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(56) Documents Cited
GB 2235872 A GB 1368039 A US 5035014 A

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(54) ALTERNATING PRESSURE PAD COVER AND CONNECTOR

(57) A cover for the inflatable cells forming a mattress or a cushion has a top cover sheet 1 and a depending side flap portion 8, the inflatable cells 6 being attached to the flap portion by attachment means 3,5, and the top cover sheet having a portion 8 which masks the attachment means. A quick release connector for an inflatable mattress is also disclosed and comprises releasably engageable male and female 61 connector parts, the female part having a socket and the male part including a projection to be received in the socket. A handle 68 linked to a cam 70, is pivotally mounted on the outside of the male part adjacent to an end wall 63 on connector 61 so that pivotal movement of the handle biases the cam part against the end 63 and effects separation of the connector parts.

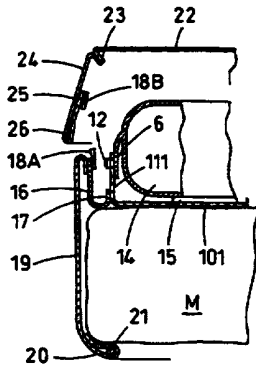
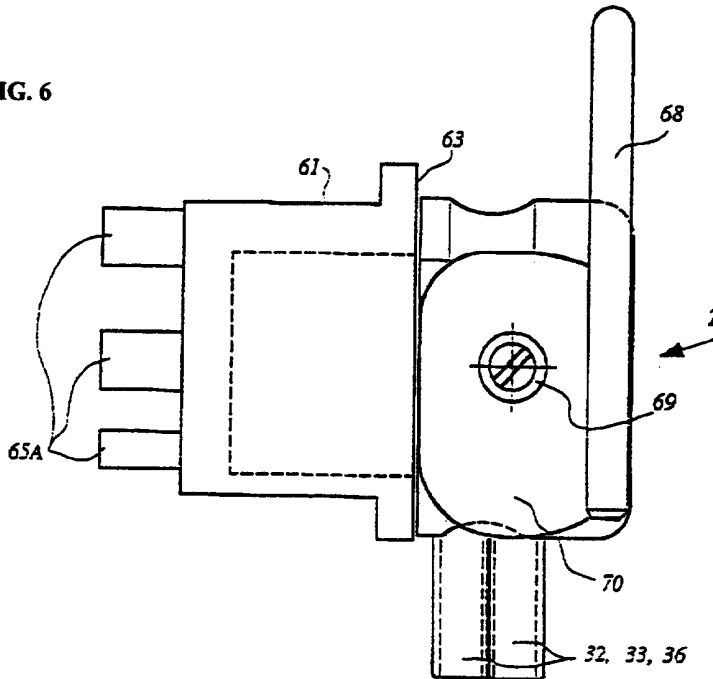


