

Jamison

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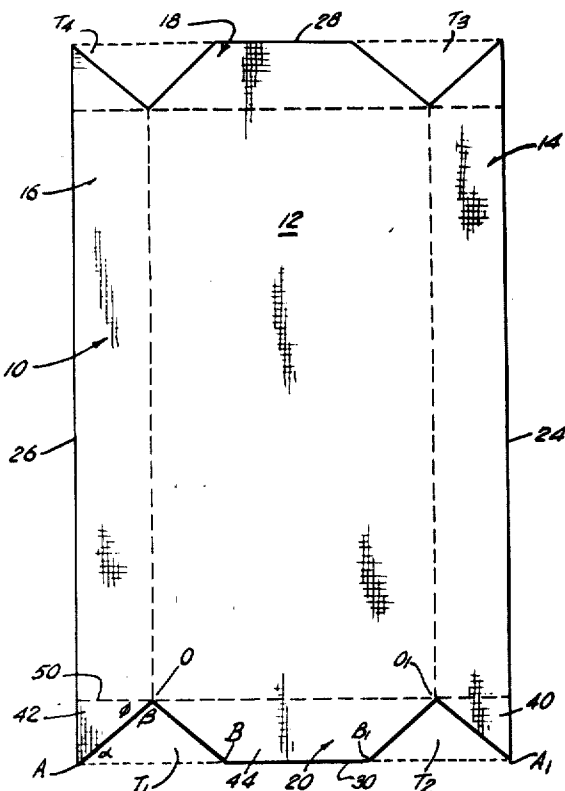
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A fitted bed sheet prepared from a simple, substantially rectangular blank of textile material by inexpensive manufacturing techniques which provide fitted or mitered corners whereby the sheet clings to the mattress or pad upon which it is placed and resists movements to shift or dislodge it therefrom, and wherein there is substantially no excess textile material to form undesirable pockets, recesses, or folds.

9 Claims, 7 Drawing Figures



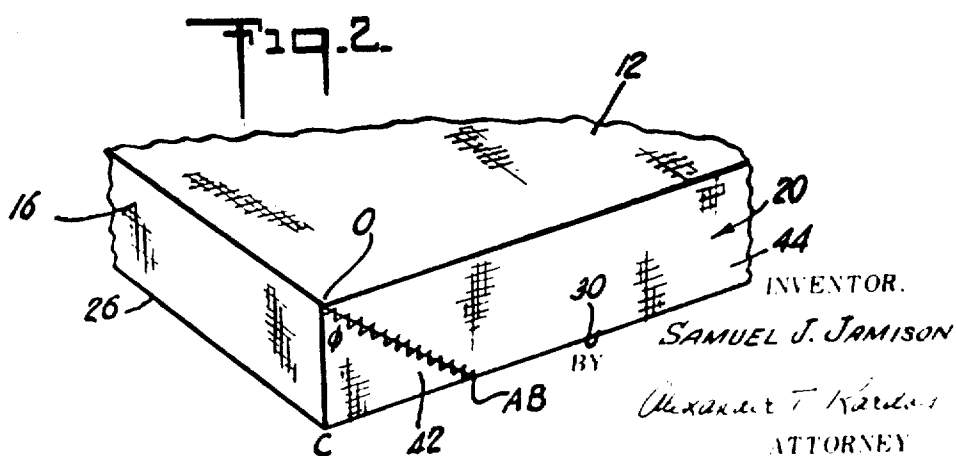
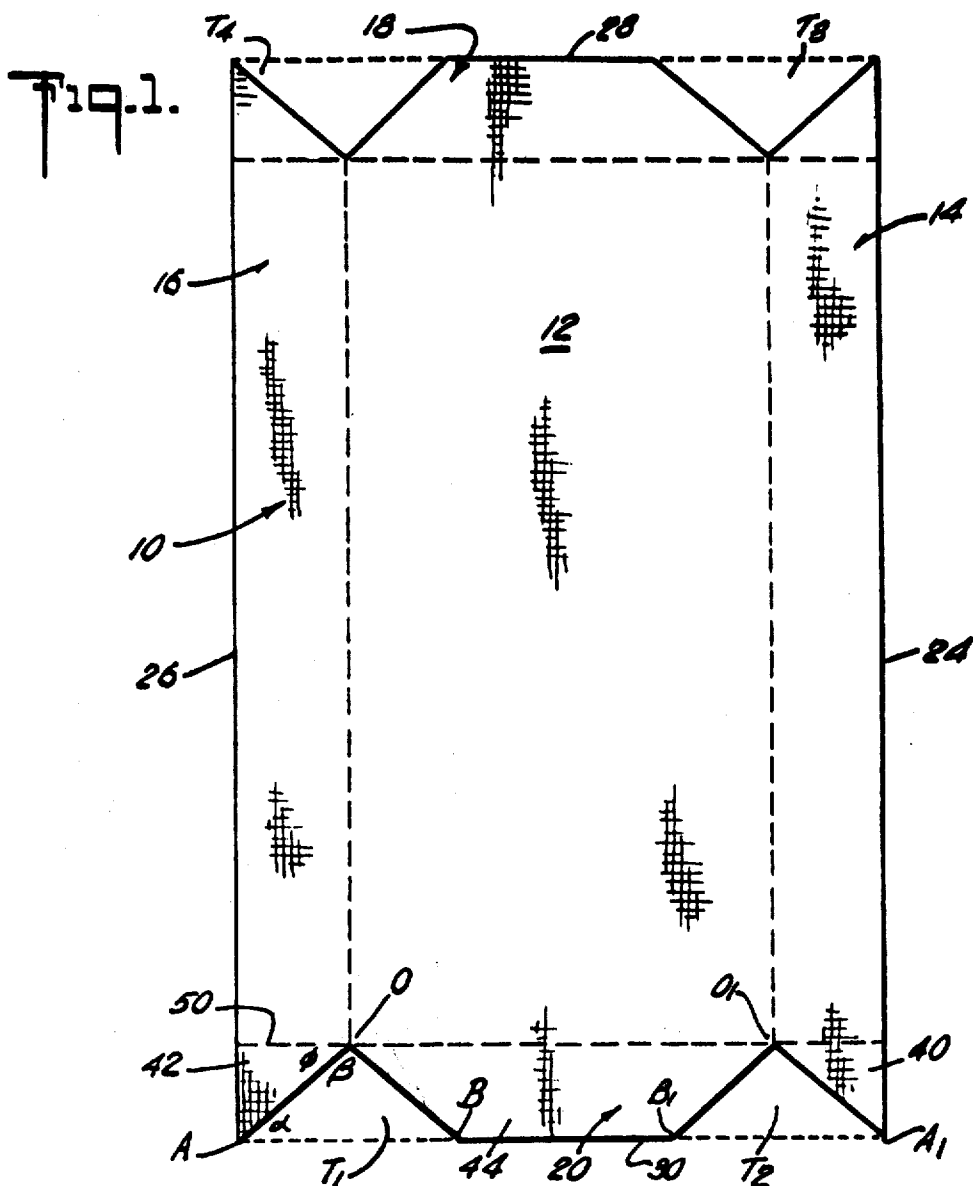


