United States Patent [19]

Richards, Jr.

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[45] **June 25, 1974**

[54] **MATTRESS COVER CONSTRUCTION**

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[73] Assignee: **Richard's Quality Bedding Company,** Grand Rapids, Mich.

[22] Filed: **Dec. 4, 1972**

[21] Appl. No.: **312,038**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 234,043, March 13, 1972.

[52] **U.S. Cl.**..... **5/345 R,** 5/347, 297/DIG. 5

[51] **Int. Cl.**..... **A47c 27/00,** A47c 31/00

[58] **Field of Search**..... 5/347, 355, 361, 361 B, 5/345 R, 361 R; 297/DIG. 5

[56] **References Cited**

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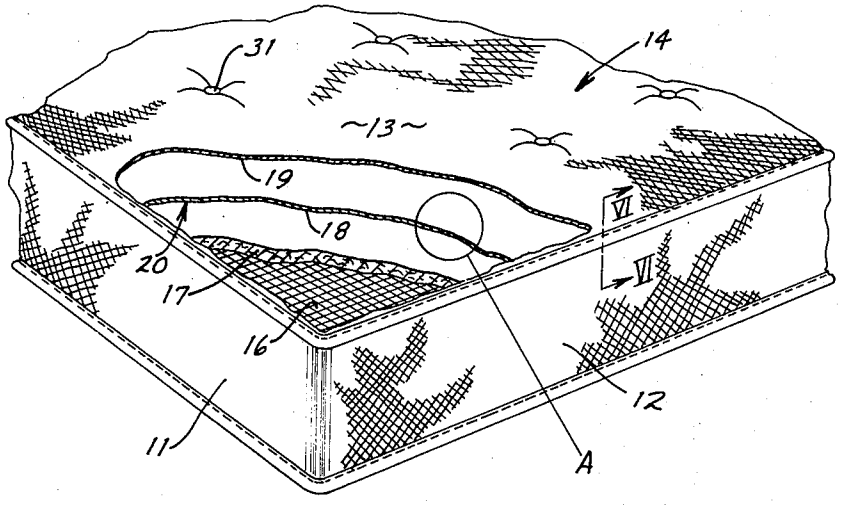
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Assistant Examiner—Andrew M. Calvert
Attorney, Agent, or Firm—Woodhams, Blanchard & Flynn

[57] **ABSTRACT**

A flexible, fire resistant mattress cover construction having a layer of padding material, one surface of which is covered by a layer of normally flammable cloth material and a layer of heat conducting metallic foil located between the padding material and the cloth material. The foil serves to prevent the flammable cloth material from bursting into flame when the cloth material is subjected to temperatures above the level at which combustion would normally occur by conducting the heat away from the location of application of heat to the cloth material.

