

[54] **BEDCLOTHES ELEVATOR AND BED WARMER**

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[22] Filed: **May 26, 1971**
[21] Appl. No.: **147,112**

[52] U.S. Cl. **5/319**
[51] Int. Cl. **A47c 21/00**
[58] Field of Search **5/317, 319, 347, 320**

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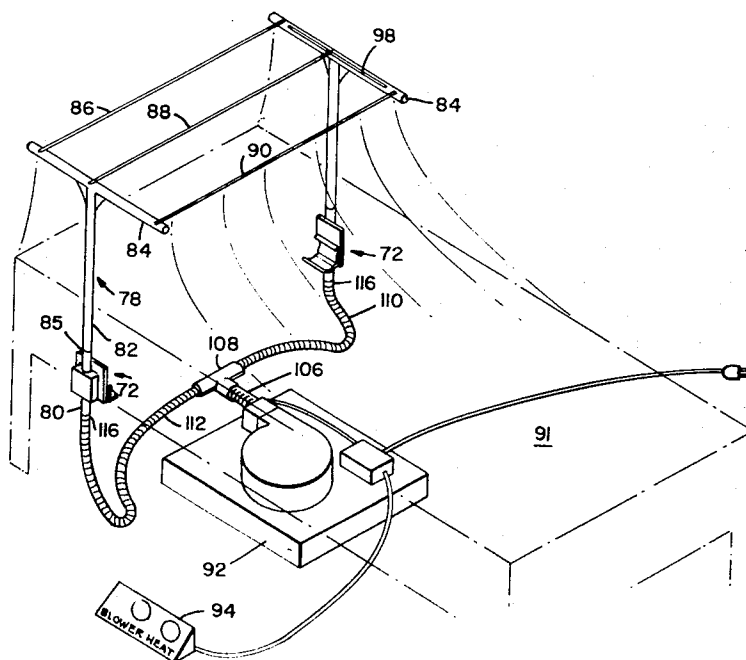
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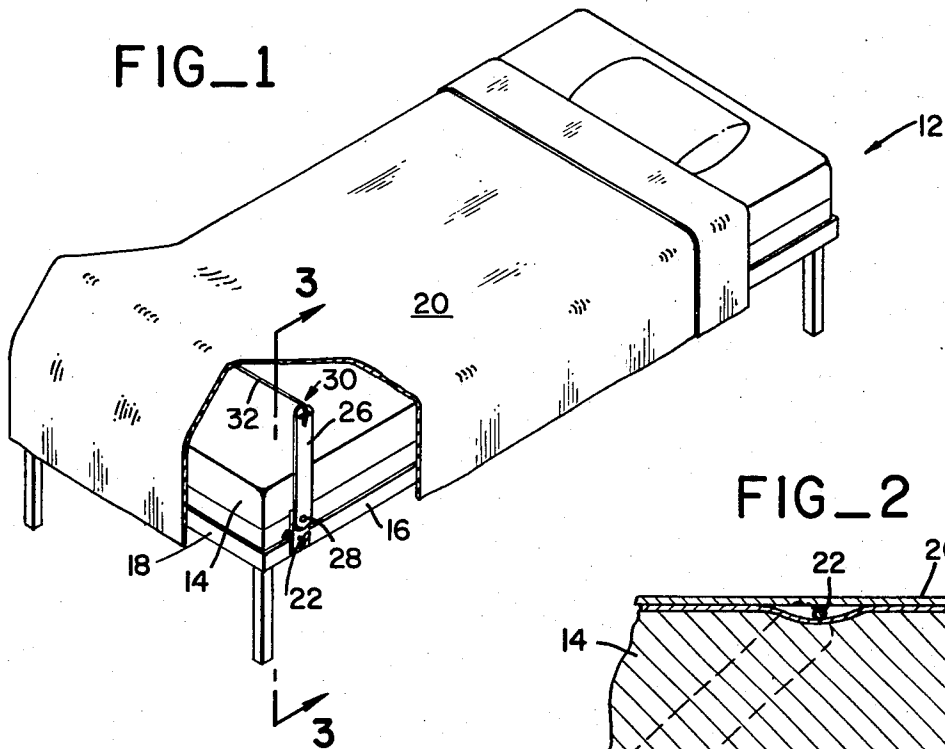
[57] **ABSTRACT**

An apparatus for elevating bedclothes above a bed and for warming the air under the bedclothes. Two hollow, tubular rigid arms are vertically mounted on either side of a bed; one or more flexible, resilient lines span the free ends of the rigid arms to form a structure over which the bedclothes drape. The flexible lines are removable and adjustable. Under the bed is a small air blower with a heating unit. The air blower discharges heated air into the bed through the passages formed in the hollow, tubular rigid arms of the bedclothes elevator.

