioned above now permits a user to manually pivot the latch member 60 out of the latch retaining pocket 32 and the captive condition. When the latch member 60 is out of the pocket 32, the cover 16 can be moved towards the closed condition and the latch member 60 then released.

[0040] Advantageously, the lock 28 acts automatically. The lock 28 is robust and cannot be accidentally knocked out of the captive condition. One lock 28 is permanently attached to each cover 16, so there can never be a situation in which there are not sufficient props or stays. Providing a permanently attached lock 28 to each cover 16 considerably speeds up the process of opening up access covers and reduces health and safety concerns.

[0041] A further advantage of the present invention is

that the lock 28 does not obtrude into the working space in, above or around the opening 14. A further advantage of the present invention is that the first retaining projection 34 is relatively small. The applicants have found that the first retaining projection 34 can be about 3-4mm in height, which is comparable with conventional raised surface patterns.

[0042] Each hinge mounting 22 defines a hinge passage 40, which is substantially circular in cross section, which extends substantially along a straight line, and is defined by parts of the frame 12 and parts of the respective cover 16. More particularly, the hinge passage 40 comprises a frame part 46 defined by the mid parts 64 defining the respective hinge recess 70. Each cover 16 includes first and second hinge projections 88, 90 which project outwardly and locate in the hinge recesses 70. Each first and second hinge projection 88, 90 defines a cover part 48 of the respective hinge passage 40.

[0043] Each hinge mounting 22 includes a hinge pin assembly 44, which in an assembled condition locates in the respective hinge passage 40, and locates in both the parts of the passage 40 defined by the frame 12 and the part of the passage 40 defined by the cover 16.

[0044] The hinge pin assembly 44 includes a pin member 50 and a pin sleeve member 52. The pin sleeve member 52 defines a longitudinal passage 54 in which the pin member 50 locates in the assembled condition, so that in the assembled condition, the pin sleeve 52 (or parts thereof) is located between the pin member 50 and the frame 12 and the pin member 50 and the cover 16, preventing direct contact between the pin member 50 and the cover 16 or frame 12.

[0045] The pin sleeve member 52 is formed of a substantially non-corrodable resiliently deformable material, for example, nylon or a similar plastics material. The pin member 50 is formed of a substantially non or low corrodable material and is optimally formed of a substantially non corrodable material, such as stainless steel.

[0046] The hinge passages 40 of the hinge mountings 22 for one cover 16 are substantially aligned. The hinge passages 40 of the hinge mountings 22 on any one side of the frame 12 could be substantially aligned.

[0047] The covers 16 and the frame 12 are formed of ductile iron by casting.

[0048] The hinge passages 40 are formed by drilling. During drilling, each cover 16 is firstly cleaned and the frame mountings 24 and the cover mountings 26 are smoothed to remove any burrs or surface irregularities. Each cover 16 is then clamped under load to the frame 12 in the closed condition, and the parts of the hinge passage 40 in the frame parts and the cover parts on one side of the cover 16 are formed in the same drilling operation. This ensures accurate alignment of the parts of the hinge passage 40. Referring to the side view shown in Fig. 2, cut outs 92 defined in the side walls 18 permit drilling access.

[0049] In one example, the frame 12 has long sides of 1.2 m long, and the hinge passages 40 along the two

long sides are drilled to an alignment tolerance of 0.25mm.

[0050] The accurate alignment of the parts of the hinge passage 40 is required because the hinge pin assembly 44 is a relatively tight, sliding but not sloppy fit within the respective hinge passage 40. For example, the hinge pin assembly 44 could have a diameter of 16.0 mm, and the hinge passage 40 could have a diameter of 16.3 mm.

[0051] Each cover has two types of hinge mounting 22. Fig. 8 shows a first type of hinge mounting 22A in which the hinge mounting does not form part of the cover mounting 26. Fig. 9 shows a second type of hinge mounting 22B in which the hinge mounting also forms part of the cover mounting 26. In the second type, the cover mounting 26 is formed on the second hinge projection 90. In the closed condition, the cover mounting 26 locates against the respective frame mounting 24.

[0052] The accurate alignment and use of the hinge pin assembly of the invention is important for a number of reasons. It provides accurate, repeatable, smooth and easy opening of the covers 16, and reduces internal crevices where dirt can build up. This is more important than it might sound to someone unfamiliar with these products after years of service in the ground. Manoeuvring a heavy, poorly fitting cover even if hinged can be time consuming and dangerous as it is at this time that the cover is most likely to be accidentally dropped, causing injury. This job is made worse under time pressure, if accessibility is poor, if there are several heavy covers which need to be manoeuvred in the same opening, and if the covers, the frames and the mountings have become dirty, clogged and/or corroded.