13 Claims, 10 Drawing Figures



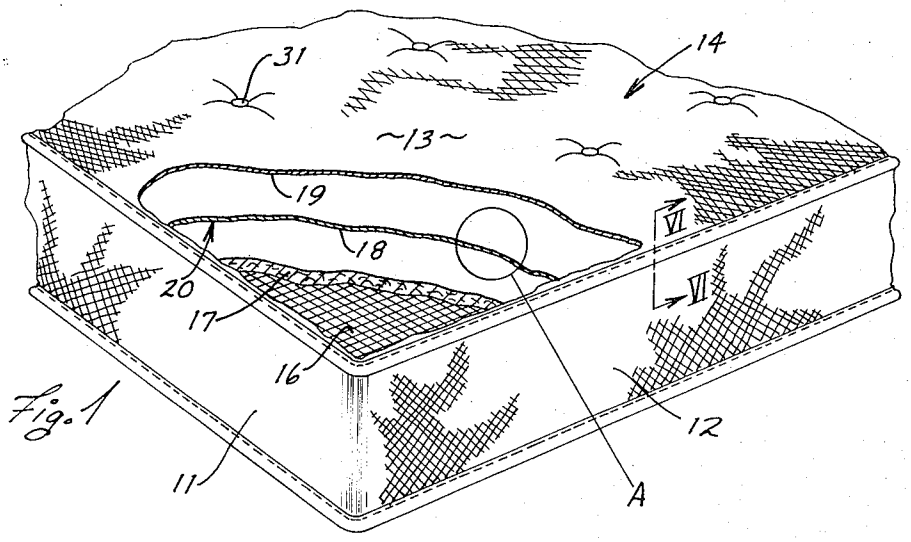


Fig. 1

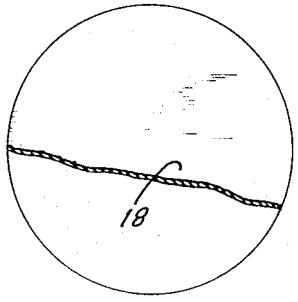


Fig. 2

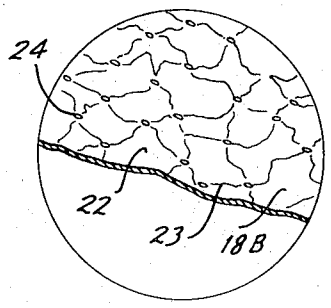


Fig. 3

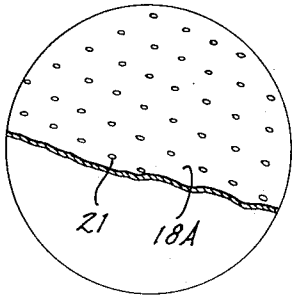


Fig. 4

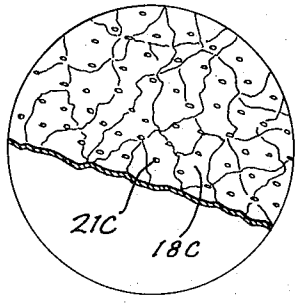


Fig. 5

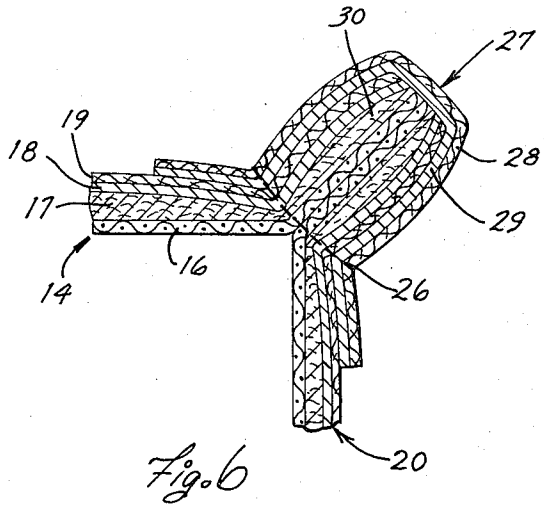


Fig. 6

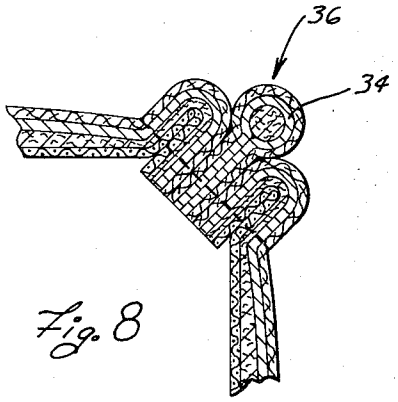


Fig. 8

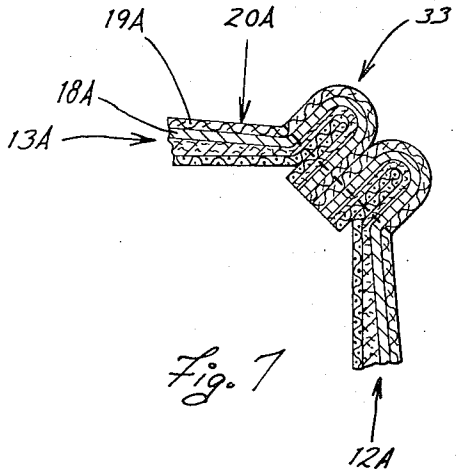