Fig. 3

FIG. 6



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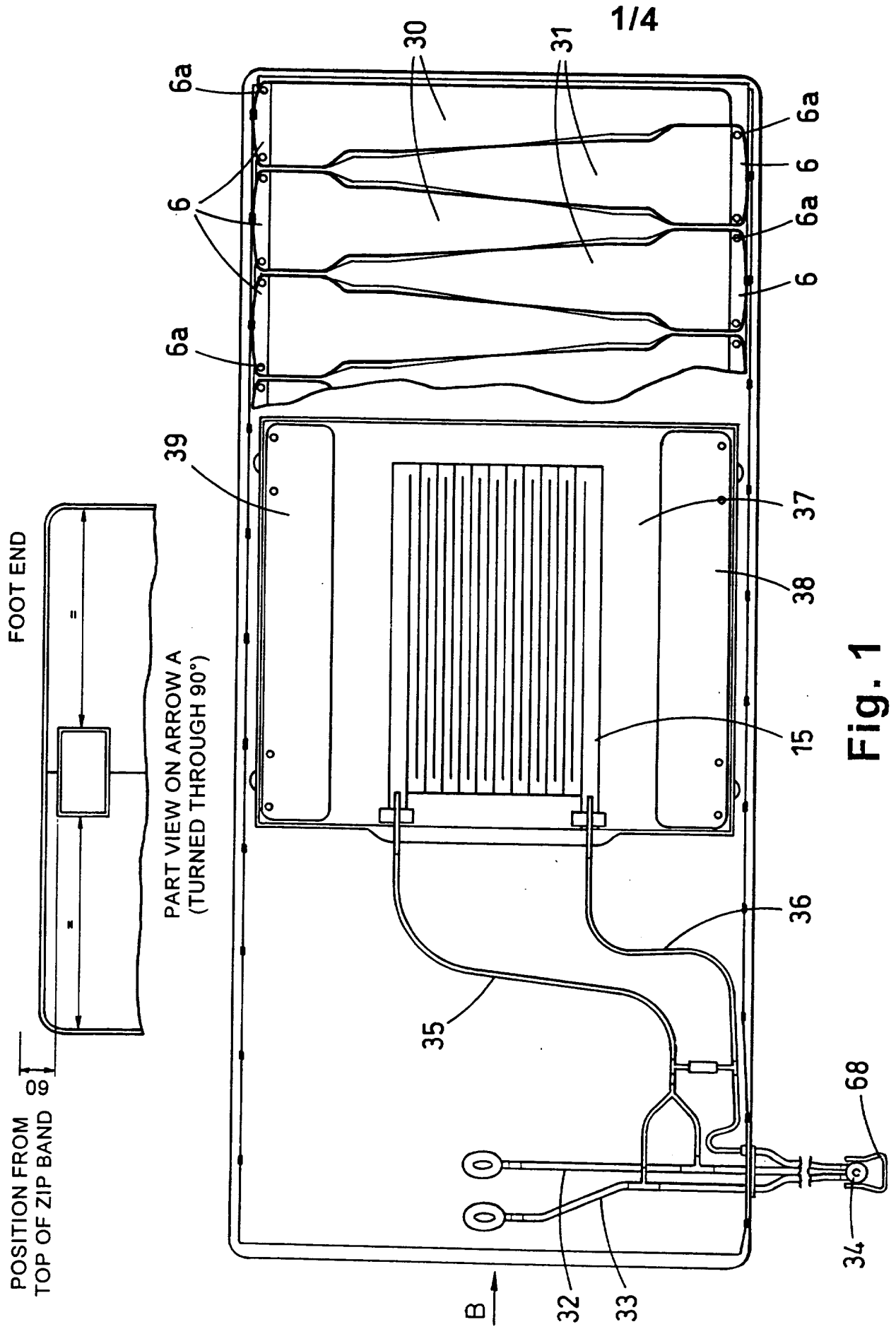