[0053] The accurate alignment and location of the hinges ensures that three point mounting of the covers on the frames under load is provided and maintained.

[0054] The use of the nylon sleeve members 52 and stainless steel pin members 50 provides a number of advantages. The nylon and stainless steel materials are long lasting and non corrodable, so ensure that hinge operation will remain acceptable over a service life of many years under arduous service conditions. Importantly, the applicants have realised that the resiliently deformable property of nylon can be utilised to provide accurately formed and aligned hinge mountings which nevertheless do not compromise the three point mounting of the covers 16. Under load, the pin sleeve members 52 have limited but sufficient resilience to allow all of the load to be transmitted through the cover and frame mountings 24, 26. A further advantage is that nylon is inherently low friction, reducing the effort required to move the covers 16.

[0055] The combination of the locks 28 and the hinge mountings 22 of the invention together provide significant advantages in reducing the time taken to open the covers, in reducing the health and safety risks and in ensuring that these benefits will be maintained over a long and arduous service life of many years.

[0056] Figs 10 and 11 show other embodiments of the

invention, many features of which are similar to those already described in relation to the embodiment of Figs 1 to 9. Therefore, for the sake of brevity, the following embodiments will only be described in so far as they differ from the embodiment already described. Where features are the same or similar, the same reference numerals have been used and the features will not be described again.

[0057] Fig. 10 shows part of a second ground surface access assembly 210, which includes a frame 12, a cover 16 and a lift assist device 94. In one example, the lift assist device 94 could be a spring strut. The lift assist device 94 is mounted at one end to an inside surface of the lower part 62 adjacent the hinge mountings and at the other end to the underside of the cover 16. The lift assist device 94 reduces the force required to open the cover 16.

[0058] Fig. 11 shows a third ground surface access assembly 310, in which, although the frame is the same size as the frame shown in Figs. 1 to 9, the assembly 310 includes only two covers 316 rather than four. This considerably reduces the manufacturing cost and complexity of the assembly 310 relative to the first assembly 10. This has been found to be possible because of the benefits of the use of the locks 28 and/or the hinge mountings 22 of the invention described above which make opening and closing of the covers easier, and/or the use of the lift assist devices 94 of the second embodiment shown in Fig 10.

[0059] Various other modifications could be made without departing from the scope of the invention. The assembly, the covers and the frame and the features thereof could be of any suitable size, shape and number, and could be formed of any suitable material. The frame could support any suitable number of covers. For example, the frame could define a substantially triangular opening in which only one cover is locatable, or a substantially square opening in which one pair of covers is locatable. In other examples, the frame could define an elongate rectangular opening in which three or more pairs of covers are locatable.

[0060] The other features of the assemblies, such as reinforcement arrangements, prising arrangements, etc could be of any suitable designs.

[0061] Any of the features or steps of any of the embodiments shown or described could be combined in any suitable way, within the scope of the overall disclosure of this document.

[0062] There is thus provided a ground surface access assembly which automatically locks when the cover is opened, providing confidence to operating personnel and increasing speed and safety. The ground surface access assembly includes accurately aligned hinge mountings which include non-corroding, low friction fittings which are somewhat resiliently deformable, which facilitate the opening and closing of the covers and ensure that three point non-rock mounting is achieved under load.