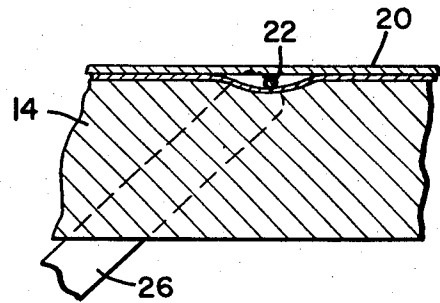
2 Claims, 8 Drawing Figures



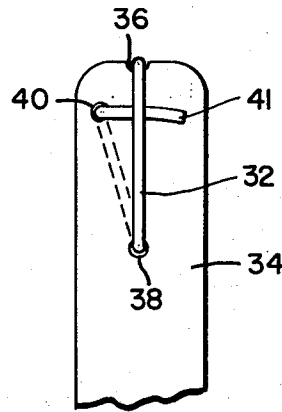
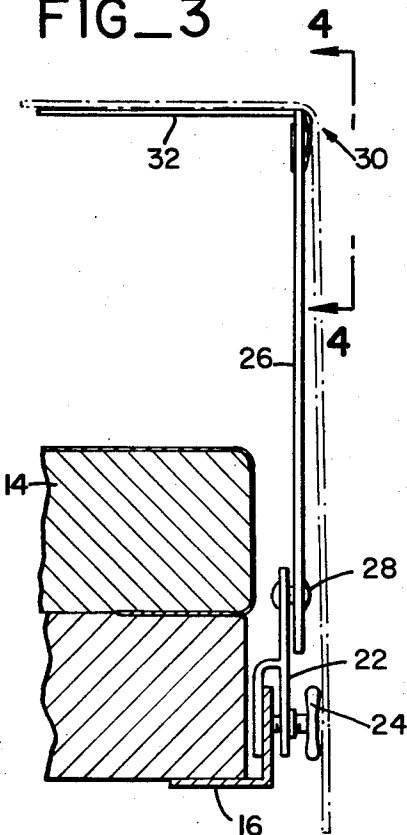
FIG_1