Fig. 3.

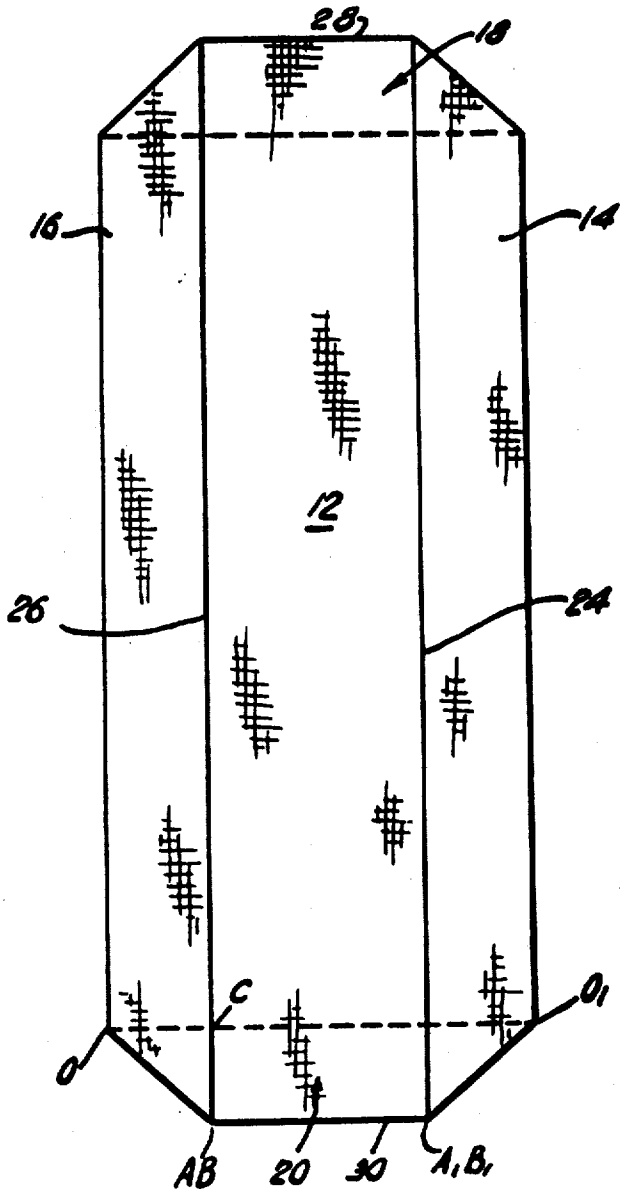
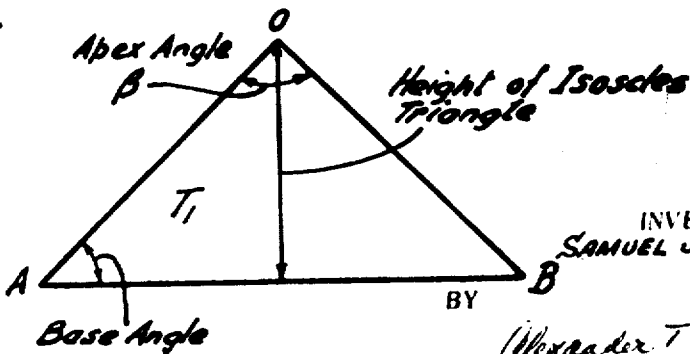