Fig. 7

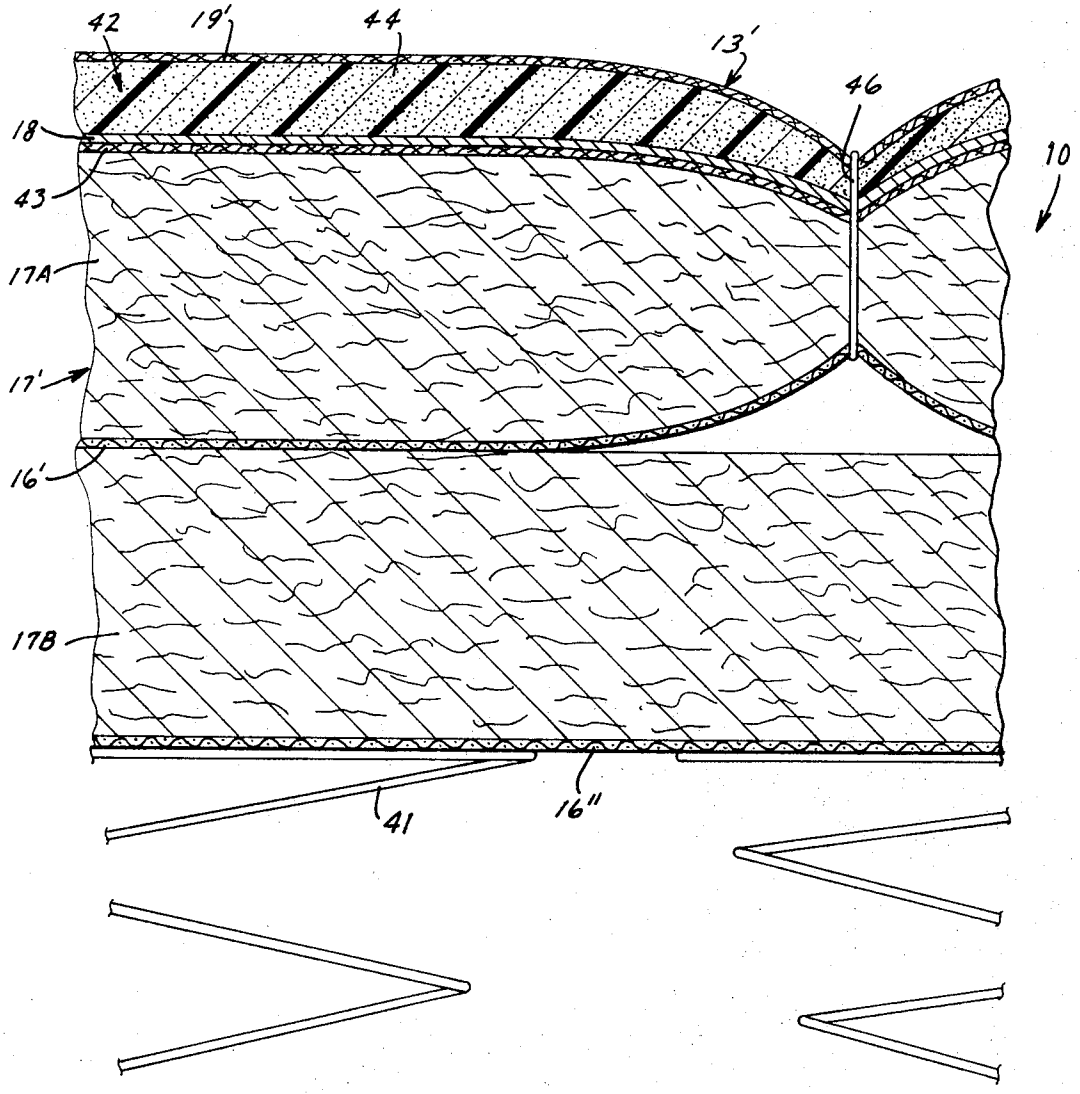

42
19'
44
13'
46
18
10
43
17A
17'
16'
17B
41
16"

Fig. 9

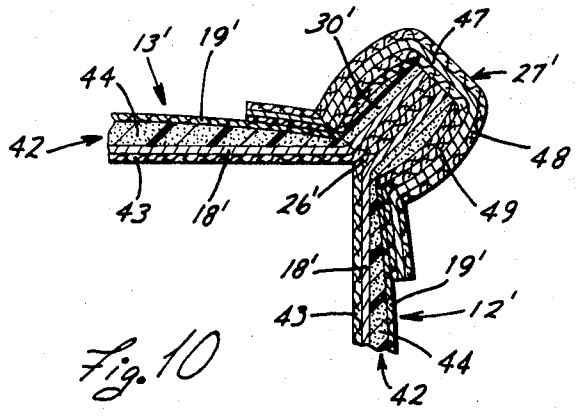

13'
19'
30'
47
44
27'
42
48
43
18'
26'
49
18'
19'
43
12'
44
42

Fig. 10

MATTRESS COVER CONSTRUCTION

CROSS REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of my copending application Ser. No. 234,043, filed Mar. 13, 1972, and entitled "Mattress Cover Construction."