FIG_2

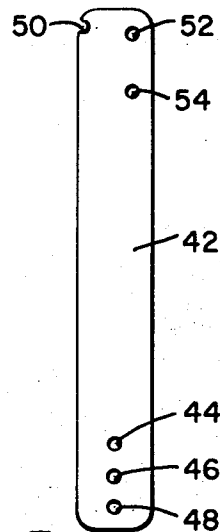


FIG_3



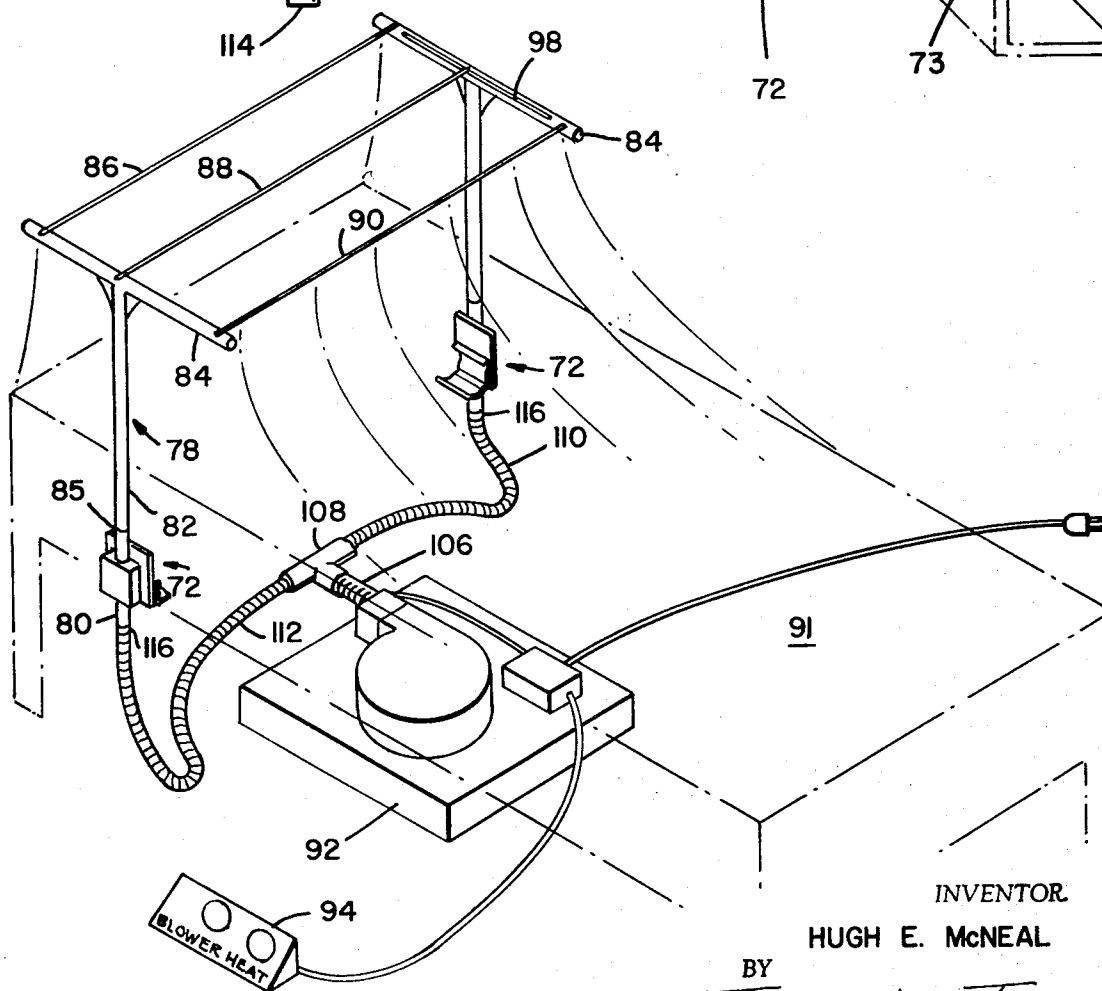
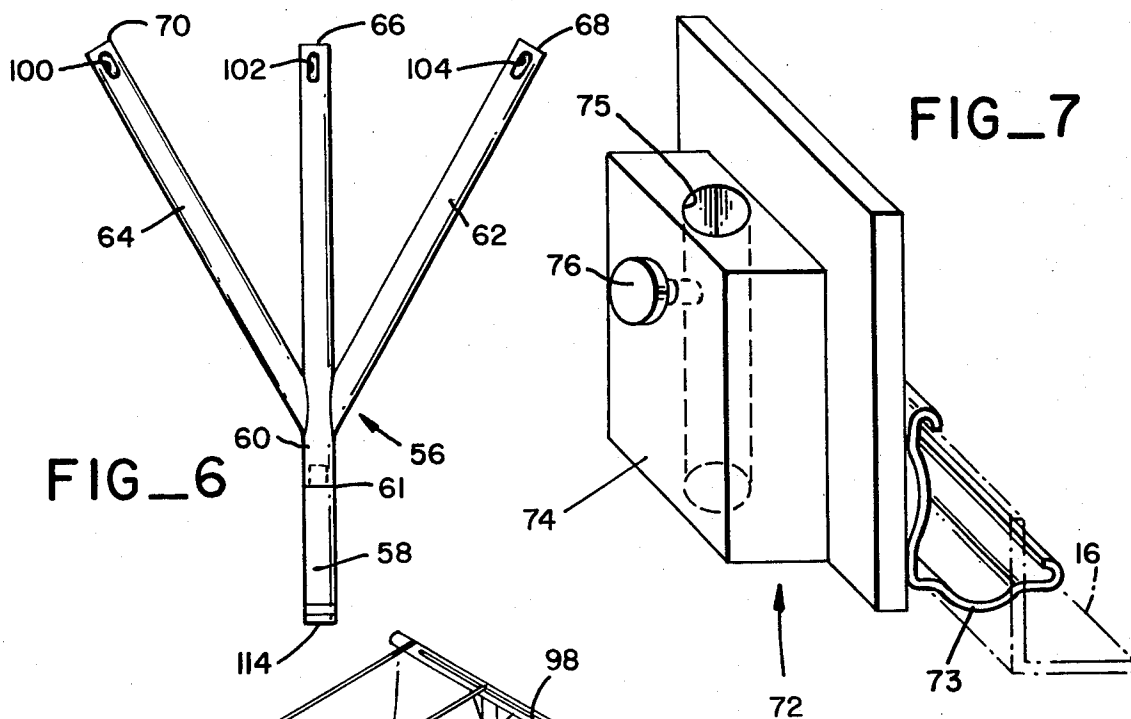
FIG_4