Claims

1. A ground surface access assembly (10, 210, 310), **characterised in that** the assembly includes a cover (16), a frame (12) defining an opening (14) in which the cover is receivable and a hinge mounting (22) for mounting the cover to the frame in or over the opening, the frame including a wall member (18) which extends around the opening.
2. An assembly according to claim 1, in which the frame includes three frame mountings (24), the cover includes three cover mountings (26), and the assembly is arranged so that, in an in use under load closed condition, each of the three cover mountings locates on a different one of the frame mountings to provide the cover with a three point non-rock mounting.
3. An assembly according to claims 1 or 2, in which the cover is movable between an open and a closed condition and includes a lock (28), for retaining the cover in the open condition.
4. An assembly according to claim 3, in which the lock is moveable between a free condition and a captive condition, and is arranged so that, as the cover is moved to the open condition, the lock automatically moves to the captive condition, in which the lock prevents the cover moving from the open condition.
5. An assembly according to claim 4, in which to move the cover from the open condition to the closed condition, the lock must be moved manually by a user from the captive condition to the free condition.
6. An assembly according to claims 4 or 5, in which the lock includes a latch member (60), a pivot mounting (30) for mounting the latch member to an underside in use of the cover, the pivot mounting is arranged to permit the latch member to move pivotally relatively to the cover and in the free condition, the latch member can move under gravity.
7. An assembly according to claim 6, in which the assembly defines a latch retaining pocket (32), in which, in the captive condition, the latch member is received.
8. An assembly according to any of the preceding claims, in which the frame includes a substantially planar surface flange (20) which extends outwardly from an in use upper part (66) of the wall member.
9. An assembly according to claim 8 when dependent on claim 7, in which the latch retaining pocket is defined by the surface flange, a first retaining projection (34) projecting upwardly from the surface flange and a second retaining projection (36) projecting from
- the cover.
10. An assembly according to any of the preceding claims, in which the hinge mounting defines a hinge passage (40), which is substantially circular in section, and extends substantially along a straight line, and is defined by parts of the frame and parts of the cover, the hinge mounting including a hinge pin assembly (44), which in an assembled condition locates in the hinge passage, and locates in both at least one part of the passage defined by the frame and at least one part of the passage defined by the cover.
11. An assembly according to claim 10, in which the hinge pin assembly includes a pin member (50) and a pin sleeve member (52), the pin sleeve member defines a longitudinal passage (54) in which the pin member locates in the assembled condition, so that in the assembled condition, the pin sleeve member (or parts thereof) is located between the pin member and the frame and the pin member and the cover.
12. An assembly according to claim 11, in which the pin sleeve member is formed of a substantially non-corrodable material, which is resiliently deformable, which may be a plastics material such as nylon.
13. An assembly according to claims 11 or 12, in which the pin member is formed of a substantially non or low corrodable material, such as stainless steel.
14. An assembly according to claim 1, in which the assembly includes a plurality of spaced hinge mountings for the cover, the hinge passages of the hinge mountings for the cover being substantially aligned, wherein each passage may be formed by drilling and the parts of the hinge passage in the frame parts and the cover parts may be formed in the same drilling operation.
15. A method of mounting a cover to a frame of a ground surface access assembly, the method including providing a ground surface access assembly, the assembly including a cover, a frame defining an opening in which the cover is receivable and a hinge mounting for mounting the cover to the frame in or over the opening, the frame including a wall member which extends around the opening, wherein the assembly may include any of the features defined in any of claims 1 to 14.