Fig. 1

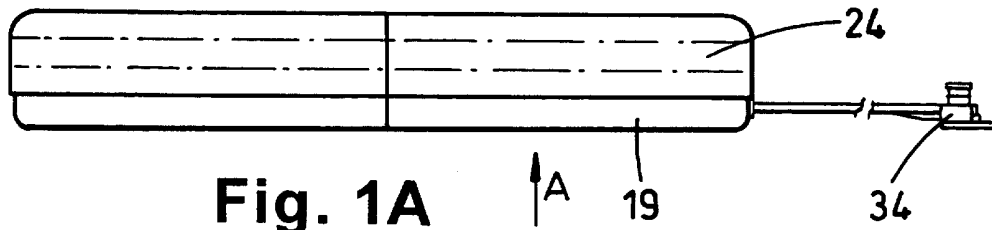


Fig. 1A

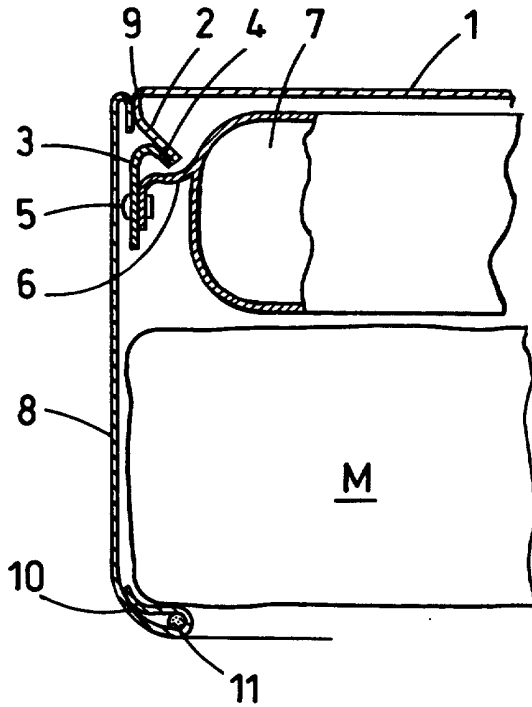


Fig. 2

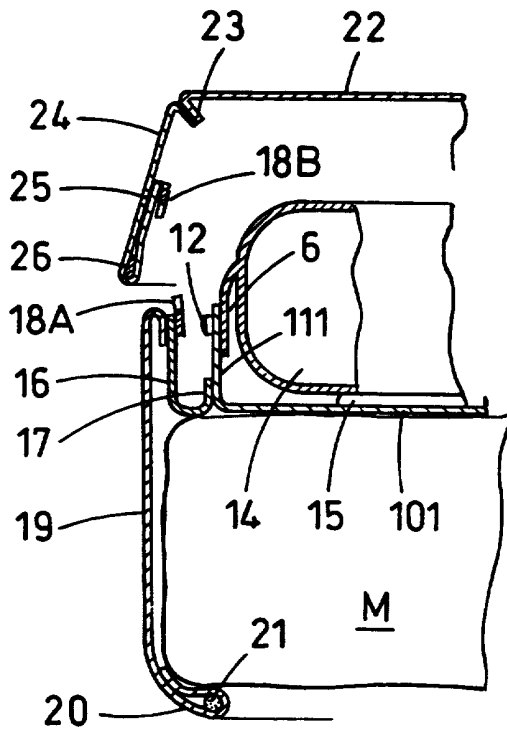


Fig. 3

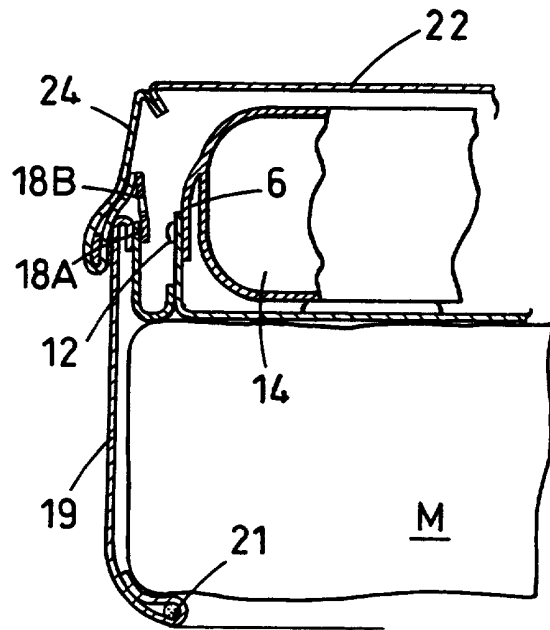


Fig. 4