FIELD OF THE INVENTION

This invention relates to a flexible, fire resistant fabric construction and, more particularly, to a flexible, fire resistant mattress cover.

BACKGROUND OF THE INVENTION

There has been an alarming number of of deaths each year caused by smokers falling to sleep in bed while having a lit cigarette in their mouth or in their hand. After the smoker has fallen to sleep, the cigarette usually falls onto the bedding igniting same, and thereafter igniting the mattress causing the smoker to be severely burned, sometimes fatally. Many efforts have been made to make the mattress covering fire resistant but the resulting fabric construction has not been entirely appealing from the standpoint of appearance and saleability. Further, the resulting fabric construction has been expensive to manufacture thereby resulting in a more expensive mattress construction and thereby diminishing the saleability of the final product.

Accordingly, it is a primary object of this invention to provide a flexible, fire resistant fabric which is capable of utilizing material which would be normally flammable and, therefore, to thereby permit the use of decorative fabrics which are appealing to the eye and enhance the saleability of the finished product.

It is a further object of this invention to provide a flexible, fire resistant fabric which can be utilized as a mattress covering and which can withstand the temperature of a lighted cigarette laying on the surface thereof without causing the normally flammable fabric material to ignite.

It is a further object of this invention to provide a flexible, fire resistant covering which can be used as a mattress covering and which will withstand the high temperatures of a lighted cigarette laying on the surface thereof to thereby prevent an ignition of the normally flammable cloth covering material even adjacent a thread pattern which has been utilized to provide tufts.

Other objects and purposes of this invention will be apparent to persons acquainted with mattress constructions of this general type upon reading the following specification and inspecting the accompanying drawings, in which:

FIG. 1 is a partially sectioned perspective illustration of a mattress construction embodying the invention.

FIG. 2 is an enlarged fragment of FIG. 1 located by the circle "A" therein.

FIG. 3 is an enlarged fragment of FIG. 1 similar to FIG. 2 and showing a modified foil construction.

FIG. 4 is an enlarged fragment of FIG. 1 similar to FIG. 2 and showing a further modified foil construction.

FIG. 5 is an enlarged fragment of FIG. 1 similar to FIG. 2 and showing a still further modified foil construction.

FIG. 6 is an enlarged sectional view taken along the line VI—VI of FIG. 1.

FIG. 7 is an enlarged sectional view similar to FIG. 6 and showing an alternate edge connection.

FIG. 8 is an enlarged sectional view similar to FIG. 6 and showing an alternate edge connection.

FIG. 9 is an enlarged, fragmentary sectional view of another embodiment of the mattress construction according to the present invention.

FIG. 10 is an enlarged sectional view similar to FIG. 6 and illustrating therein an edge connection for the mattress construction illustrated in FIG. 9.

SUMMARY OF THE INVENTION

In general, the objects and purposes of the invention are met by providing a flexible, fire resistant, fabric having a thick layer of padding material covered by a layer of normally flammable cloth material and a layer of heat conducting metallic foil located between the padding material and the cloth material. The foil serves to prevent the flammable cloth material from bursting into flame when the cloth material is subjected to temperatures at which combustion would normally occur by conducting the heat away from the location of application of heat to the cloth material.

In a preferred embodiment of the invention, a thin layer of a resilient foamed material, such as either foamed plastic or rubber material, is disposed between the cloth cover layer and the metallic foil layer for dampening substantially all of the noise generated by the foil layer during utilization of the mattress. Further, the foil layer is preferably provided with a thin nonwoven layer of fabric bonded thereto for increasing the strength of the foil and for minimizing the noise generated by the foil.

