Oct. 13, 1953 DE MERLE E. ECKART ET AL 2,654,898

MATTRESS WITH REINFORCED OPENING

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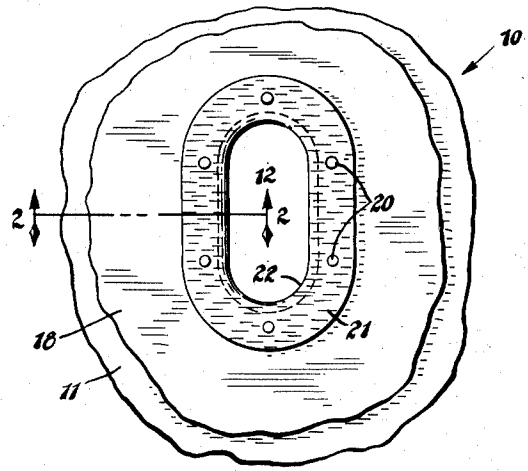


Fig. 1.

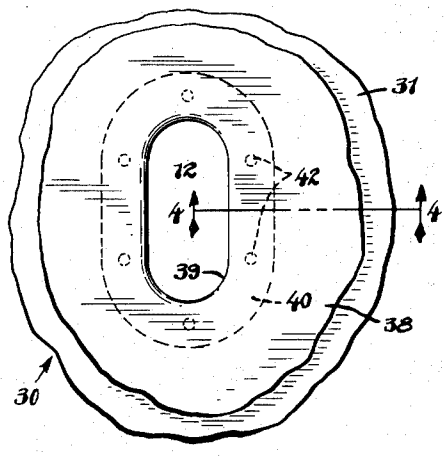


Fig. 3.

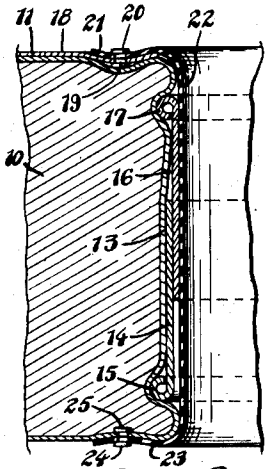


Fig. 2.

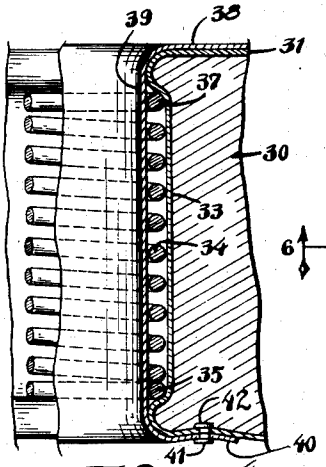


Fig. 4.

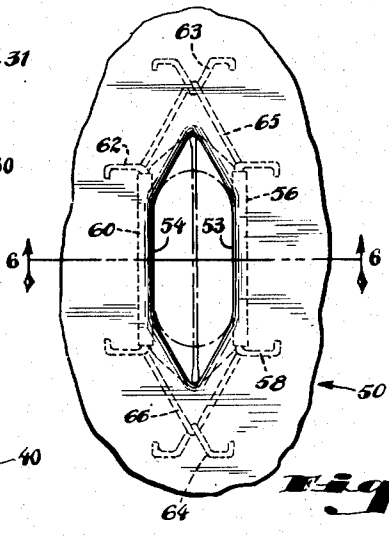


Fig. 5.

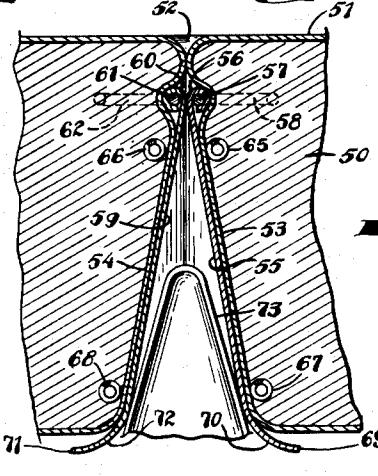


Fig. 6.