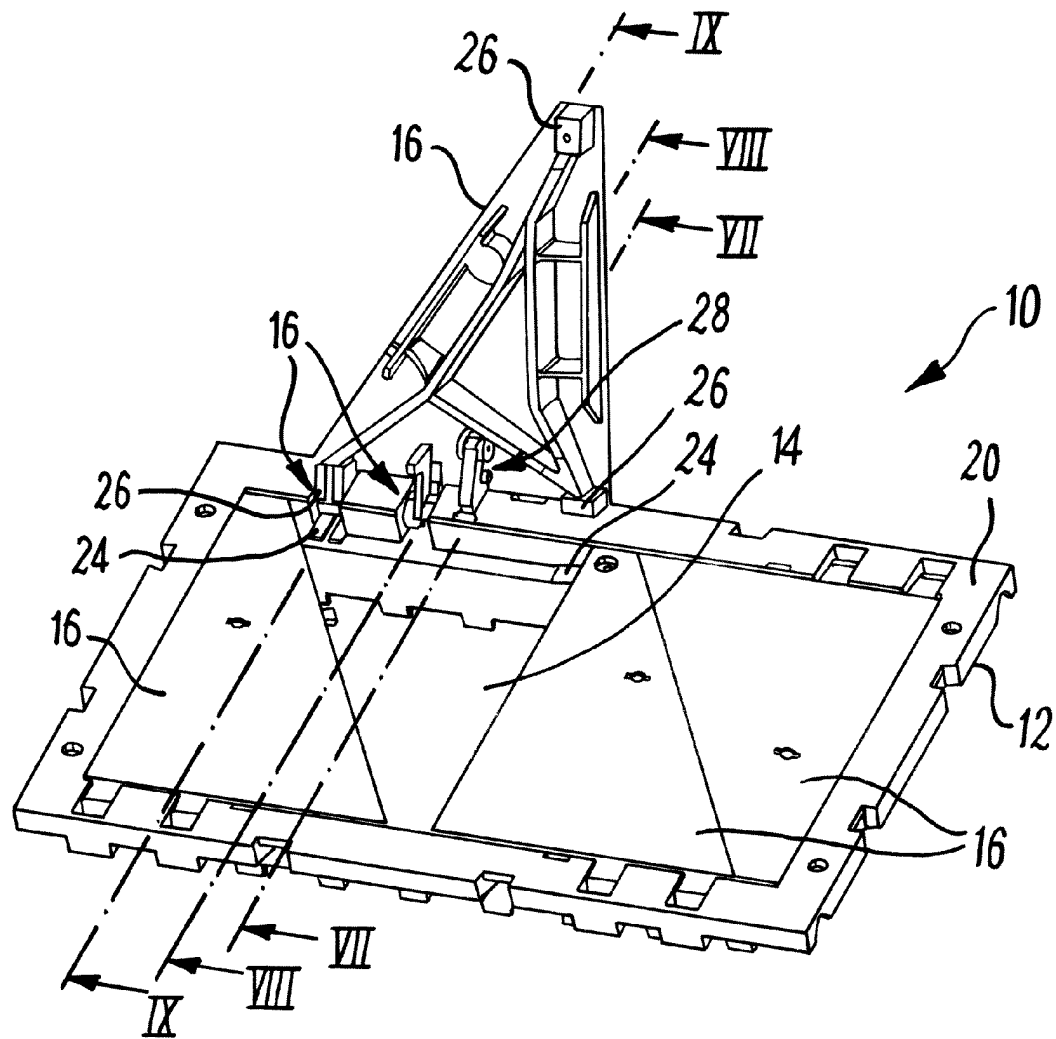


Fig. 1

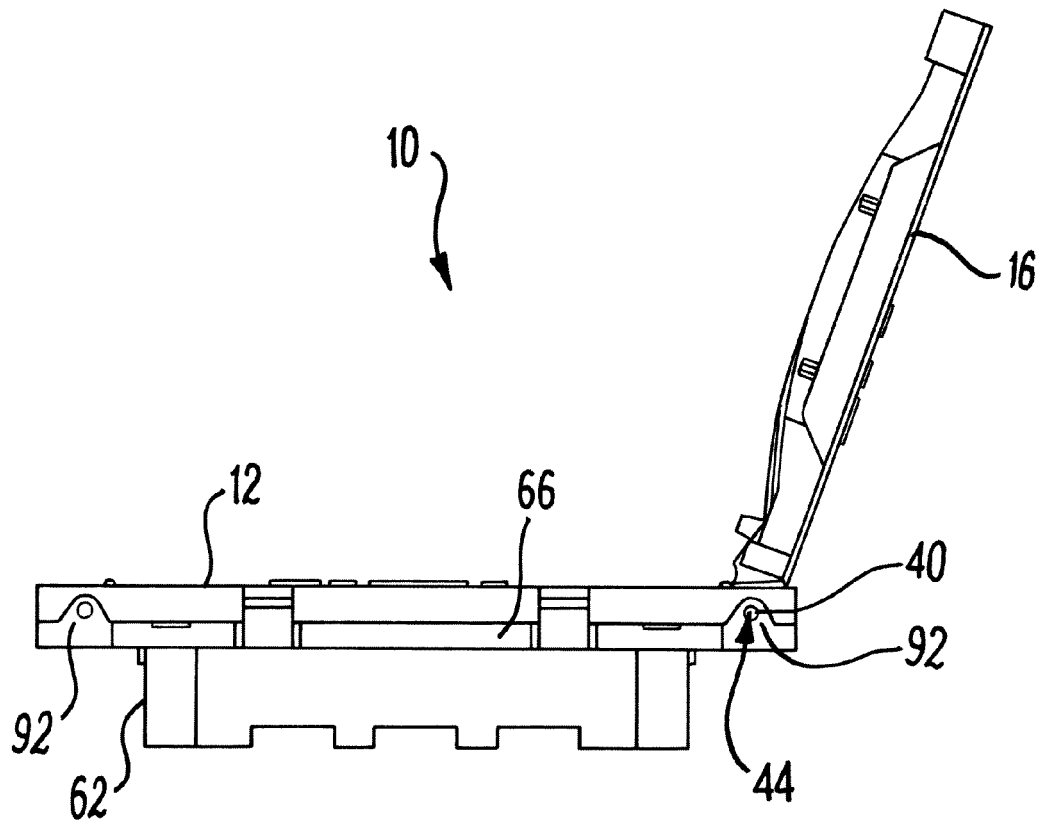