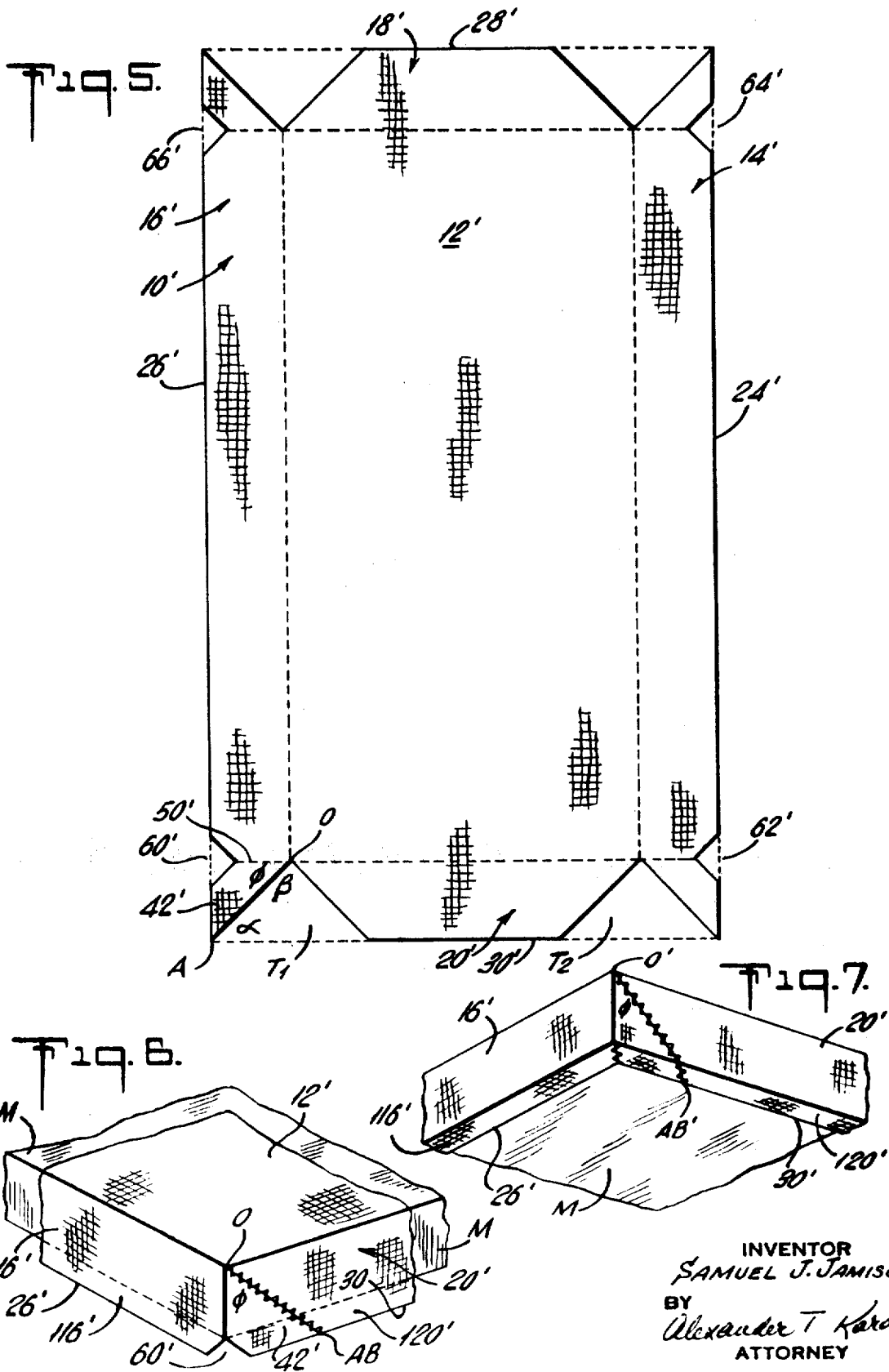


Fig. 4.