FIG_5



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BEDCLOTHES ELEVATOR AND BED WARMER**FIELD OF THE INVENTION**

This invention relates to appliances for beds and, more particularly, to those devices which support bedclothes above the bed and also to those devices which heat beds.

SUMMARY OF THE INVENTION

The bedclothes elevator and bed warmer is an apparatus for raising the bedclothes above the lower extremities of an occupant of the bed to relieve the occupant from the weight of the bedclothes. In addition, the apparatus provides a source of warm air which convectively heats the volume created underneath the bedclothes by the operation of the bedclothes elevator. The bedclothes elevator consists of a pair of rigid arms mounted vertically on respective sides of the lower end of a bed. Flexible, resilient lines span the free ends of the rigid arms and are removably affixed to the rigid arms. In operation the rigid arms and the flexible lines form a structure over which the bedclothes drape. A small, portable, air blower with a heating unit is placed near by. The air blower draws air from the atmosphere, heats the air by an electric heating unit located in the discharge path of the air blower and delivers the heated air through conduits to the lower ends of the passages formed in the hollow, rigid arms. The heated air travels up through the passages and exhausts into the volume underneath the bedclothes. The air blower has a remote control unit located at the bedside for regulating the air temperature in the bed. The occupant of the bed can thereby control the speed of the air blower and the temperature of the heating unit.

An object of the present invention is to provide a bedclothes elevator structure that does not interfere with the removal or replacement of bedclothes on the bed. The flexible lines which span the rigid arms are easily removable from the rigid arms. In one embodiment the flexible lines are simply untied; in another embodiment the flexible lines are unsnapped. By having removable, flexible lines the present invention does not interfere with the routine change of bedclothes customary to the normal operation of a bed.

Another object of the present invention is to provide a bedclothes elevator that is storable on the bed in a nearly invisible location and that does not interfere with the normal use of the bed. To this end the rigid arms are positionable for storage below the top, horizontal surface of the mattress and the small diameter, flexible lines spanning the rigid arms rest flat on the top surface of the mattress. In one embodiment of the present invention, the rigid arms are pivotally mounted at the sides of the bed so that the rigid arms are rotatable downward to a position along the frame rail of the bed. In another embodiment of the present invention, the rigid arms slide vertically downward to a storage position below the top surface of the mattress. Both embodiments permit the bedclothes to rest on the top surface of the mattress in a flat, smooth plane. There is no hump or mound appearing on the bed after the bed has been made. Also, the occupant can use the bed in the customary manner when the bedclothes elevator is stored thereon because the flexible lines resting on the top surface of the mattress will stretch around the deformation of the mattress made by the occupant.

A further object of the present invention is to provide an easily adjustable conversion of the apparatus between beds of different widths. The invention can be adapted for use on small single beds or large king-size double beds merely by shortening or lengthening the flexible lines.

An additional object of the invention is to apply simultaneous bedclothes elevation for two occupants of different heights. The apparatus permits the rigid arms to be located at respectively, nonsymmetrical positions on the bed. That is to say, for the taller occupant one of the rigid arms can be placed very near the lower end of the bed, and for the shorter occupant the other rigid arm can be placed farther away from that end of the bed. The flexible lines, when traversing the mattress, are then more skewed than perpendicular to the sides of the bed.

Another object of the present invention is to provide a means for the occupant to control the temperature of the bed. An air blower with a heating unit is mounted beneath the bed, and warm air is discharged by the air blower into the bed. The air blower has a remote control unit which is accessible to the occupant of the bed. The control unit enables the occupant to regulate the amount of heat which is exhausted by the air blower into the bed.