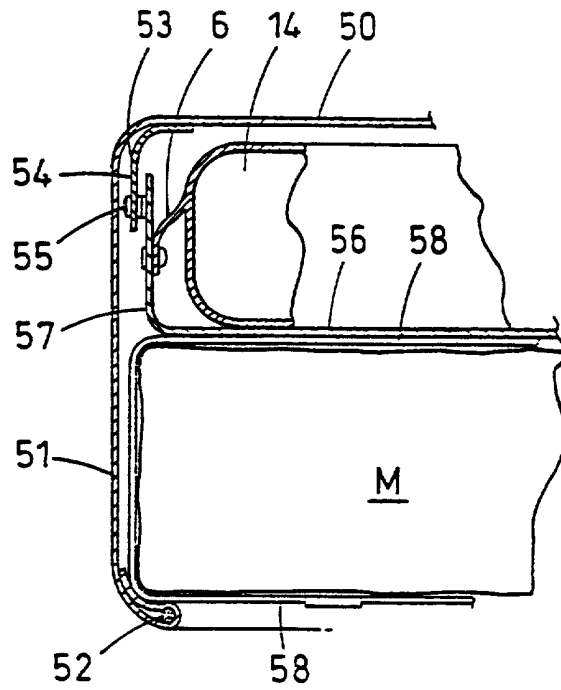


Fig. 5

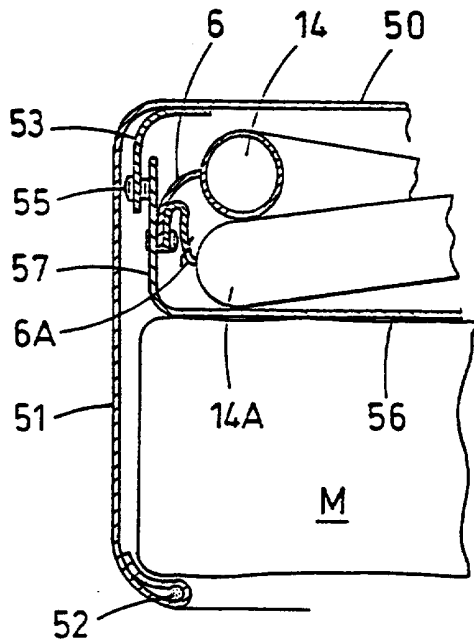


Fig. 5A

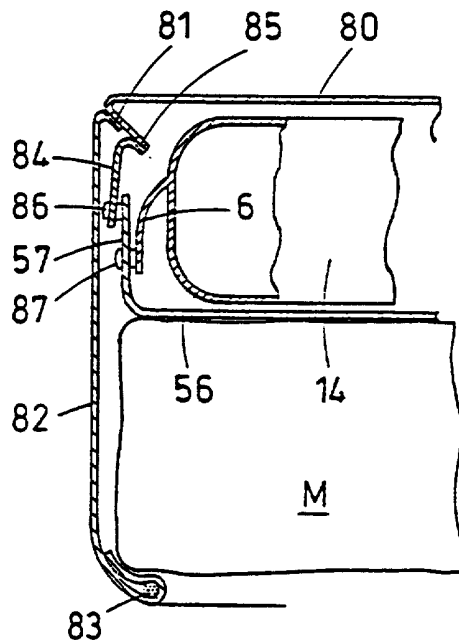


Fig. 5B

FIG. 6

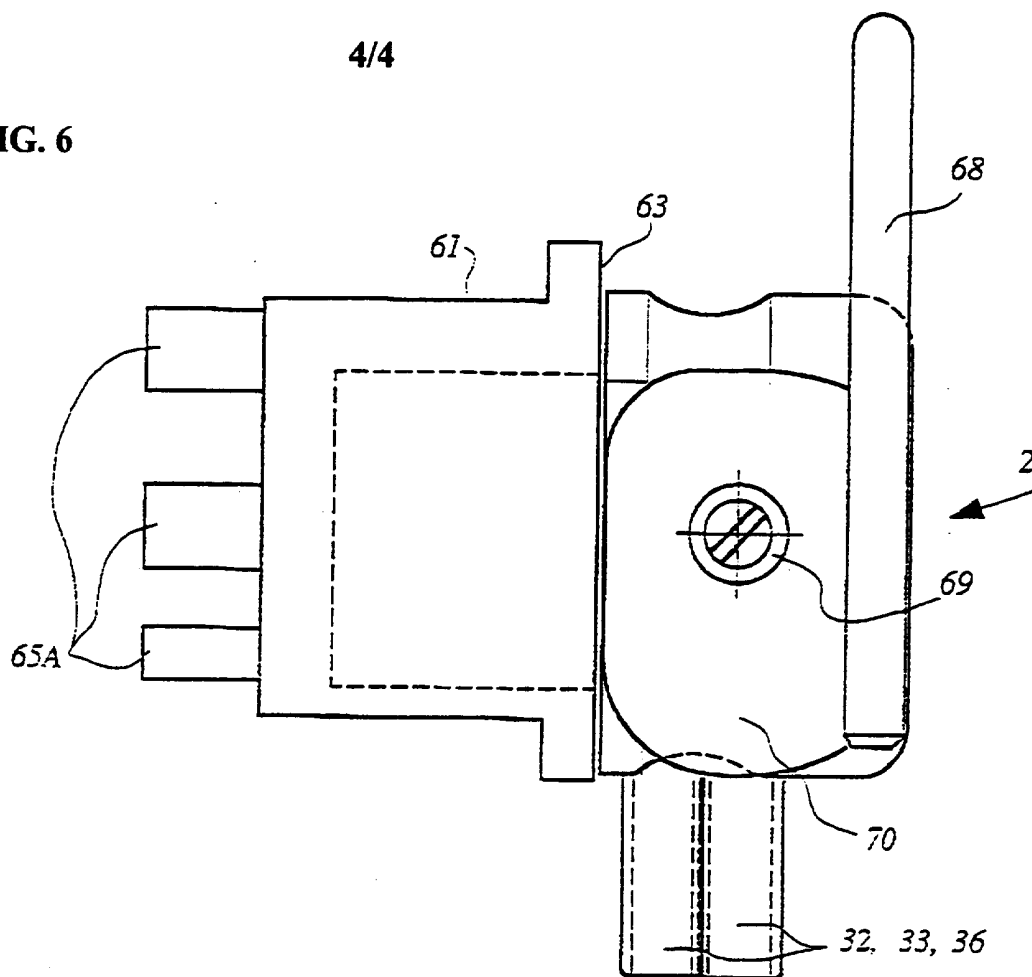
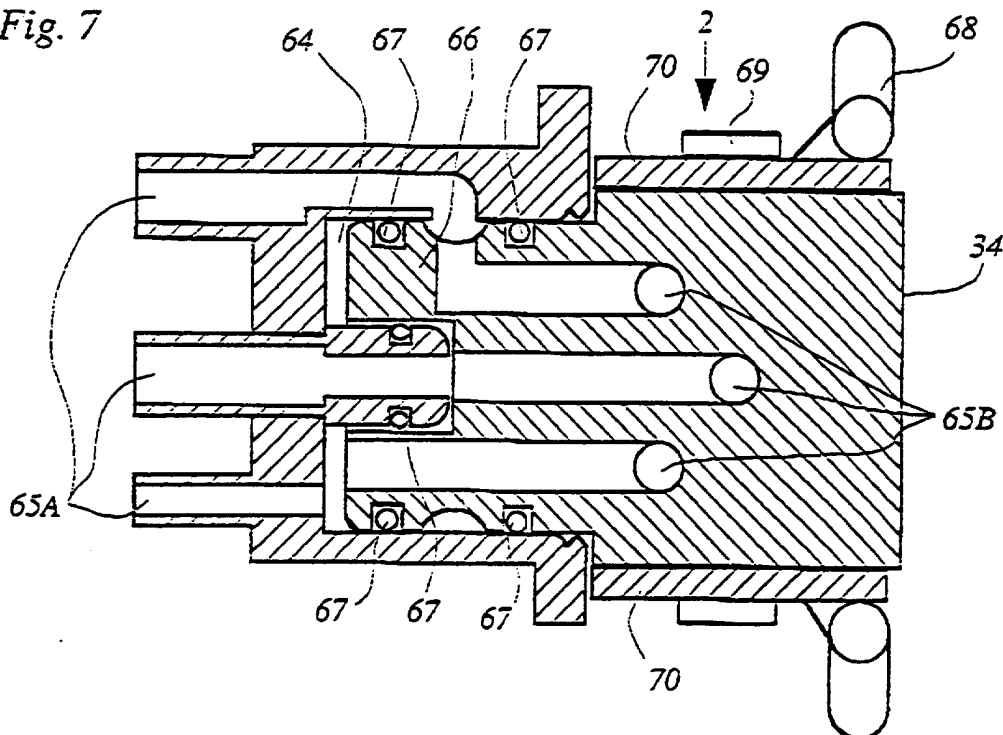