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FITTED BED SHEET

This patent application is a continuation-in-part of co-pending patent application, Ser. No. 851,264, filed Aug. 19, 1969, now abandoned.

The present invention relates to a sheet adapted to be used on a bed and which is provided with fitted or mitered corners whereby the sheet may be relatively securely positioned on the mattress or pad so as to prevent it from being accidentally shifted, moved, or dislodged therefrom by the movements of the person occupying the bed.

Additionally, the bed sheet is so constructed that there is substantially no excess textile material to form undesirable pockets, recesses, or folds.

Among the objects of the invention is the provision of an improved, fitted or contoured bed sheet which is simple in construction; is relatively inexpensive to manufacture; is easy to position on a mattress; smoothly overlies the mattress with a minimum of bulges and wrinkles; has substantially no excess textile material forming undesirable pockets, recesses, or folds; resists shifting, moving about, or dislodgement due to movements of the occupant of the bed; and which is readily removed after use for replacement by another sheet.

These objects and others which will become clear hereinafter are accomplished by providing a substantially rectangular blank of textile material having two side selvages and two end raw edges; removing relatively large isosceles triangular portions of a specified shape and size from at least one of the ends having raw edges; folding the blank in a particular way; overedging, bias-taping or otherwise binding the raw edges; and then unfolding the folded blank in a particular way whereby the fitted or contoured bed sheet is formed. Additional fitting and contouring of the bed sheet may be provided by removing relatively small isosceles triangular portions of a specified shape and size from the selvage sides of the blank of textile materials adjacent at least one end thereof, whereby the folded blank can be folded again in a particular way as to be fitted and contoured to the bottom surface of the mattress upon which the bed sheet is to be used.

Some of the objects of the present invention having been stated, other objects and purposes will appear as the description in the following specification proceeds, when taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a top plan view of a flat, substantially rectangular blank of textile material from which the fitted bed sheet is formed;

FIG. 2 is a fragmentary isometric view from above of one of the corner portions of the fitted bed sheet, showing the side panels and end panels turned downwardly and joined together;

FIG. 3 is a bottom plan view of the fitted bed sheet during an intermediate stage of its production;

FIG. 4 is a diagrammatic sketch showing the geometric relationship of the sides and angles of the isosceles triangle which is cut from the textile blank;

FIG. 5 is a top plan view of a modification of the flat, substantially rectangular blank of textile material of FIG. 1;

FIG. 6 is a fragmentary isometric view from above of the corner portions of the modified fitted bed sheet of FIG. 5 showing the relationship of a partially fabricated

fitted bed sheet to the mattress upon which it is to be fitted; and

FIG. 7 is a fragmentary isometric view from below of one of the corner portions of the modified fitted bed sheet of FIG. 5, showing the completely fabricated fitted bed sheet on the mattress upon which it has been fitted.

Referring more specifically to the drawings, the numeral 10 designates a substantially rectangular blank of textile material suitable for use in forming the fitted bed sheet of the present invention. The blank 10 comprises a central, substantially rectangular panel 12 which will ultimately become the top portion of the fitted bed sheet, a pair of opposed side panels 14 and 16 which will ultimately become the side panels or side skirts of the fitted sheet, and a pair of opposed end panels 18 and 20 which will ultimately become the end panels or end skirts of the fitted sheet.

As originally formed, usually by a weaving process in a loom, the edges 24 and 26 of the side panels 14 and 16 are selvages and are naturally finished or non-ravelling. The ends 28 and 30 of the end panels 18 and 20, however, are not selvages but are cut to desired length, subsequent to the manufacturing process, and are raw or ravelling edges.

As originally formed, the raw ends 28 and 30 of the end panels 18 and 20 run directly and completely across the full width of the blank 10, from salvage 24 to selvage 26 in a straight line, substantially at right angles to such selvages.

As shown, a pair of relatively large triangular pieces, T_1 and T_2 , are cut out of the end panel 20 and, in the same way, a pair of triangular pieces, T_3 and T_4 may be cut out of the end panel 18, if it is desired to have four fitted or mitered corners on the sheet.

Inasmuch as all these triangular pieces are substantially alike, the invention will be described further with reference to triangular piece T_1 but it is to be appreciated that the operations and processing of the other triangular pieces are similar, although reversed in direction and hand.

The triangular piece T_1 forms an isosceles triangle having an apex O and two substantially equal sides OA and OB. The third side AB of the isosceles triangle lies in the outer raw edge 30 of the end panel 20 and terminates at the corner A of the blank 10. The intersection of one of the two equal sides, in this case side OA, with the third side AB is located substantially at the same corner A of the blank which is also the extremity of the raw edge 30 of the end panel 20.