A further object is to provide a bedclothes elevator that forms a substantial volume beneath the bedclothes. The embodiment of the present invention having two or more flexible lines creates a structure with a substantial flat surface parallel to and above the mattress. When this embodiment is viewed from the side of the bed, it can be seen that the bedclothes drape over a large, trapezoidal shaped structure rather than a small, triangular structure common to most bedclothes elevators.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a bed with some of the bedclothes cut away to show one embodiment of my invention as installed;

FIG. 2 is a fragmentary side view of the bed showing the mattress and bedclothes in greatly enlarged scale to illustrate the storage position of a rigid arm;

FIG. 3 is an end view of the bed partially in section taken long line 3—3 of FIG. 1 showing a suitable expedient for attaching the apparatus to a bed frame;

FIG. 4 is a side view of one rigid arm taken along line 4—4 of FIG. 3 showing a suitable expedient for adjustably attaching the flexible line to the free end of a rigid arm;

FIG. 5 is a side view of a rigid arm showing various modifications in the location of the attachment points;

FIG. 6 is a side view of one of the rigid arms showing another embodiment;

FIG. 7 is a perspective view of a suitable expedient for attaching a tubular rigid arm to a bed frame; and

FIG. 8 is a perspective view of another embodiment of my invention on a bed showing the installation of the bed warmer.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring more particularly to the drawings, in FIG. 1 reference numeral 12 indicates generally a bed frame

that supports a mattress 14 thereon. The bed frame consists of four frame rails, two of which are longitudinal to the mattress and two of which are transverse to the mattress. In FIG. 1, only two frame rails are shown, longitudinal rail 16 and transverse rail 18. Both the bed frame and the mattress are covered by the bedclothes 20. A clamping block 22 is attached to frame rail 16. The clamping block is removably attached to the frame rail to allow the apparatus of the invention to be positioned adjustably thereon to be removed from the bed if desired. For angle iron rails as shown in FIG. 3, a block having an integral "C" clamp with a clamping bolt 24 can be used. Although the above-enumerated elements are shown single in FIG. 1, it is to be understood that an identical set of elements is mounted on the opposite of the side bed.

Referring to FIGS. 1, 2, 3, 4 and 5, a rigid arm 26 is attached to the clamping block 22 by a pivot 28. The clamping block, pivot, and arm may be fabricated from any suitably rigid material including wood, metal or plastic. Remote from the pivot 28, rigid arm 26 has a free end 30. Pivot 28 permits the free end of the rigid arm to travel in a circular arc.

Attached to free end 30 is a flexible, resilient line or member 32 which spans the gap between the two rigid arms located on opposing longitudinal frame rails. The rigid arms 26 and the flexible line 32 form a U-shaped section having the rigid arms for end sections and the flexible line for the center section. The flexible line supports the bedclothes 20 which are draped over the flexible line as shown in FIGS. 1 and 3. In FIG. 3, the bedclothes fall downward from the free end 30 of the rigid arm away from the clamping block 22 and the clamping bolt 24. As a result, bedclothes may be added or subtracted from the bedclothes already upon the bed without interference from the apparatus. In one device designed in accordance with the invention the flexible line is a length of surgical rubber tubing having an outside diameter of one quarter of an inch. Such material is sufficiently inelastic to prevent excessive sagging of the bedclothes in the gap between the free ends of the rigid arms.

Because the rigid arms are pivotally mounted at 28, the rigid arms can be rotated downward toward the frame rail 16 for storage. In the stored position, FIG. 2, flexible line 22 rests upon mattress 14 and is covered by the bedclothes 20. The resilient line rests substantially flat upon the mattress and does not produce a visible bulge in the exterior surface of the bedclothes. Consequently, the bed can be made up without any exterior indication of the installation of the apparatus. In addition, the elasticity of the flexible line permits the occupant of the bed to recline on top of the flexible line when the apparatus is stored. The flexible line will elastically conform to the deformation of the mattress made by the occupant. In addition, because of the small diameter of the flexible line, the occupant of the bed will be unaware of the presence of the flexible line beneath his body.