DETAILED DESCRIPTION

The development disclosed hereinbelow arose out of a need for a fire resistant material for covering the internal structure of a mattress. Accordingly, the following discussion will describe the development in a mattress covering environment. However, it is to be recognized that the covering material can be used on other products, such as upholstered chairs and the like, and the discussion pertaining to a use on a mattress is not to be considered limiting.

Referring to FIG. 1, the mattress **10** has a covering **14** including a plurality of sidewalls, two sidewalls **11** and **12** of which are illustrated in FIG. 1, a top wall **13** and a bottom wall (not illustrated). The construction for the top wall **13**, as well as the sidewalls **11** and **12**, comprises a thin mesh or netting **16** having padding material **17** disposed adjacent the outer surface thereof. The padding material **17** may be of any conventional type, such as a cotton material or a foam rubber or plastic material to name a few. The outer surface of the padding material is covered by a laminated fabric construction **20** comprising a sheet of heat conducting metallic foil **18** and a layer of normally flammable cloth material **19** bonded to the outer surface thereof. The cloth material **19**, normally referred to as the ticking of a mattress, may be secured to the foil **18** by any conventional material, such as an adhesive. The netting **16**, padding **17** and laminate **20** are usually held together by conventional stitching or tufting.

The foil **18** (FIG. 2) may be any conventional, thin and heat conducting metal, such as aluminum. In one

set of tests, the aluminum sheet had a thickness of 0.003 of an inch. However, thicknesses somewhat larger and smaller than 0.0003 of an inch are believed to be acceptable. The foil, in a first embodiment, is relatively flat and smooth as illustrated in FIG. 2. Alternatively, a modified form of the foil 18A (FIG. 4) can be flat and smooth but having a plurality of regularly spaced perforations 21, which may be formed by a punching or perforating operation. The perforations permit the covering laminate to breathe and thereby provide for air circulation in the space between the user's body and the laminate. This prevents perspiration. However, the diameter of the openings must be minimized to prevent enough air from passing through the openings to support a blaze. In other words, the effectiveness of the foil to prevent flames is not noticeably reduced by the provision of regularly spaced or randomly spaced small openings in the foil. The diameter of the perforations is preferably in the approximate range of 1/64 of an inch to one-eighth of an inch. In one preferred embodiment, the spacing between the openings was about one-fourth of an inch. However, it will be seen that the spacing between adjacent holes can be increased as the hole size increases while maintaining the same air flow capability through the foil. Also, it was observed that better flexibility was provided in the foil by using a greater number of small holes, provided that enough stock remained to effect satisfactory heat conduction.

A still further modified form of the foil 18B (FIG. 3) is crumpled or wrinkled so that it has a plurality of ridges 22 and crevices 23 and a plurality of randomly spaced openings 24 therein. The random nature of the openings 24 is caused by the process in which the foil 18B becomes crumpled and they occur where the foil is stressed beyond a tolerable limit. Alternatively, a modified embodiment of the foil 18C (FIG. 5) is crumpled in the same manner as described for the embodiment of the foil 18B in FIG. 3, but it has a plurality of regularly spaced openings 21C similar to those illustrated in FIG. 4.

The embodiment of FIG. 5 can be used when the process by which the foil 18C is crumpled does not produce sufficient randomly arranged openings therein, as with the foil 18B illustrated in FIG. 3, or where the spacing between the random openings is too great and additional openings are desired.

The foil constructions 18, 18A, 18B and 18C are satisfactorily produced from an aluminum foil having a thickness of about 0.0003 of an inch.

Preferably, the crumpled foil in FIGS. 3 and 5 is bonded to the cloth material 19 while the foil is still flat and smooth. This will assure that the entire surface of the foil will adhere to the adjacent surface of the cloth. Thereafter, the laminated material 20 can be fed between a pair of pressure applying rollers, at least one of which is a textured roller whereby the foil is effectively wrinkled. If desired, the textured roller may also have pins thereon for perforating the foil as same passes thereover.

When it is desired to secure the top wall 13 (FIG. 6) of the mattress covering 14, for example, to a sidewall 12, wherein both the top wall 13 and the sidewall 12 comprise a netting 16, padding material 17 and a laminate 20, the two mutually adjacent edge portions 30 may be fastened together by an appropriate stitching 26. The meeting edge portions 30 of the top wall and sidewall may be further secured and protected by an elongated strip of laminated edging material 27 comprising an elongated strip of cloth 28 laminated to a strip of metallic foil, as in the laminate 20 of the mattress covering 14. The foil 29 may be identical in thickness to the foil 18 on the top laminate 20.