The angle α which the line OA makes with the line of the raw edge 30 is one of the two base angles of the isosceles triangle and is within specified limits in order to accomplish the purposes of the present invention. It has been established that a base angle α of from about 45° to about 36° is satisfactory. Within the narrower aspects of the present invention, however, a base angle α of from about 45° to about 39° is deemed more desirable in order to obtain a better fit for a rectangular parallelepiped mattress.

Simple geometric calculations from FIG. 4 will reveal that the range of the apex angle β of the isosceles triangle is therefore from about 108° to an angle about 90° and preferably in the range of from about 102° to an angle about 90° .

The height or altitude of the isosceles triangle will depend primarily upon the thickness of the mattress or pad which is to be covered by the sheet. Some mattresses, for example, those used in cribs or in youth beds, are as small as 13 × 28 inches (basket pad size), or 19 × 34 inches (bassinet size), or 24 × 46 inches (¼ crib size), or 28 × 52 inches (standard crib size) or 33 × 66 inches (youth bed size), with the mattress thickness as thin as about 2 inches, or occasionally less. Other mattresses, for example, those used in beds for adults, are as large as 76 × 80 inches (king size), or 60 × 80 inches (queen size), or 54 × 75 inches (full bed size), or 48 × 75 inches (¾ bed size), or 39 × 75 inches (twin bed size), with the mattress thickness as much as 7 inches, or occasionally more. The height of the isosceles triangle should therefore be selected as to cover this range of from about 2 inches, or slightly less, up to about 7 inches, or more, if desired.

The base AB of the isosceles triangle will, of course, depend upon the height of the isosceles triangle and the values of the base and apex angles of the particular case.

Removal of the two isosceles triangular pieces T_1 and T_2 from the end panel 20 will leave two right angled triangular tabs 40 and 42 at the ends thereof and a centrally located isosceles trapezoidal portion 44 having two parallel sides and two slanting equilateral sides. These right angled triangular tabs 40 and 42 and the centrally located isosceles trapezoid 44 will ultimately be joined to form the end panel on the completed, fitted bed sheet.

The sheeting material from which the blank is made is usually a plain weave muslin or percale cotton fabric, usually made from carded yarns or occasionally from combed yarns, and comes in light, medium, or heavy weights and in a wide range of constructions which vary from about 56 × 56 (56-square) and 64 × 64 (64-square usually made from 20's or 21's cotton yarn; 68 × 72 and 68 × 76, usually made from 25's cotton yarn; 84 × 92, usually made from 30's to 40's cotton yarn; 96 × 108, usually made from 40's cotton yarn, upwards. More finely woven fabrics, usually percales up to 160-count, 180-count, or 200-count made of single 40's or better, are used for crib or similar sheets.

Occasionally, synthetic yarns, for example, polyester, polyamide, polyacrylics, or rayon yarns, etc., are blended with the cotton in 50-50 blends, for example, or in other percentages, as desired or required, in order to obtain desired properties and characteristics.

Although woven textile material is the fabric of choice for the fitted sheet, it is to be appreciated that other sheet materials could be substituted therefor. For example, a nonwoven fabric or paper could be employed which, of course, would render the product more desirable from an economical aspect, in view of the single use and ready disposability thereof.

Although the invention is being described and illustrated with four isosceles triangular cut-outs in the blank, it is to be observed that such renders it of particular use of a "bottom" bed sheet with all four corners being fitted and contoured to fit the four corners of the mattress. The invention is also of use, however, for "top" bed sheets wherein it is desired that only two isosceles triangular cut-outs be employed at one end so

that the fitted sheets fit only the bottom corners of the bed, leaving the top corners free.

In operation, in order to form the fitted corner illustrated in FIG. 2 of the drawings, the central isosceles trapezoidal part of the end panels 18 and 20 is turned over downwardly approximately at right angles to the plane formed by the central rectangular top panel 12. The side panels 14 and 16 are also turned over downwardly approximately at right angles to the plane formed by the central rectangular top panel 12. The triangular tabs 40 and 42 attached to the side panels 14 and 16, respectively, extending beyond the fold line 50 and ending in points A and A1 are then wrapped around the corners so that point A and A1 are superimposed, respectively, on points B and B1. Line OA thus comes into substantially abutting relationship with line OB, and line O_1A_1 comes into substantially abutting relationship with line O_1B_1 with a minimum of overlapping textile material. This overlapping material is sufficient merely to permit the lines OA and OB, as well as O_1A_1 and O_1B_1 , to be joined together by being bias-taped, over-edged or otherwise joined. There is practically no excess material to form unsightly bulges or wrinkles at the corners of the bed when it is made and there are no undesirable pockets, recesses, or folds of excess material. The absence of such pockets, recesses, or folds of excess textile material is one of the features of the present invention.