Fig. 7



ALTERNATING PRESSURE PAD COVER & CONNECTOR

The invention relates to an alternating pressure pad for use by patients and others prone to bed sores and the like and also to a quick release connector for connecting an inflatable mattress or pressure pad to an air pump.

An alternating pressure pad comprises sets of cells inflatable by air pressure; means to pump pressurised air alternately to each set of cells via respective air supply lines; and means to exhaust air from the cells. Each set comprises a main line from which extend branch lines. The cells are housed in a plastics cover, having ports for the air supply and exhaust lines, and the like. Usually, the cells are formed of sheets of welded plastics, and have flaps on their sides adjacent the edges of the pad. The flaps are connected by buttons or poppers to the cover. This leaves an unattractive row of buttons along the side of the cover and is generally unsightly and inconvenient.

It is one object of this invention to provide a cover for a pad which provides a neater external appearance and which also has fewer external crevices into which dirt and dust can lodge.

According to the invention in one aspect there is provided an alternating pressure pad system comprising inflatable cells in a cover open at its lower end by which the cover is held on the mattress, the cells being connected to the cover by an inner substantially vertical wall.

The invention may take various forms. Where the cover is to be fitted over an existing mattress or other supporting base on which the cells are to lie, the top cover sheet may include a depending side wall having an elasticated lower end portion to be

tucked under the mattress. In another embodiment, the pad includes a base as its own floor on to which the cells are placed and a pressure sensor is fixed and a skirt is connected to the base, and the skirt and the side wall of the cover are releasably connectable, e.g. by a zip. It is a much preferred feature of the invention that the set of cells be constructed and arranged so that the cell system is relatively rigid or self-supporting.