A suitable means for adjustably attaching the flexible line 32 to rigid arm 34 is shown in FIG. 4. A line slot 36 is cut across the end of the free end of the rigid arm at the longitudinal center line of the rigid arm. The line slot is cut deeply enough into the end of the rigid arm so that when attached, the flexible line will not slip out

of the line slot and around the sides of the free end. The free end of the rigid arm also contains a first hole 38 located on the longitudinal center line of the rigid arm remote from line slot 36 and a second hole 40 laterally located from the longitudinal center line between the line slot 36 and first hole 38.

To attach the flexible line to the rigid arm, the flexible line is initially affixed to the other, opposing rigid arm on the other side of the bed. The attachment may be made by any suitable means including tying. Then the flexible line is pulled across the mattress and over line slot 36 in the end of the free end of rigid arm 34. The flexible line is next threaded through first hole 38 in the rigid arm and passed through second hole 40. Thereafter, the end 41 of the flexible line is forced under the portion of the flexible line 32 that has been pulled across the outside face of the rigid arm 34 between line slot 36 and first hole 38.

The adjustable attachment of the flexible line permits the apparatus to be used on beds of differing widths. Mounting the rigid arms on the frame rails is independent of the size of the bed and the flexible line can be adjusted to accommodate any gap between the rigid arms. Further, the rigid arms can be mounted at positions on the bed frame other than directly opposite each other. For example, one rigid arm can be located near the end of the bed and the other, near the middle. In this way, the invention can accommodate simultaneously both a short and a tall occupant.

Referring to FIG. 5, the rigid arm 42 can be fabricated with multiple, pivotal attachment holes 44, 46 and 48 spaced along the longitudinal center line of rigid arm. Multiple holes in the rigid arm attachment permit pivot 28 to be adjustably positioned on the rigid arm at various distances from the free end. The clamping block 22 has only one pivotal attachment point. No elevation adjustment is made on the clamping block. By changing the pivot point on the rigid arm, the elevation of the free end 30 above the mattress can be adjusted. As a result, the overall elevation of the bedclothes above the mattress can be varied to suit the occupant.

The flexible line 32 can itself be adjustably positioned on the rigid arm. Rigid arm 42 has a line slot 50 which is cut across the side of the free end and is laterally located from the longitudinal center line of the rigid arm. In contrast, line slot 36 in FIG. 4 is located on the longitudinal center line of the rigid arm and cuts across the end of the free end. Rigid arm 42 also has a first hole 52 remote from line slot 50 and a second hole 54 remote from both line slot 50 and first hole 52. The flexible line is tied on rigid arm 42 in the same manner as described above and shown in FIG. 4.

When the laterally located line slots 50 are used, the flexible line spanning the rigid arms is shifted laterally from the longitudinal center line of the rigid arm. The shift in the flexible line causes the apex of the draping bedclothes to shift laterally too. Therefore, by utilizing the laterally located slots 50 the occupant can laterally adjust the cavity of the bedclothes. Moreover, laterally located slots assure that the rigid arms will be entirely below the surface of the mattress 14 when the rigid arms are pivoted downward for storage as in FIG. 2. When the bed is made up, the appearance of the bed is thereby enhanced.

A further modification of the invention is shown in FIGS. 6 and 7. Reference numeral 56 indicates generally a rigid arm constructed from hollow, tubular members. The tubular members can be constructed from any suitable metallic or plastic material. The rigid arm 56 has a lower member 58. The lower member is removably attached to an upper member 60 by a coupling 61. Attached to the upper member are two diverging members, respectively 62 and 64. The entire rigid arm 56 is hollow so as to define an air passage, and all of the members internally communicate with one another. The upper member 60 and the two diverging members 62 and 64 each have free ends, respectively 66, 68 and 70. These free ends are capped or otherwise closed to prevent foreign material from entering the rigid arm and to prevent the escape of ventilating air from a source described below.

A clamping block 72 is provided for attaching the tubular rigid arm 56 to the frame rails. The clamping block 72 has a spring clip 73 for such attachment. The spring clip is a resilient metallic member that frictionally engages the frame rail 16 after the spring clip has been physically deformed around the frame rail. Whether the spring clip 73 or the C-clamp on clamping block 22 is used will depend upon the design of the frame rail. The clamping block 72 has a clamping means 74. The clamping means is a rectangular metallic block with a cylindrical hole 75 therethrough to accommodate tubular members. A clamping bolt 76 is threaded through the clamping means 74 to penetrate the wall of the cylindrical hole 75. The clamping bolt thus can frictionally engage a member of a tubular rigid arm that is inserted into the cylindrical hole. The clamping bolt 76 provides both restraint and adjustability for the rigid arms.