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Fig. 7.

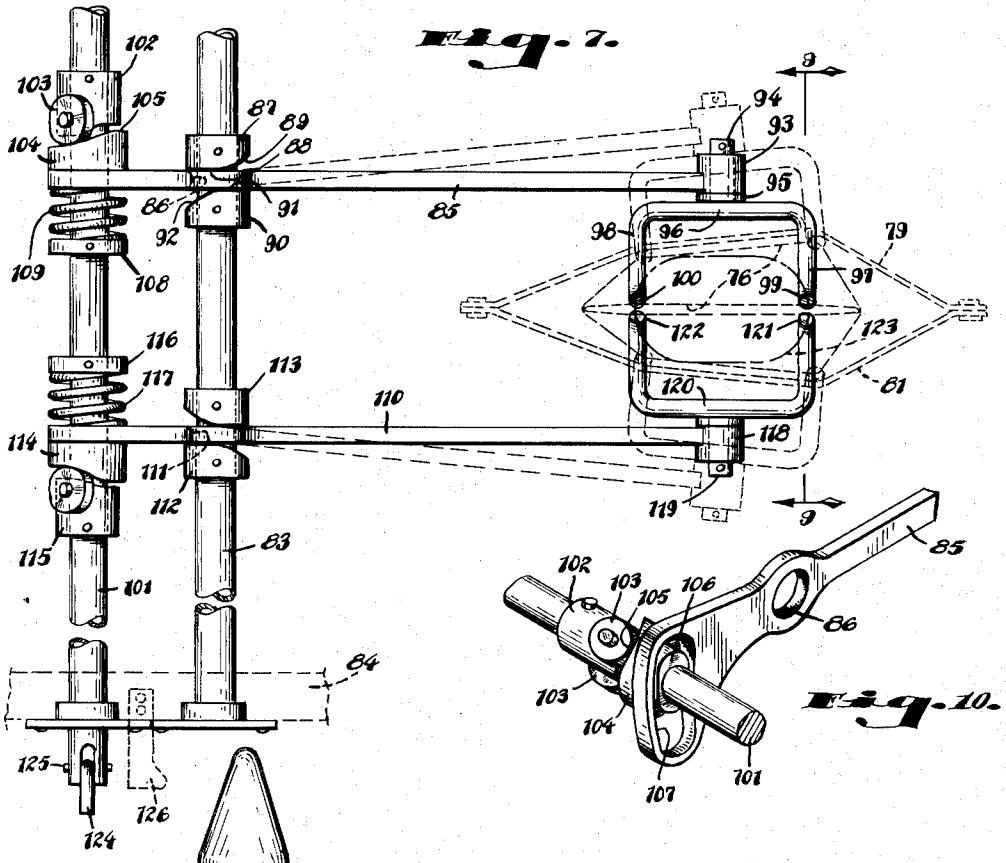


Fig. 10.

Fig. 9.

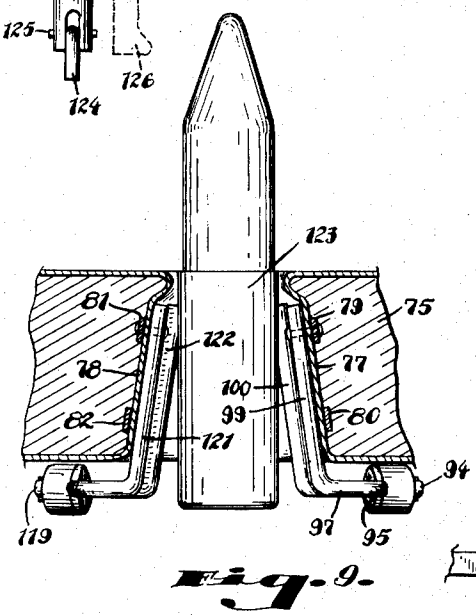
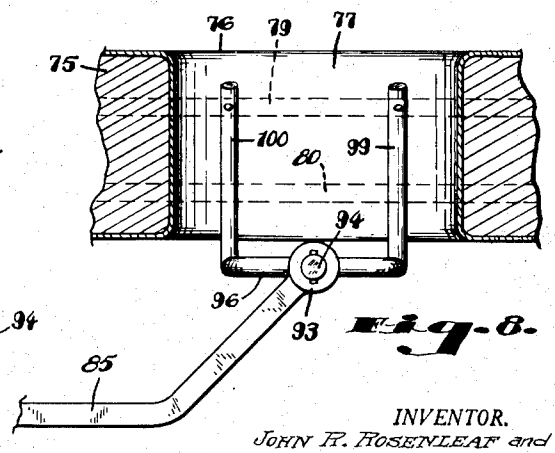