Fig. 2

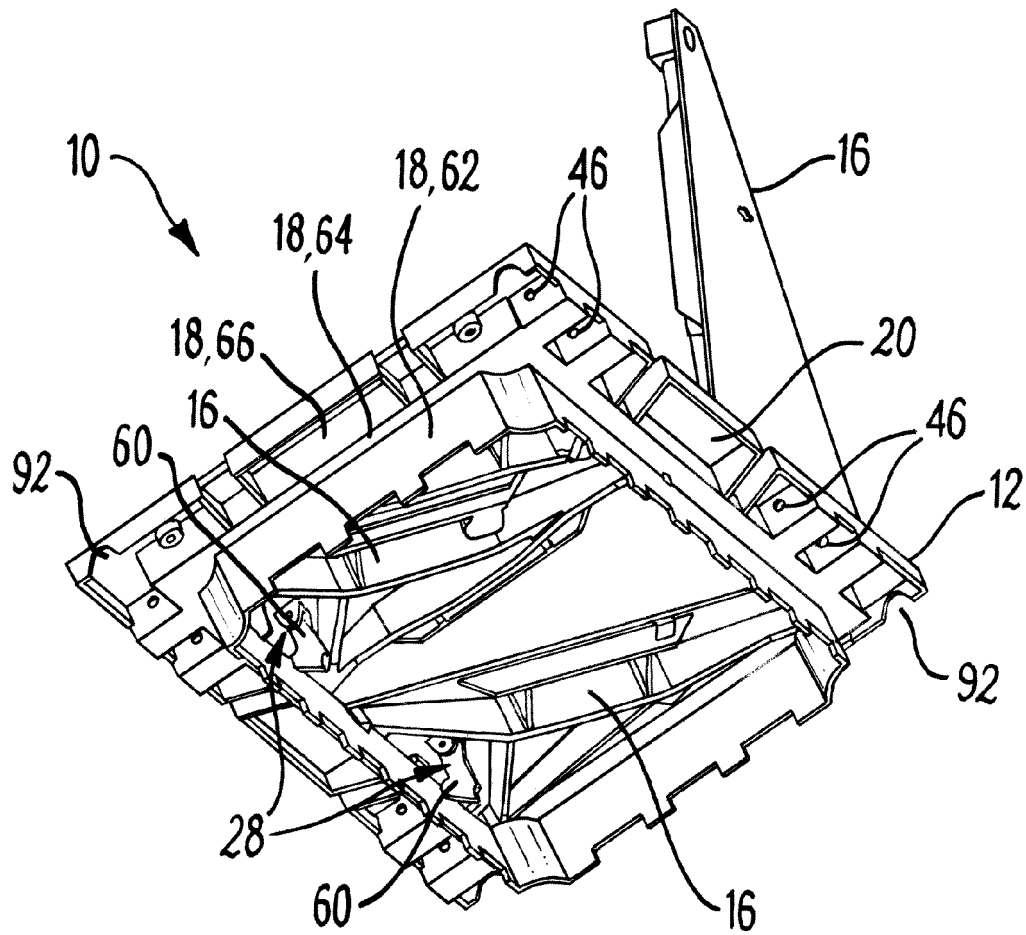


Fig. 3

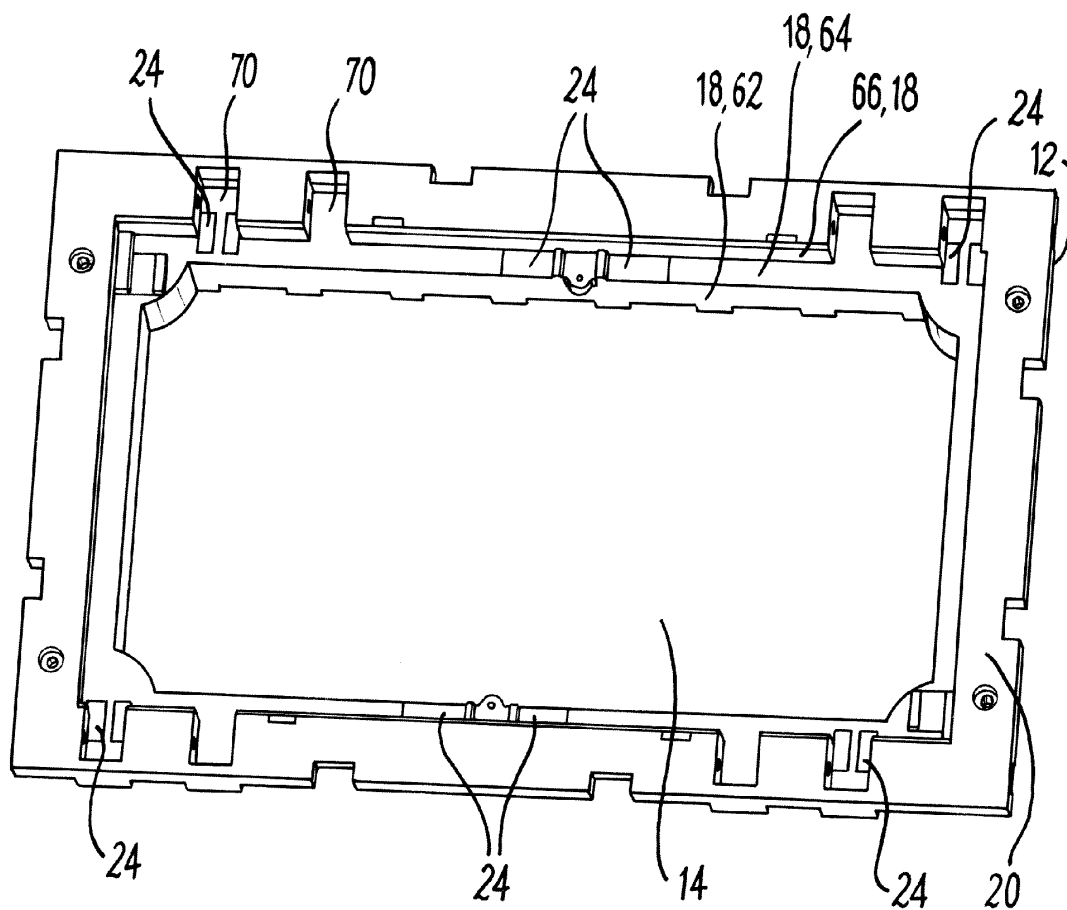