It is to be noted in referring to FIG. 1 and FIG. 2 that the triangular tab 42 possesses an angle ϕ which is numerically equal to the angle α of the isosceles triangle and is therefore in the same range of acceptable angularity. This is the angle determined by the slanting hypotenuse OA of the triangular tab 42 and the fold line 50, which fold line has a portion OC which ultimately extends somewhat generally vertically in the finished bed sheet. See FIG. 2. The angle ϕ is referred to herein as the triangular tab angle to the vertical and is also in the range of from about 45° to about 36° and preferably in the range of from about 45° to about 39°. A wider range is, of course, suitable for mattresses and pads having sides which do not come down vertically but slant inwardly or outwardly to some degree.

An easier and more commercial approach to form the fitted bed sheet is illustrated in FIG. 3. The two side panels 14 and 16 are folded over inwardly so that they contact and lie on top of the central rectangular portion 12. In so doing, point A naturally falls upon point B inasmuch as lines OA and OB are substantially of the same length and relative angularity, being the two equal sides of an isosceles triangle.

Again, it is to be noted that line OA and line OB come into contact and are joined by being bias-taped, over-edged or otherwise joined with a minimum of excess textile material. Thus, unsightly bulges and wrinkles are avoided as well as undesirable pockets, recesses, or folds of excess materials.

If desired, the bias tape or over-edge seaming may start from point O on FIG. 3, go through point AB, along the raw edge 30 of the end panel 20, go through point A1 B1 and end at point O1, whereby not only are the corner pieces joined at both corners, but the entire raw edge of the end panel 20 is protected from ravelling, all in one operation.

The semi-finished fitted bed sheet may then be unfolded and opened and the bottom corner C moves under top corner O and then into or sometimes preferably inwardly beyond vertical alignment therewith. The other corners move similarly and the fitted bed sheet is ready for use.

The reason why it is sometimes preferred for the bottom corner C to be positioned inwardly of vertical alignment with the top corner O is clear from a geometric consideration of the fitted sheet (see FIG. 2). If top corner O were to be positioned directly over bottom corner C, then the portion OC of the fold line 50 would extend vertically to the plane formed by the top panel 12 and the fitted sheet would fit the corner of the mattress but would not really cling very securely thereto. By employing an apex angle greater than 90° and up to about 108°, the portion OC of the fold line 50 is necessarily pulled inwardly and, although the top corner O fits the top corner of the mattress, the bottom corner C actually is pulled tightly under the bottom corner of the mattress and very securely clings thereto.

FIGS. 5 through 7 represent a modification of the fitted bed sheet of FIGS. 1-3. In these figures, corresponding reference numerals with superscripts have been used where needed to identify corresponding elements found in FIGS. 1-3. Further description at this time is believed unnecessary.

Relatively small triangular notches 60', 62', 64' and 66' are formed in the side selvages 24' and 26' adjacent the ends thereof and, as shown, are essentially isosceles triangular in shape, having a side or base lying in the side selvage and two equal slanting sides terminating in an apex which, in FIG. 5, falls on the fold line 50'. Such location is deemed ideal and is the most desirable. However, other locations along the lengths of the side selvages adjacent the ends thereof are also satisfactory in some cases.

The length of the base of the triangular notches, as measured along the side selvage, may be as small as about 1½ inches and as large as about 3 inches. The altitude or height of the triangular notches, as measured at right angles to the side selvage, may be as small as about ¾ inch and may be as large as about 1½ inches. In cutting these triangular notches from the rectangular blank 10', some additional material may be left in order to facilitate subsequent seaming.

The altitude or height of the triangular notch is determined to a large extent by the width of the side panels 14' and 16', the width of the end panels 18' and 20', and by the thickness of the mattress M to which the bed sheet is to be fitted. For a perfect, snug fit, the altitude or height of the triangular notch should equal the difference between the width of the side or end panel and the thickness of the mattress. For example, if the width of the side or end panel is about 6 inches and the thickness of the mattress is only about 4 inches, then the altitude of the triangular notch is about 2 inches. In such a case, the length of the side of the triangular notch as measured along the selvage 24' or 26' is about 4 inches.

Such configuration is best shown in FIG. 6 wherein the mattress M is shown primarily in dotted outline and the side panel 16' and the end panel 20' are shown with the triangular notch 60' in open or unseamed and unfinished state.

The ideal situation and the ideal configuration leading to the smoothest seaming operation exists when the apex angle of the notch is about 90° and each base angle of the notch is about 45°. Such a configuration, when formed in conjunction with the locating of the apex of the notch at the fold line 50', creates an excellent rectangular box-like corner at the lower corner of the mattress, as shown in FIG. 7. It is to be noted that, in such a situation, the apexes of the notches 60' and 62' fall on the same fold line 50' as do the apexes of the larger triangular notches T₁ and T₂. In a similar way, the apexes of the notches 64' and 66' fall on the same fold line at the other end of the blank 10' when four contoured corners are desired.