Fig. 8.



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MATTRESS WITH REINFORCED OPENING

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Application November 26, 1948, Serial No. 62,115

2 Claims. (Cl. 5—91)

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The present invention relates to mattress structure, and is particularly concerned with the provision of a mattress for an invalid's bed, provided with an opening therethrough for the accommodation and movement therethrough of a bed pan, for instance, of the character disclosed in our co-pending application Serial Number 62,112, filed November 26, 1948, for Bed Pan Device. We are here concerned with the details of various forms of mattress openings and guards therefor, the primary object of the present invention being to provide structure of such character as to accommodate a bed pan which will normally be supported beneath the bed and which is projectible into a position for convenient use by an occupant of the bed. Ancillary objects of the invention consist in the provision of means for reinforcing the walls of such an opening, means for protecting the interior of such an opening against contamination, means providing for normal resiliency of the mattress in the region of such an opening, means for holding such an opening normally closed, but permitting expansion thereof when the bed pan is to be projected, and detailed structure for controlling the expansion and contraction of such an opening. Further objects of the invention will appear as the description proceeds.

To the accomplishment of the above and related objects, our invention may be embodied in the forms illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that change may be made in the specific constructions illustrated and described, so long as the scope of the appended claims is not violated.

Fig. 1 is a fragmentary plan view of a mattress constructed in accordance with our invention and provided with one form of means for accomplishing the above-described functions;

Fig. 2 is a fragmental vertical section taken substantially on the line 2—2 of Fig. 1;

Fig. 3 is a view similar to Fig. 1 and showing a modified form of structure;

Fig. 4 is a fragmental section taken substantially on the line 4—4 of Fig. 3;

Fig. 5 is a plan view of a further form of mattress opening including means for normally holding the opening in closed condition;

Fig. 6 is a vertical section taken substantially on the line 6—6 of Fig. 5;

Fig. 7 is a fragmentary plan view of a mechanical device for expanding a mattress opening generally of the character of that illustrated in Fig. 5;

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Fig. 8 is an enlarged fragmental longitudinal sectional view of the structure illustrated in Fig 7;

Fig. 9 is a similarly enlarged fragmental transverse sectional view taken substantially on the line 9—9 of Fig. 7; and

Fig. 10 is an enlarged fragmental perspective view of a detail of the operating mechanism of Fig. 7.

Referring more particularly to the drawings, it will be seen that, in Figs. 1 and 2, we have illustrated a fragment of a mattress indicated generally by the reference numeral 10 and including the usual cover or ticking 11, said mattress being formed with an opening 12 therethrough extending between the upper and lower surfaces thereof. The ticking 11 is formed to provide an integral or integrated tubular sleeve 13 which defines the walls of the opening 12.

A substantially rigid tubular element 14 which may preferably be formed of sheet metal or like material, is provided at its lower end with an outturned bead 15, and is received within the opening 12 with its bead disposed near the lower mouth of said opening. The element 14 is so proportioned with respect to the opening 12 that its bead 15 will radially distort the walls of the tubular ticking sleeve 13, whereby said element will be held, by the resilience of the mattress stuffing, against substantial axial movement within the opening 12. The upper end of the element 14 will extend somewhat beyond the horizontal median plane of the mattress, as shown.