The elongated edging strip 27 covers the free edge portions 30 of the joined top wall 13 and the sidewall 12 to prevent an exposure of the padding material 17 to a temperature which is higher than the temperature at which combustion would occur if the free edge portions were exposed.

Other types of connections along the mutually adjacent edges of the top wall, bottom wall and the sidewalls of the mattress cover may be provided as long as the padding material, which is exposed adjacent the edges 30, has a foil covering. For example, the conventional French seam 33 (FIG. 7) has its adjacent edge portions tucked in and then stitched together. Thus, the foil backing 18A on the laminate 20A of the top wall 13A and sidewall 12A automatically permits both the cloth material 19A and the padding 17A to withstand temperatures which are above the permissible level, namely, the level at which the cloth and padding normally become combustible.

The conventional welted connection 36 (FIG. 8) can be used as long as the welt cord cover has a foil backing 34. The remainder of this connection is substantially identical with the French seam.

The aforedescribed mattress covering is extremely effective in preventing the normally flammable cloth material 19 from bursting into flame when exposed to temperatures which are above a level at which combustion would normally occur if the foil layer 18 were not bonded to the undersurface of the cloth. Bonding of the foil to the undersurface of the cloth material 19 not only diffuses heat quickly, but also prevents the development of an air pocket between the cloth material 19 and the foil 18 when the combined materials are flexed. This prevents the supply of a draft through the cloth and thereby prevents the cloth material from bursting into flames. Instead, the cloth material merely chars if, for example, a burning cigarette is laid on the surface thereof. The mattress cover construction described hereinabove is also very effective in preventing the cloth material 19 from bursting into flame at the location of tufting 31, as illustrated in FIG. 1.

The mattress cover construction 10 may be assembled by utilizing conventional stitching which thereby avoids the expense of a special mattress construction. It is unnecessary to treat the cloth chemically so that it is nonflammable. Thus, the cloth material 19 can be of any conventional type normally used in present mattress constructions, thereby maintaining a more attractive appearance. Also, the metal foil behind the cover cloth tends to make the colors more vivid in said cloth.

A laminate 20 having the foils 18 and 18A, illustrated in FIGS. 2 and 4, respectively, produces a sound when it is flexed. It has been discovered that this sound may be substantially reduced to an acceptable level, if not eliminated, by crumpling the foil according to the aforedescribed embodiments of FIGS. 3 and 5. The crumpled foil thus produces a more desirable mattress cover from the standpoint of sound.

The flexible fabric mattress covering described hereinabove is very effective in preventing an ignition of the

normally flammable cloth material 19 when a cigarette is laid thereon. The burning portion of a cigarette is normally at a temperature of about 500°F and it has been found that the metallic heat conducting foil bonded to the under surface of the cloth material 19 serves to conduct the heat away from the area at which the burning portion of the cigarette is in contact. Thus, the cigarette will burn up completely without causing the cover cloth 19 to burst into flame.

It will be recognized that the concepts disclosed above can be applied to uses other than mattress covers. For example, the foil in any of its disclosed forms could be laminated between the vinyl layer and the cloth backing layer of the fabric used in chairs, automobile seats and the like.

MODIFICATION

FIG. 9 illustrates therein a modified mattress construction according to the present invention which is similar to the mattress construction illustrated in FIG. 1 so that corresponding parts of the construction illustrated in FIG. 9 have been identified by the same reference numeral utilized in the construction illustrated in FIG. 1 except that the numerals have been additionally distinguished by the addition of a prime (') thereto.

Referring specifically to FIG. 9, there is illustrated a mattress construction 10' which includes a conventional internal coil spring structure 41 surrounded by a covering which includes top and bottom walls and a plurality of sidewalls in a conventional manner, only the top wall 13' being illustrated in FIG. 9. The top wall 13' is provided with a rather thick layer of flexible padding material 17', which padding material is a conventional flammable material such as cotton, foam rubber, foam plastic or the like. The layer of padding material 17', in the illustrated embodiment, is divided into superimposed outer and inner sublayers 17A and 17B, respectively, whicch sublayers are separated by a thin flexible mesh or netting 16'. A further thin flexible mesh or netting 16'' bounds the inner surface of the inner sublayer 17B.