The cells may take any form, e.g. generally rectangular or cylindrical. Preferably, they extend transversely of the underlying mattress or support surface and have longitudinal feed and exhaust headers. In a preferred construction, the cells are interdigitated as described in US Patent No. 5,396,671, the contents of which are specifically incorporated herein by reference.

The alternating pressure support system preferably includes a pressure sensor pad which is arranged to underlie the cells and is integrated into the system.

In order that the invention may be well understood, it will now be described by way of example only with reference to the accompanying drawings, in which:

Figure 1 is a plan view of one embodiment of a cover for an alternating pressure support pad, partly broken away to show the interior construction;

Figure 1A is a view in the direction of the arrow B in Figure 1;

Figure 2 is a partial vertical section through one embodiment of a cover in which an alternating pressure pad is supported on a mattress;

Figure 3 is a partial vertical section through a second embodiment of a cover in an open condition;

Figure 4 is a view as in Figure 3 showing the closed condition;

Figure 5 is a partial vertical section through a third embodiment of a cover;

Figure 5A is a view of a cover similar to Figure 5;

Figure 5B is a view of a modification of the cover shown in Figure 5;

Figure 6 is a side view of an assembled quick release connector; and

Figure 7 is a sectional view of the assembled connector shown in Figure 6, but with the plug connector rotated through 90°.

Referring to Figure 1, the pressure pad comprises a series of interdigitated inflatable cells 30,31 which can be inflated from a pump unit (not shown) as described in the above US Patent. The cells are fed with air through tubes 32,33 from a connector 34. To enable the cells to be deflated quickly connector 34 is rapidly releasable from the pump unit, e.g. for the purpose of applying CPR (cardiac pulmonary resuscitation) to the patient in an emergency. Details of the connector are described below in relation to Figures 6 and 7. Branch lines 35 and 36 circulate air through a pressure sensor pad 15 which is constructed as described in our copending PCT Application No. GB96/02895. Sensor pad 15 includes a non-inflated mat portion 37 having end strips 38,39 for removably securing the pad, e.g. by press studs or 'Velcro' strips, in a taut, flat condition across a mattress or other support for the alternating pressure pad. The cells are provided at their ends with flaps 6 for attaching the cells to a component of the cover, e.g. by press studs 6a.

The cover shown in Figure 2 comprises a top cover sheet 1 of rectangular form, dimensioned to overlay a mattress M. The sheet is made of stretchable material,

typically a waterproof plastics. The edge portions 2 of the sheet 1 are turned in, as shown. A short longitudinal wall 3 is welded to the free end 4 of the sheet so that it hangs down below the top sheet. The wall 3 is made of a non-stretch material. The wall 3 has a stud 5 releasably connected to the flap 6 of an inflatable multicell set 7, not shown in detail.

A plastics web is welded to the outer shoulder 9 of the sheet 1 to form a depending side wall 8. The free end of the wall 8 is turned in and sewn at 10 to the inside surface and elastic cord 11 inserted into the slot thereby formed. The cover of Figure 1 may be applied onto a mattress with the elasticated edges tucked underneath, the cells 7 resting on the surface of the mattress. In this way, the cover lies securely on the mattress, and the attachment means 5 are not visible. The rigidity of the cells helps to hold the cover in place.

The embodiment of Figures 3 and 4 is similar to that of Figure 2 but includes a preformed rigid or non-stretch base 101 arranged to lie on a mattress M. The base 101 has upright side walls 111, near the free end of which are fasteners 12, such as press studs. The flap 6 of the set of cells 14 is connected to the fasteners, with the cells lying on the base 101 with a pressure sensor mat 15 in between. A shorter plastics side wall 16 is welded at its lower end to the lower corner of the outside 17 of the wall 11. A zip or other releasable connector half 18A extends above the wall 16 from the inside. A skirt wall 19 is sewn or welded to the outside of the side wall 17. The skirt 19 is looped back on itself at its lower end to form a loop 20 to incorporate elastic cord 21. A top cover sheet comprises a sheet 22 having an in-turned longer

side portion 23. A side wall 24 is welded to the outer edge 23 of the sheet 22. The lower part of the wall 24 is looped back on itself and welded to the inside of the wall at 25 to form a slot to contain reinforcement 26. A complementary zip or other releasable connector part 18B is secured to the inside of the wall at 25, to engage the lower zip part 18A. The cover may be used in the manner shown in Figure 2, except that the base 101 lies on the bed mattress instead of the cells. The top cover sheet may be detached using the zip connection for cleaning and like purposes. The joint 18A-18B and the attachment means 12 are concealed by the top wall 24 and the skirt, so that the connection of the cells to the cover and the parts of the cover are concealed. The whole has an attractive layered appearance which is illustrated in Figure 1A.