A second tubular element 16 proportioned and designed to telescope snugly within the open upper end of the element 14, is likewise provided with a bead 17 near its upper end, the dimensions of the element 16 being such that it, too, will distort the walls of the sleeve 13 and will be held against substantial axial movement relative to the distorted portions of said walls. It will be obvious that, because of the telescopic relation between the elements 14 and 16, the reinforcing means will not substantially affect the capacity of the mattress to respond to forces impressed upon its upper surface, so that the patient on the mattress will experience no discomfort as a result of the provision of the reinforcing means which holds the opening 12 against radial collapse.

In this form of the invention, we have shown the usual bed sheet 18 cut away to provide a hole registrable with the upper mouth of the opening 12; and we prefer to secure to the sheet, at perimetrally spaced points about the hole therein,

a series of elements 19 each comprising one unit of a separable fastener. A corresponding series of elements 20, adapted to mate with the elements 19, is provided about the perimetral end portion 21 of a rubber or rubberized tube 22, whereby said perimetral portion of said tube may be secured to the sheet 18 about the perimeter of the hole therein. The body of the tube 22 projects through the opening 12, and its opposite end 23 is outturned in the manner clearly illustrated in Fig. 2, said end portion 23 carrying a perimetral series of fastener elements 24 adapted to mate with a corresponding series of elements 25 secured to the lower surface of the mattress.

In Figs. 3 and 4, we have shown a modified arrangement similar in functional effect to that illustrated in Figs. 1 and 2. In this form of the invention, the mattress 30 is provided with ticking 31 formed to provide a tubular sleeve 33 defining the walls of the opening 12. Within the opening is disposed a coiled spring 34 whose lower and upper convolutions, 35 and 37, respectively, are disposed in parallel planes normal to the axis of the spring. The diametrical dimension of the spring 34 will preferably somewhat exceed the undistorted corresponding dimension of the sleeve 33 whereby, upon insertion of said spring into the opening, the walls of the sleeve 33 will be outwardly distorted in the manner clearly illustrated in Fig. 4 to inhibit axial movement of the spring 34 relative to the mattress. While a spring formed of wire of round section is illustrated, it will be clear that the spring may equally wll be made from flat stock.

In this form of the invention, we have shown the sheet 38, corresponding to the sheet 18 of Fig. 2, formed with a tube 39 adapted to be projected through the opening 12, the remote end of said tube being outturned as at 40 and provided with a perimetral series of fastening elements 41 adapted to mate with a corresponding series of elements 42 secured to the lower surface of the mattress. Obviously, the sheet 38 may be a rubber sheet of the character customarily used in hospitals, and may be used in cooperation with a textile sheet formed with a mere port therein for registry with the opening 12, the latter sheet being preferably secured in place about the perimeter of the opening 12 in any suitable fashion.

It is believed to be obvious that this form of the invention will likewise contribute to the comfort of the patient.

In Figs. 5 and 6, we have shown a port construction of such character that the lateral walls of the mattress opening will normally be held resiliently in mutual contact, being separable by a force applied to guide plates associated with said walls through a bed pan of suitable construction. The mattress 50 of this form of the invention is provided with an opening 52 guarded by relatively movable portions 53 and 54 of the ticking 51. A guide plate 55 lies in contact with the ticking wall 53, being supported in that position by a rolled bead 56 sleeved upon the body 57 of a C-shaped anchor 58 embedded in the mattress. A similar guide plate 59 bears upon the wall 54, said plate being similarly supported through the medium of a rolled bead 60 sleeved on the body 61 of a corresponding anchor 62.