The padding material 17' is covered by a multilayer covering 42 which is designed to prevent itself from bursting into flames, and is also effective for preventing burning of the padding material 17' by preventing flames and/or excessive heat from being transmitted thereto. The covering 42 includes a sheet of heat conducting metallic foil 18' positioned so as to totally overlap the layer of padding material 17'. The foil 18' is preferably provided with a thin reinforcement layer 43 bonded to the undersurface thereof, which reinforcement layer 43 is disposed so as to directly engage the outer surface of the padding material 17'. The reinforcement layer 43 preferably comprises a thin nonwoven fabric. The fabric layer 43 generally has a thickness no greater, and preferably less, than the thickness of the foil 18'.

The covering 42 further includes a thin layer of a flexible and resilient flammable foam 44, such as rubber or plastic foam, which layer is positioned directly on top of and is substantially coextensive with the layer of foil 18'. The foam layer 44 may have a thickness lying generally within the range of between ⅛ to ½ inch, and preferably has a thickness of approximately ¼ inch. The foam layer 44 is in turn covered by an outer covering layer of cloth material 19', which layer 19' is conventionally referred to as the ticking. The ticking 19' is superimposed and substantially coextensive with the foam layer 44 and defines the outer surface of the mattress. The covering 42 may be fixedly secured to the underlying layer of padding material 17' in a conventional manner, as by tufting or stitching. FIG. 9 illustrates the use of stitching 46 for fixedly securing the outer covering 42 to the outermost layer of padding 17a.

While the description as set forth above relates to the top wall 13', it will be recognized that the sidewalls (not shown) of the mattress will be of similar construction so as to provide the desired fire resistance.

The meeting edge portions of the top wall and sidewalls of the mattress construction illustrated in FIG. 9 may again be secured and protected by the formation of an edge similar to the construction illustrated in FIG. 6, which edge as it relates to the mattress construction of FIG. 9 is illustrtated in FIG. 10. The meeting edge portions 30' of the top wall and sidewall, and specifically the meeting edge portions of the covering 42, are positioned mutually adjacent one another and may be fastened together by appropriate stitching 26'. The meeting edge portions 30' may be further secured and protected by an elongated strip of laminated edging material 27' which again comprises a thin strip of metallic foil 47, which foil may be identical in thickness to the foil 18'. The strip of foil 47 preferably has a thin reinforcement layer of a fabric material bonded to the opposite sides thereof. In the illustrated embodiment, layers of fabric 48 and 49 are bonded to the opposite sides of the foil strip 47. The fabric layers 48 and 49 are both preferably of a thin non-woven fabric and are thus substantially identical to the fabric layer 43 as described above.

The mattress construction 10' as illustrated in FIGS. 9 and 10 is highly desirable since the provision of the fabric layer 43 bonded to the undersurface of the foil 18' substantially minimizes the noise generated by the foil. At the same time, the fabric layer, by being bonded to the foil, substantially increases the strength of the foil and particularly prevents breakage or splitting of the foil due to continual flexing of the foil during utilization of the mattress. Still further, the provision of the thin foam layer 44 greatly minimizes and substantially eliminates the noise generated by the foil since the foam layer effectively dampens any noise generated by the foil and prevents transmission of the noise exteriorly of the mattress. At the same time, even though the foam 44 is a flammable material, nevertheless it has been experimentally determined that the thinness of the foam 44, and its disposition immediately over the foil 18', effectively prevents the transmission of excessive heat and flames to the padding 17', while at the same time the ticking 19' and the foam 44 themselves do not burst into flames. In fact, it has been experimentally determined that the covering 42 as illustrated in FIG. 9 is very effective in preventing an ignition of the normally flammable cloth material 19' and foam 44 when a cigarette is laid directly on the material 19'. While a cigarette laid directly on the ticking 19' does cause a burning of the ticking 19' and foam 44 directly in the vicinity of the cigarette, nevertheless it has been determined that the cigarette will burn up completely without causing either the cover material 19' or foam 44 to burst into flames. Rather, the ticking 19' and foam 44 merely char in the immediate vicinity of the cigarette. Further, the foil 18' prevents the cigarette

from causing the padding 17' from bursting into flames.