Fig. 4

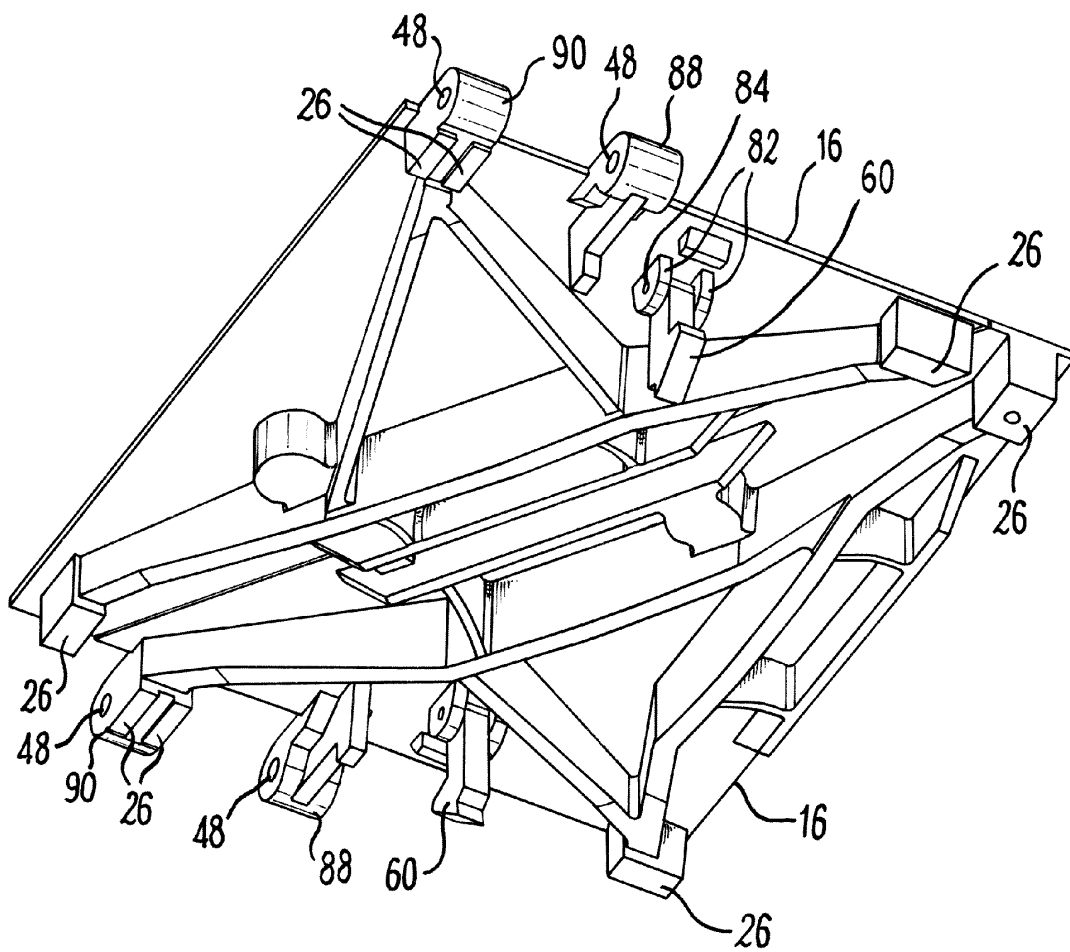


Fig. 5