Other anchors 63 and 64, disposed substantially in the median longitudinal plane between the walls 53 and 54, and beyond the ends of the opening 52, support coiled springs 65 and 66; said springs engaging the walls 53 and 54 near

their upper ends. Similar anchors (not shown) support coiled springs 67 and 68 bearing against the walls 53 and 54 near their lower ends. It will be seen that the tendency of the springs 65, 66, 67 and 68 is to urge the walls 53 and 54 toward each other.

The lower edge of the plate 55 projects beyond the lower surface of the mattress 50 and flares away from the plate 59, as at 69, through a smooth curve 70, as is clearly shown in Fig. 6; and the lower edge of the plate 59 similarly flares away from the plate 55, as at 71, through a smooth curve 72. Thus, when the plates 55 and 59 are in contact with each other, their lower end portions are separated and the portions 70 and 72 thereof present camming surfaces to, for instance, the tapered nose 73 of a bed pan, for instance of the character illustrated in our copending application Serial Number 62,114, filed November 26, 1948, for Bed Pan. Thus, as such nose 73 is urged upwardly, bearing against the surfaces 70 and 72, the plates 55 and 59 will be separated, in the manner illustrated in Fig. 6, and continued upward movement of the bed pan will cause further separation of said plates, against the tendency of the springs 65, 66, 67 and 68, to permit passage of the bed pan entirely through the opening 52. Upon subsequent withdrawal of the bed pan, the plates 55 and 59 will be returned into mutual contact to close the opening 52.

In Figs. 7 to 10, we have shown mechanical separating means, cooperable with a mattress opening resiliently held normally in closed condition. In this form of the invention, the mattress 75 is formed with an opening 76 whose lateral walls 77 and 78 are continuously urged into mutual contact by leaf springs 79 and 80 engaging the wall 77, and 81 and 82 engaging the wall 78. As shown, the remote ends of the springs 79 and 81 are riveted together, and the ends of the springs 80 and 82 will be similarly riveted together, the riveted ends of the spring pairs being suitably anchored in place within the mattress. It will be obvious that the leaf springs may be used in place of the coiled springs in the form of the invention illustrated in Figs. 5 and 6, and that coiled springs may be used in place of leaf springs in the form of the invention illustrated in Figs. 7 to 10.

A bar 83 is transversely supported upon the bed frame 84 upon which the mattress of this form of the invention is carried. A lever 85 is formed, near one end, with an opening 86 adapted to be sleeved upon the bar 83. As is most clearly shown in Figs. 7 and 10, the perimetral walls of the opening 86 are axially curved, the opening being so proportioned that the lever 85 may rock about an axis transverse to the axis of the bar 83, as well as about the axis of the bar 83. A stop block 87 is fixed to the bar adjacent one lateral surface of the lever 85, and a second stop block 90 is fixed to the bar 83 adjacent the other lateral surface of said lever, said blocks 87 and 90 cooperating with said lever to prevent bodily movement thereof axially with respect to the bar 83. Surfaces 88 and 91 on the blocks 87 and 90 normal to the axis of the bar 83 likewise prevent clockwise rocking movement of the lever 85 about an axis transverse to the axis of the bar 83; but oppositely disposed inclined surfaces 89 and 92 on the blocks 87 and 90 permit limited counter-clockwise rocking of said lever about such axis, as viewed in Fig. 7.

At its end remote from the opening 86, the

lever 85 carries a sleeve 93 in which is journalled a pin 94 having a collar 95 which carries a claw whose body 96 extends substantially parallel with the median longitudinal plane of the mattress opening and which carries two arms 97 and 98 projecting substantially into that plane and there carrying upstanding fingers 99 and 100 adapted to be disposed in the mattress opening and in engagement with the wall 77 thereof. Preferably, but not necessarily, the fingers 99 and 100 will be secured to the spring 79 or 80.