The diverging members 62 and 64 of the upper member 60 of the tubular rigid arm 56 permit the use of three flexible lines to span the gap across the mattress. Although the tubular rigid arm 56 has only three free ends, it is obvious that more free ends can be created by adding more diverging members to the upper member 60. The flexible lines can be attached to the free ends of the tubular rigid arms by any convenient method including knots, metal hooks attached to the flexible lines or loops in the ends of the flexible lines.

When more than one flexible line is used to span the rigid arms, the multiple flexible lines create a flat surface from the bed covering that is essentially parallel to and elevated above the mattress. When viewed from the side of the bed, the draping bedclothes describe a structure that is trapezoidal in shape. When only one flexible line is used as in FIG. 1, the draping bedclothes describe a triangular shaped structure. In both embodiments, the bedclothes drape completely over the apparatus and may be added or removed independently of the apparatus. However, when multiple flexible lines are utilized, the size of the volume or cavity under the bedclothes is substantially increased. The occupant of the bed is thereby permitted more movement beneath the bedclothes before coming in contact with the bedclothes.

To install the pair of tubular rigid arms on an unmade bed, two clamping blocks 72 are attached respectively to the two longitudinal frame rails of the bed by either

spring clips 73 or C-clamps 22. The clamping blocks are positioned near the lower or foot end of the bed. Next, the lower members 58 of the tubular rigid arms 56 are inserted into holes 75 in the clamping blocks. The clamping bolts 76 are tightened and frictionally engage the lower members. The upper members 60 of the tubular rigid arms are then inserted respectively into the lower members 58. Coupling 61 firmly holds the upper members and the lower members together. The three flexible lines next are attached to the respective free ends of the tubular rigid arms. The flexible lines span the mattress in parallel, spaced apart relationship. Finally, the bed is made up by placing the bedclothes over the apparatus. To remove the apparatus from the bed, the above described sequence is reversed.

To store on the bed the apparatus with the flexible lines attached, the adjusting bolts 76 on the clamping blocks 72 are loosened. The lower members 58 slide through the clamping means 74 and are removed from the upper members 60 when the coupling 61 has passed through the clamping means. The upper members continue to slide down through the clamping means until the junctures of the divergent members 62 and 64 prevent further passage. On each tubular rigid arm the distance between the juncture of the divergent members and the free ends 66, 68 and 70 is sufficiently short so that in storage none of the members protrudes above the level of the top surface of the mattress. To raise the apparatus from storage, the above described sequence is reversed. In both sequences of raising and lowering the tubular rigid arms, the bedclothes can either remain on the apparatus or be removed therefrom as desired.

An additional modification of the invention is shown in FIG. 8. Reference numeral 78 indicates generally a rigid arm constructed from hollow, tubular members. The tubular members can be constructed from any suitable metallic or plastic material. The tubular rigid arm 78 has a lower member 80. The lower member is removably attached to an upper member 82 by a coupling 85. Attached to the upper member 82 is a perpendicular member 84. The entire tubular rigid arm 78 is hollow so as to define an air passage, and all of the members internally communicate with one another. The two opposing ends of the tubular perpendicular member 84 are capped or otherwise closed to prevent foreign material from entering the tubular rigid arm and to prevent the escape of ventilating air from a source described below.

The tubular rigid arm 78 with the perpendicular member 84 does not have any specific free ends to which the flexible lines can be attached as the other embodiments have. Instead, the entire perpendicular member 84 can be utilized for attachment. In FIG. 8 the perpendicular members have three flexible, resilient lines 86, 88, 90 which span between the tubular rigid arms. Although only three flexible lines are shown in FIG. 8, it is to be understood that more flexible lines can be utilized if desired. The flexible lines 86, 88, 90 are of similar construction as flexible line 32 in FIGS. 1, 3, 4. The flexible lines 86, 88, 90 can be attached to the perpendicular members 84 by any suitable means including the attachment methods described above. The procedures for the set up, operation and storage of tubular rigid arms 78 having perpendicular members are the same as the procedures enumerated

above for tubular rigid arms 56 having diverging members.