Figure 5 illustrates another embodiment in which a top cover sheet member 50 extends downwardly to provide an uninterrupted surface at the sides 51 of the cover. An elasticated cord 52 is sewn into the lower edge of the top cover member and secures the system on a supporting mattress M. Inside the top cover 50 in the region of its junction with the downwardly depending portion 51, a strip 53 is welded or sewn to the inside of the top cover. Strip 53 has a downwardly depending portion 54 which carries a series of press studs 55. The inflatable cells fill the space between mattress M and the top cover 50 and a base sheet 56 is arranged to extend between the cells 14 and the mattress M. Base sheet 56 has an upstanding strip 57 which is secured to strip 54 by press studs 55.

The cover sheet 50 and strip 53 (and the corresponding components in Figures 2 to 4) are conveniently formed from a heat, radio frequency (RF) or ultra-sound weldable plastics sheet material, e.g. a polyurethane material. The base sheet may also be a polyurethane material but is preferably a non-stretchable material having non-slip surfaces. The base sheet may be fixed firmly to the mattress or other support surface by straps 58, attached to the base sheet and passing around the mattress. The mattress M may be of conventional design, e.g. a foam mattress. Preferably, a waterproof cover is used to envelope the mattress to prevent any extraneous liquids of body fluids from entering and contaminating the mattress.

Figure 5B shows a modification of the embodiment of Figure 5A. In Figure 5B, the top cover sheet 80 is welded at 81 to a skirt portion 82 which has a lower edge turned up and welded or sewn to include an elasticated cord 83. A strip of sheet material 84 is also welded to the top cover sheet 80 at 84. At its lowermost edge wall 84 is releasably attached by studs or other attachment means 86 to a base sheet 56. Base sheet 56 has an upstanding wall portion 57, which has a releasable connection means 84 to a flap 6 attached to an inflatable cell 14 contained within the cover.

It will be appreciated that the drawings are diagrammatic and that, for example, the inflatable cells will fill the space between the top cover and the mattress M or base sheet in the various embodiments of the invention. The space within the cover may contain overlying cells or tubes. This is illustrated in Figure 5A which shows two inflatable tube-like cells 14 and 14a supported on a base sheet 56 and each having

attachment flaps 6 and 6a for attaching the cells to the upstanding wall portion 57 of the base sheet. The remaining structure of the cover is as shown in Figure 5.

Another problem which arises in inflatable mattresses is to provide a means for quickly deflating the cells so that resuscitation procedures can be performed, e.g. in the case of the patient suffering cardiac arrest.

The invention therefore includes a connector and, in particular, a two-part quick release connector, for use in an alternating pressure pad system of the type used to prevent or alleviate bed sores in patients, or indeed in any inflatable mattress system.

According to the invention in a further aspect there is provided a quick release connector comprising releasably engageable female and male connector parts, the female part having a socket terminating in an end wall bounding the entrance to the socket, the male part including a projection to be received in the socket, a handle including a cam part the handle being pivotably mounted on the outside of the male part adjacent the end wall when the parts are engaged, the handle being arranged so that pivotal movement of the handle biases the cam part against the end wall to overcome the engagement of the projection in the socket and permit separation of the connector parts.

Preferably, the male part includes a plug portion arranged to be received in the socket as a snap fit engagement.

Preferably the parts are arranged so that they may be rotated relative to the other through 360°.

Preferably, the connectors are arranged to connect a plurality of air or power supply lines, say three or more.

In order that the details of the connector may be well understood reference will be made to Figures 1, 6 and 7 of the accompanying diagrammatic drawings.

A quick release connector is preferably provided at the pump unit which is the source of inflation air for the cells. In Figure 1, one half (the male half) of the connector is shown. Referring to Figures 6 and 7, the connector includes a female member 61 fitted into the wall of a pump unit (not shown) and a male or plug member 34 connected to the external air lines mattress. Both members are conveniently moulded or machined from a rigid plastics. The female member includes a vertical outside wall 63 from which extends sideways a socket 64 having ports 65A connected to the air and/or electricity lines. The socket 64 is eccentrically located with respect to the outside diameter of the female member 61. The male member 34 has passageways 65B to align with the parts of the female member, and having a forward projection or plug part 66 arranged to be received in the socket as a snap fit. O-ring seals 67 are present for this purpose, but other means may be used.