A rock shaft 101 is journalled in the frame 84 upon an axis parallel to the axis of the bar 83, and fixedly carries a collar 102 which, in the illustrated embodiment of the invention, carries two diametrically spaced rollers 103. Loosely mounted on the shaft 101 adjacent the collar 102 is a cam element 104 formed with a peripheral cam surface 105 of variable axial height engaged by the rollers 103. Upon its end remote from the cam surface 105, the element 104 carries a non-circular projection 106 engaging in a curved slot 107, concentric with the opening 86, in that end of the lever 85 adjacent said opening 86. It will be seen that this construction permits rocking movement of the lever 85 about the axis of the bar 83, while holding the cam element 104 against oscillation about the axis of the shaft 101. An abutment washer 108 fixed to the shaft 101 supports one end of a spring 109, the other end of which engages the lever 85 to urge said lever and the cam element 104 toward the fixed collar 102, whereby the surface 105 is held resiliently in engagement with the rollers 103.

A similar lever 110 is formed with an opening 111, sleeved on the bar 83 and anchored by the abutment blocks 112 and 113 similar to the blocks 87 and 90. A cam element 114 similar to the element 104 cooperates with a collar 115 similar to the collar 102, the adjacent end of the lever 110 being pressed against said cam element 114 by a spring 117 confined between said lever and a washer 116 similar to the washer 108. At its remote end, the lever 110 carries a sleeve 118 in which is journalled a pin 119 carrying a claw 120 like the claw 96, the fingers 121 and 122 of said claw 120 operatively engaging the wall 78 of the mattress opening.

It will be clear that the springs 79, 80, 81 and 82 and the springs 109 and 117 will normally hold the mattress walls 77 and 78 in mutual engagement to close the mattress opening. If, however, the shaft 101 is rocked in a clockwise direction, as viewed from the bottom of Fig. 7, the rollers on the collars 102 and 115 will ride up the cooperating cam surfaces of the elements 104 and 114 to force said cam elements toward each other against the tendency of the springs 109 and 117, thereby rocking the lever 110 in a clockwise direction and the lever 85 in a counter-clockwise direction to move them into the dotted-line positions of Fig. 7. The claw elements 96 and 120 are thus separated to draw the walls 77 and 78 apart, against the tendency of the leaf springs, to permit passage of a bed pan, for instance of the character illustrated at 123 in Fig. 9, through the

mattress opening. An operating lever 124 is secured to the shaft 101 through a pivot pin 125, and may be engaged with a stop bracket 126 carried by the bed frame 84 after the shaft has been so rocked, to hold the parts in the dotted-line positions of Fig. 7. It will be clear that, since the levers 85 and 110 are rockable about the axis of the bar 83, the claws 96 and 120 will not inhibit vertical resiliency of that portion of the mattress immediately surrounding the opening therethrough.

We claim as our invention:

1. A mattress for an invalid's bed, said mattress being formed with a substantially vertical opening therethrough constructed and arranged for the passage of a bed pan therethrough and having an upper mouth and a lower mouth, tubular, axially collapsible sleeve means defining perimetral walls for said opening, a first substantially rigid tubular element formed adjacent one end with outwardly projecting-perimetrally-arranged flange means, said element being located wholly within said sleeve means and laterally sustaining the latter, with its flange means disposed near the lower mouth of said opening and perimetrally outwardly distorting said sleeve means to anchor said element relative to said sleeve means, and said element projecting upwardly beyond a predetermined plane intermediate the upper and lower surfaces of said mattress, and a second substantially rigid tubular element formed adjacent one end with outwardly-projecting, perimetrally-arranged flange means, said second element being located wholly within said sleeve means and laterally sustaining the latter, with its flange means disposed near the upper mouth of said opening and perimetrally outwardly distorting said sleeve means to anchor said second element relative to said sleeve means, said second element projecting downwardly past said plane and being telescopically engaged with said first tubular element to provide for axial movement of said tubular elements, relative to each other.

2. The mattress of claim 1 including a tube of waterproof, flexible material arranged within said tubular elements, penetrating said opening, and provided at each end with a perimetrally outturned portion, and means for removably anchoring each such out-turned portion against substantial movement relative to one horizontal surface of said mattress.

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