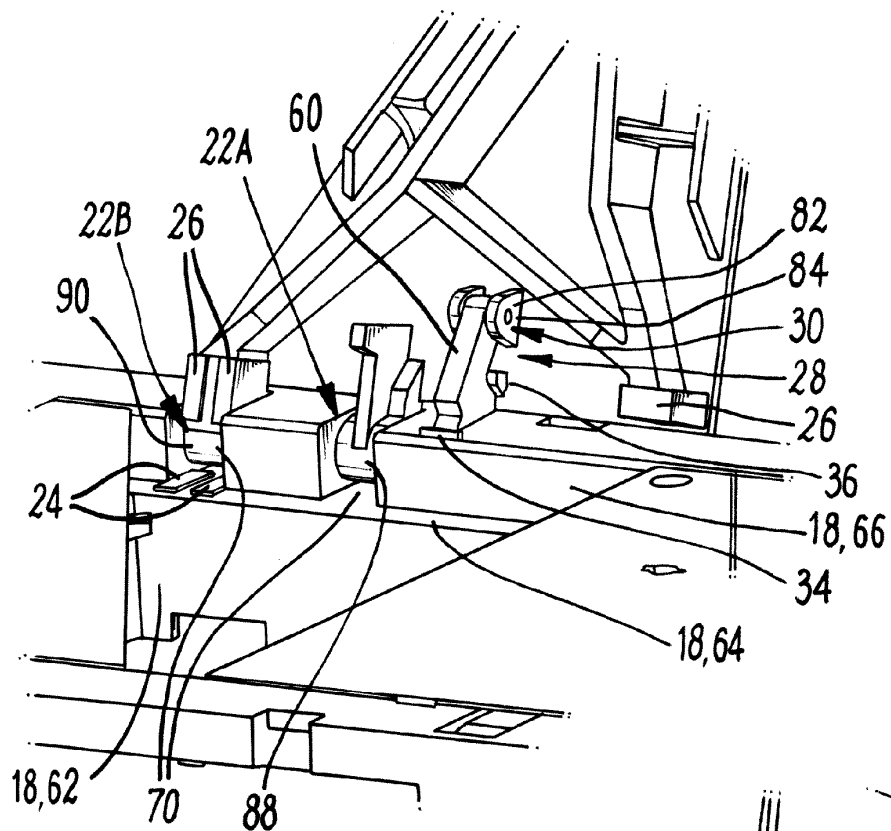


Fig. 6

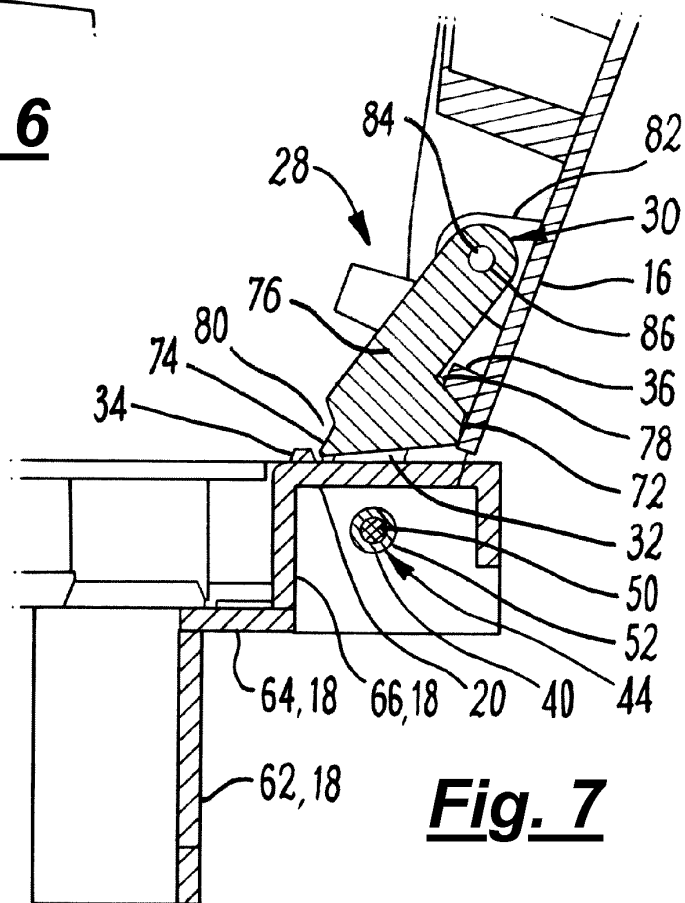


Fig. 7