Particular attention is called to the side bottom panel 116' and the end bottom panel 120' which are ultimately joined together when the two slanting sides of the triangular notch are seamed or otherwise joined together. The side bottom panel 116' normally lies finally in a plane at right angles to the plane of the side panel 16' and thus is basically in a plane parallel to the top rectangular panel 12'. The end bottom panel 120' normally lies finally in a plane at right angles to the plane of the end panel 20' and thus is also basically in a plane parallel to the top rectangular panel 12'.

It is also to be appreciated that, when the smaller notches 60', 62', 64' and 66' are drawn together and seamed, as shown in FIG. 7, the side selvages 24' and 26' are shortened and grip the mattress more securely. This is particularly true if the apex angle is greater than about 90° and the base angles are each less than about 45°. Where such additional gripping action is desired or required, the apex angle may be increased to about 102° or even to as high as about 108°. In such a case, the base angles are decreased to about 39° or even to as low as about 36°.

Where such angles are used, the side bottom panels and the end bottom panels are drawn and stretched, thereby creating a more secure grip on the mattress.

The invention will be described in greater particularity by reference to the following Examples which disclose specific embodiments of the invention for illustrative purposes but which are not to be construed as limitative of the broader aspects thereof.

EXAMPLE I

A cotton sheet blank such as illustrated in FIG. 1 is made to the following specifications: length — 62 inches; width — 37 inches; length of each equal side of the isosceles triangle is 8½ inches; length of third side of isosceles triangle is 13 inches; altitude of isosceles triangle is 5½ inches; and angle included between two equal sides (or apex angle) is 100°; and the base angles are 40° each.

The blank is formed into a fitted bed sheet having four fitted corners and has dimensions of 51 inches long and 24 inches wide. The raw edge at the end panel is over-edge seamed to prevent ravelling. See FIG. 2. The resulting fitted bed sheet is used on a 4½ inch thick mattress and is very satisfactory. The panels forming the skirt fit and cling to the mattress very well. The excellency of the "cling" properties is demonstrated by grasping the fitted sheet approximately at its geometric center and lifting the sheet and mattress upwardly. The "cling" is so good that the heavy mattress remains

within the fitted sheets, being held therein by the four fitted corners.

EXAMPLE II

A cotton bed sheet blank such as illustrated in FIG. 1 is made to the specifications set forth in Example I, except that the isosceles triangle has a base of $6\frac{1}{2}$ inches; an altitude of $3\frac{3}{4}$ inches; equal sides of 4.9 inches; an apex angle of the triangle of 82° ; and base angles of 49° .

The blank is formed into a four corner fitted bed sheet. The panels of the skirt fit loosely on a 5 inch thick mattress and are not acceptable. Additionally, the fitted sheet does not pass the "cling" test.

EXAMPLE III

A cotton bed sheet such as illustrated in FIG. 1 is made according to the procedures set forth in Example I except that the apex angle is reduced to 94° and the base angles are increased to 43° each. The altitude of the isosceles triangle remains the same but the sides and bases are correspondingly shortened. The results are comparable. The fitted sheet fits the mattress well and passes the "cling" test.

EXAMPLE IV

A cotton bed sheet blank such as illustrated in FIG. 1 is made to the following specifications as set forth in Example I: the isosceles triangle has a base of $7\frac{1}{2}$ inches; an altitude of 3 inches; equal sides of 6.1 inches; an apex angle of 104° ; and a base angle of 38° . The blank is made into a fitted bed sheet having four fitted corners and is commercially acceptable. The skirt formed by the panels is slightly snug on a 2 inch thick mattress but is acceptable. It passes the "cling" test.

EXAMPLE V

The procedures of Example I are followed substantially as set forth therein except that only two corners are fitted. The resulting sheet is well suited as a "top" sheet.

EXAMPLE VI

A cotton sheet blank such as illustrated in FIG. 5 is made to the following specifications: length — 62 inches; width — 37 inches; length of each equal side of the large isosceles triangle is $8\frac{1}{2}$ inches; length of the third side of the large isosceles triangle is 12 inches; the altitude of the large isosceles triangle is 6 inches; the angle included between the two equal sides (or apex angle) is 90° ; and the base angles are 45° each. The apexes of the large isosceles triangles fall on the fold line 50'.

Four smaller notches are formed, as shown in FIG. 5. Each notch is an isosceles triangle having a base length of 2 inches as measured along the side selvage and an altitude of 1 inch. Each notch has its apex also falling on the dotted fold line, as shown.