Although particular preferred embodiments of the invention have been disclosed in detail for illustrative purposes, it will be recognized that variations or modifications of the disclosed apparatus, including the rearrangement of parts, lie within the scope of the present invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a mattress having a relatively thick internal support structure and upper and lower coverings superimposed on and coextensive with the respective upper and lower surfaces of said support structure and fixed relative thereto, comprising the improvement wherein said upper covering includes:

a relatively thick layer of flexible and flammable padding positioned adjacent and overlying the upper surface of said support structure;

a thin sheet of flexible heat conducting metallic foil positioned adjacent and substantially coextensively overlying the upper surface of said layer of padding;

a thin layer of a resilient foam material positioned adjacent and substantially coextensively overlying the upper surface of said sheet of foil, said foil being sandwiched between said padding and said foam material; and

a thin sheet of flexible flammable cloth positioned adjacent and substantially coextensively overlying the upper surface of said layer of foam material, said sheet of cloth comprising the external ticking of said mattress;

whereby said sheet of foil diffuses concentrations of heat as applied to said cloth.

2. A mattress according to claim 1, further including a thin layer of flexible fabric bonded to one side of said foil.

3. A mattress according to claim 2, wherein said thin layer of fabric as bonded to said foil is positioned between said foil and the adjacent surface of said padding means.

4. A mattress according to claim 2, wherein said thin layer of foam material has a thickness of approximately ¼ inch.

5. A mattress according to claim 1, wherein said foam layer is of a flammable material and has a thickness approximately within the range of between ⅛ inch and ½ inch.

6. A mattress according to claim 1, further including a side covering surrounding the side of said support structure and extending substantially perpendicularly between said upper and lower coverings, said side covering being of a layered structure identical to said upper covering.

7. A mattress according to claim 6, wherein said upper and side coverings have coextensive edge portions disposed directly adjacent and fixedly connected to one another, and means coacting with said edge portions for making same fire resistant, said last-mentioned means comprising elongated strip means extending coextensively with the edge portions, said strip means having an elongated strip of heat conductive metal foil associated therewith.

8. A mattress according to claim 1, wherein said lower covering is of a layered structure identical to said upper covering.

9. In a mattress having a relatively thick internal support structure and upper and lower coverings superimposed on and coextensive with the respective upper and lower surfaces of said support structure and fixed relative thereto, comprising the improvement wherein said upper covering includes:

a relatively thick layer of flexible and flammable padding positioned adjacent and coextensively overlying the upper surface of said support structure;

a thin, flexible, fire resistant, laminated layer positioned adjacent and substantially coextensively overlying the upper surface of said layer of padding, said laminated layer including a thin sheet of flexible heat conducting metallic foil substantially coextensively overlying said layer of padding; and

said laminated layer further including a thin layer of flexible flammable fabric positioned adajcent and substantially coextensively overlying said sheet of metallic foil, said layer of flexible fabric being bonded to said sheet of metallic foil;

whereby said sheet of foil diffuses concentrations of heat for preventing burning of said padding.

10. A mattress according to claim 9, further including a thin sheet of flexible flammable cloth positioned adjacent and substantially coextensively overlying said laminated layer so that said laminated layer is disposed between said cloth and said padding, said cloth comprising the external ticking of said mattress.

11. A mattress according to claim 10, further including a thin layer of resilient and flammable foam material positioned adjacent and substantially coextensively overlying the upper surface of said laminated layer, said thin layer of resilient foam material being positioned between said laminated layer and said cloth.

12. A mattress according to claim 9, wherein said thin layer of flexible fabric comprises a flammable cloth which constitutes the external ticking of said mattress, and said sheet of metallic foil being positioned between said external ticking and said layer of padding.

13. A mattress according to claim 9, further including a side covering disposed around the side of said support structure and extending substantially perpendicularly between said upper and lower coverings, said side covering having the opposite edges thereof fixedly connected to respective edges of said upper and lower covering, and said lower and side coverings each being of a layered structure identical to said upper covering.

* * * * *