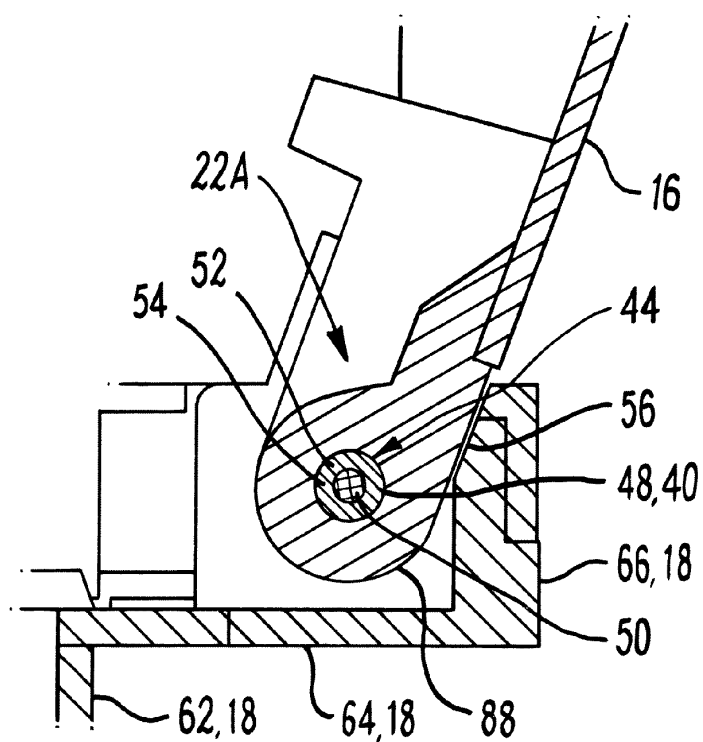


Fig. 8

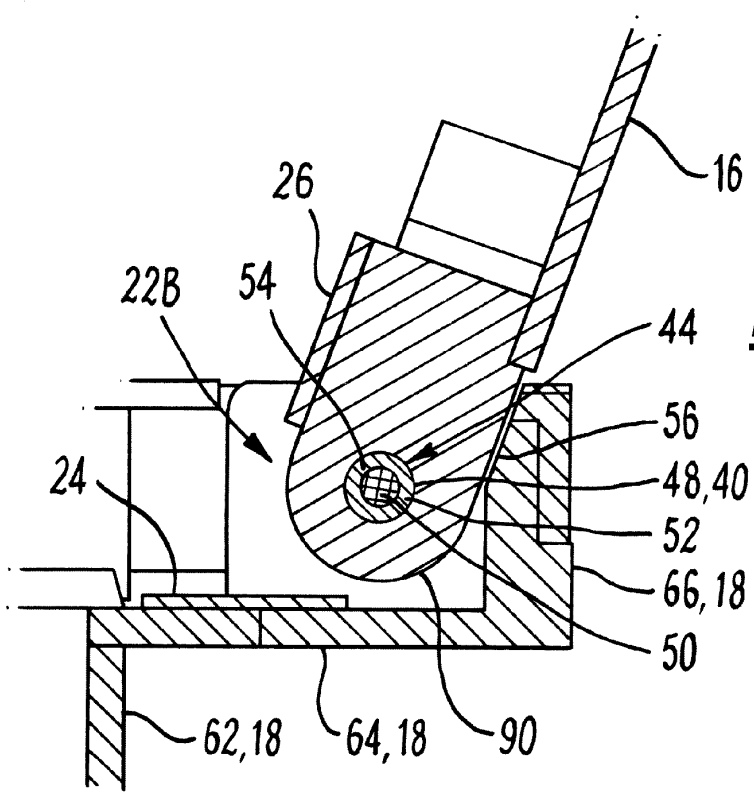


Fig. 9