The present invention also provides a means for the occupant of the bed to control the temperature of the bed. Located beneath bed 91 is an air-blower 92. The air blower consists of an electrically powered, variable speed blower with a thermostatically controlled induction heater located in the discharge of the air blower. The air blower has a remote control box 94 which can be located at a convenient location accessible to the occupant of the bed. The remote control box permits the occupant to regulate the speed of the air blower and the output temperature of the induction heater.

The air blower discharges the heated air into a first conduit 106. The first conduit 106 is connected to a T-coupling 108. The T-coupling is connected to two secondary conduits 110 and 112. The conduits and T-coupling can be constructed from any suitable material that is both air tight and flexible. One suitable expedient is the flexible hose used on women's portable, home, hair drying units that connects the electric air blower located on a table to the hair drying chamber located on the head of the user.

The tubular rigid arms 56 and 78 also comprise part of the air discharge path of the air blower. The perpendicular member 84 of the tubular rigid arm 78 has a longitudinal slot 98 in the wall of tubular member. The tubular rigid arm 56 having diverging members has smaller longitudinal slots 100, 102, 104 which penetrate the walls of the upper member 60 and the diverging members 62, 64. The couplings 61 and 85 are airtight. Also both lower tubular members 58 and 80 have ends 114, 116 remote from the coupling ends that are not capped or otherwise closed. In short, the tubular rigid arms 56 and 78 are air-tight except for an orifice at the uncoupled ends 114, 116 of the lower members 58 and 80 and for the slots 98, 100, 102, 104. Further, both tubular rigid arms 56 and 78 are hollow so as to define air passages and all of the tubular members of the same tubular rigid arm communicate internally. Consequently, when the secondary conduits 110, 112 are attached to the lower members 58, 80, the heated air travels into the tubular rigid arms through the orifices at the uncoupled ends 114, 116 of the lower members and the heated air travels out of the tubular rigid arms through the slots 98, 100, 102, 104.

In operation, the air blower 92 takes ambient air, compresses it, heats it, and discharges it through first conduit 106 to T-coupling 108. From T-coupling 108 the air travels through either secondary conduit 110 or secondary conduit 112. Each secondary conduit is connected to one of the lower members of a tubular rigid arm. The heated air next travels in turn up through the

lower members, the upper members and out through the longitudinal slot or slots. The warm air is finally discharged into the closed volume or cavity under the bedclothes created by the bedclothes elevator. The closed volume is bounded by the upper surface of the mattress and the inner surface of the bedclothes. If cooling is desired, unheated ambient air can be discharged into the bed simply by operating the air blower with the induction heater turned off.

Although several embodiments of the invention have been shown and described, it will be obvious that other adaptations and modifications can be made without departing from the true spirit and scope of the invention.

What is claimed is:

1. Apparatus for a bed having a mattress and a bed covering, said apparatus being adapted for ventilating the interior space of said bed between the mattress and the bed covering comprising:

means for elevating said bed covering above the mattress thereby creating a closed volume bounded by the mattress and the bed covering, said means including first and second rigid arms, each rigid arm having a free end and a pivoting end, means for pivotally attaching said pivoting ends of said rigid arms respectively to opposite sides of a bed to that the free ends of said rigid arms are movable respectively through substantially equal radius arcs, a resilient flexible member having first and second ends, said first end of said flexible member being attached to the free end of said first rigid arm and means for removably affixing said second end of said flexible member to the free end of said second rigid arm so that said flexible member can extend between the free ends of said rigid arms and can overlie the mattress;

a conduit operatively connected to said elevating means and having a first end for communication with the closed volume and a second end exterior of said volume; and

means for supplying ventilating air to said second end of the conduit at variable temperatures whereby the ventilating air flows from the supplying means, through the conduit and into the closed volume.

2. The apparatus of claim 1 including an additional flexible resilient member and means for attaching said additional member to said free ends in parallel spaced apart relation to said one flexible resilient member whereby said rigid arms can be spanned by at least two flexible, resilient members to form from the bed covering a flat surface essentially parallel to and elevated above said bed mattress.

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