The blank is formed into a fitted bed sheet having four fitted corners and has dimensions of 50 inches long and 25 inches wide. The slanting sides of the notches are sewn together. The raw edge at the end panel is overedge seamed to prevent ravelling. The resulting fitted bed sheet is used on a 5 inch thick mattress and is very satisfactory. The side and end panels

forming the skirt fit and cling to the mattress very well. The side and end bottom panels form a plane at right angles to the side and end panels and also parallel to the top rectangular panel. The side and end bottom panels go under the mattress and secure it well. The excellency of the "cling" properties is demonstrated by grasping the fitted sheet approximately at its geometric center and lifting the sheet and mattress upwardly. The "cling" is so good that the heavy mattress remains with the fitted sheets, being held therein by the four fitted corners and sewn notches.

EXAMPLE VII

The procedures of Example VI are followed substantially as set forth therein except that the notches each measure 3 inches as measured along the side selvage and have altitudes of $1\frac{1}{2}$ inches. The fitted bed sheet is used on a mattress which is $4\frac{1}{2}$ inches thick and fits it very well, passing the center "lift" test.

Although the invention has been described with particular reference to specific embodiments thereof, such is intended for illustrative purposes and is not to be considered as limitative of the invention, except as defined by the appended claims.

What is claimed:

1. A fitted bed sheet of simplified construction prepared from a substantially rectangular blank of textile material comprising a central substantially rectangular panel, a pair of opposed side panels formed integrally with said central panel, and a pair of opposed end panels formed integrally with said central panel, at least one of said end panels having cut out therefrom a pair of triangular pieces, each piece forming an isosceles triangle with the two equal sides thereof being directed inwardly of said end panel and the third side thereof lying along the outer edge of said end panel, the intersection of one of said equal sides with said third side being located substantially at the extremity and corner of said end panel said isosceles triangle having base angles of from about 45° to about 36° .

2. A fitted bed sheet of simplified construction prepared from a substantially rectangular blank of textile material comprising a top substantially rectangular panel, a pair of opposed side panels formed integrally with said top panel, and at least one end panel comprising a pair of right angled triangular tabs formed integrally with said side panels and a centrally located isosceles trapezoidal portion formed integrally with said top panel, said isosceles trapezoidal portion having base angles of from about 45° to about 36° , said triangular tabs and isosceles trapezoidal portion being joined together to form said end panel.

3. A fitted bed sheet as defined in claim 2 wherein the triangular tabs and the isosceles trapezoidal portion are joined by overedge seaming to form each panel.

4. A fitted bed sheet as defined in claim 2 wherein there are two end panels and both end panels comprise triangular tabs and isosceles trapezoidal portions.

5. A substantially rectangular blank of textile material for use in forming a fitted bed sheet comprising a central substantially rectangular panel, a pair of opposed side panels formed integrally with said central panel, and a pair of opposed end panels formed integrally with central panel, at least one of said end panels having cut out therefrom a pair of triangular

pieces, each piece forming an isosceles triangle with the two equal sides thereof being directed inwardly of said end panel and the third side thereof lying along the outer edge of said end panel, the intersection of one of said equal sides with said third side being located substantially at the extremity and corner of said end panel said isosceles triangle having base angles of from about 45° to about 36°.

6. A method of forming a fitted bed sheet which comprises: forming a substantially rectangular blank of textile material comprising a central substantially rectangular panel, a pair of opposed side panels, and a pair of opposed end panels; removing two triangular pieces from at least one end of said end panel, each triangular piece forming an isosceles triangle with the two equal sides thereof being directed inwardly of said end panel and the third side thereof lying along the outer edge of said end panel, the intersection of one of said equal sides with said third side being located substantially at the extremity and corner of said end panel; folding said side panels inwardly onto said central panel whereby the two equal sides of said isosceles triangles coincide; and joining together said equal sides to form the fitted sheet.

7. A method as defined in claim 6 wherein triangular pieces are removed from both end panels.

8. A fitted bed sheet of simplified construction prepared from a substantially rectangular blank of textile material comprising a central substantially rectangular panel, a pair of opposed side panels formed integrally with said central panel, and a pair of opposed end panels formed integrally with said central panel, at least one of said end panels having cut out therefrom a pair of triangular pieces each piece forming an isosceles triangle with the two equal sides thereof being directed inwardly of said end panel and the third side thereof lying along the outer edge of said panel, said isosceles triangle having base angles of from about 45° to about 36°, the intersection of one of said equal sides with said third side being located substantially at the extremity and corner of said end panel, and each of said side panels having cut out therefrom at least one triangular piece adjacent one end thereof, each piece forming an isosceles triangle with the two equal sides thereof being directed inwardly of said side panel and the third side thereof lying along the outer edge of said side panel.

9. The fitted bed sheet of claim 8 wherein the apexes of at least two of said triangular pieces cut from said end panel fall on the same line as at least two of said triangular pieces cut from said side panel.

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