A handle 68 is pivotably mounted on pins 69 on the outside of the member 34. The handle has a basal cam portion 70 arranged to abut the vertical wall when the parts 61 & 34 are interchanged. The passageways 65A, 65B are connected as shown. To release the parts 61 & 34 the handle 69 is grasped and pulled away from the socket part 61 and downward until the cam portion 70 acts on the wall 63 to act as a fulcrum to urge the parts apart when the male part is pulled away. The device is simple to

operate, even in an emergency, e.g. cardiac arrest, yet provides a secure airtight connection when required.

A mattress cover of the invention has the advantages that it is easy to fit in position prior to use; it can be made of showerproof material and be easy to clean; the fasteners are concealed; and where the system incorporates a sensor it may be fitted crease free so that overpressure situations are avoided. The cover may be made of a variety of materials.

CLAIMS:-

1. Alternating pressure pad system which comprises at least two sets of inflatable cells contained within a cover, the cover having a top cover sheet and a depending side flap portion, the inflatable cells being attached to said flap portion by attachment means either directly or via an upstanding wall portion of a base sheet, the top cover sheet having a portion which masks said attachment means.
2. Alternating pressure pad system which comprises at least two sets of inflatable cells contained within a cover, the cover including a top cover sheet having a downwardly depending peripheral strip which has attachment means for releasable attachment of the inflatable cells, and wherein said top cover sheet also has a downwardly depending skirt for masking the attachment means and securing the cover to an underlying support surface.
3. Alternating pressure pad system which comprises at least two sets of inflatable cells contained within a cover, the cover having a top cover sheet having a downwardly depending flap portion and a base sheet which underlies the mattress, said base sheet having an upstanding wall portion which has attachment means for attaching the cells thereto and said upstanding wall portion carries fastening means for fastening the base sheet to the top cover so that when the upstanding wall is fastened to the top cover, said attachment means are masked.
4. A system as claimed in claim 3 wherein said upstanding wall portion is fastened directly to a flap portion attached to the top cover sheet.

5. A system as claimed in claim 4 wherein said top cover sheet includes a downward extension portion which masks the fastening means and secures the cover to an underlying support surface on which the base sheet rests.

6. A system as claimed in claim 3 wherein said upstanding wall is attached to a first component of the fastening means, the other component of the fastening means being attached to said downwardly depending flap portion of the top cover sheet.

7. A system as claimed in claim 6 wherein said first component of the fastening means is attached to a downwardly depending skirt for securing the cover to an underlying supporting surface.

8. A system as claimed in claim 2 or 7 wherein the skirt has an elasticated lower edge for gripping side panels or the underside of an underlying mattress.

9. A system as claimed in claim 3 wherein the fastening means comprises a zip or other quick release fastening means.

10. A system as claimed in any of the preceding claims wherein said flap portion or said upstanding wall portion are made from substantially non-stretchable fabric.

11. A quick release connector for an air supply to an inflatable mattress which comprises releasably engageable male and female connector parts, the female part having a socket terminating in an end wall bounding the entrance to the socket; the male part including a projection to be received in the socket, a handle linked to a cam, the handle being pivotably mounted on the outside of the male part adjacent to

the end wall when the parts are engaged, the handle being arranged so that pivotal movement of the handle biases the cam part against the end wall of the projection in the socket and permits separation of the connector parts.

12. A connector according to claim 11 wherein said female part is located in the wall of a pump housing and said end wall comprises a portion of the wall of said housing.



Application No: GB 9626289.4
Claims searched: 1-10

Examiner: John Graham
Date of search: 11 March 1997

**Patents Act 1977
Search Report under Section 17**

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): A4M

Int Cl (Ed.6): A47C. A47G. A61G.

Other: ONLINE DATABASE:WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2235872 A (SLUMBERLAND) whole document	1-3
A	US 5035014 (SSI) whole document	1-3

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.



Application No: GB 9626289.4
Claims searched: 11, 12

Examiner: Roger Binding
Date of search: 25 June 1997

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Further Search Report under Section 17**

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK Cl (Ed.O): F2G (G4A, G4F, G4J, G4K, G4Z, G9A, G9Z)
Int Cl (Ed.6): F16L 37/00, 37/02, 37/04, 37/08, 37/22
Other: Online WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 1368039 A (FIRMA CARL KURT WALTHER), see page 2, lines 79 to 112.	11

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.
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