Method and apparatus for forming a pad used to cover a spring assembly in the construction of a support, such as a mattress or seating means. The pad is constructed to include a resilient, single density layer of fiber elements and a firm, double density layer of fiber elements, with the outside surface of the double density layer being provided with a synthetic backing. The pad is constructed from fabric scraps, wherein the scraps are shredded to form a plurality of fiber elements. Some of the fiber elements are supplied to a first carding station operable for carding the fiber elements to form two lengths of fiber roping which are reciprocally fed over each other and onto the upper surface of a conveyor to form the double density layer of fiber material which is then subjected to a needle punching operation to cause certain of the fiber elements to vertically engage each other. Additional amounts of the shredded fiber elements are supplied to a second carding station operable for forming a third length of fiber material which is reciprocally applied to the upper surface of the double density layer to form a single density layer, both layers of which are subjected to a second needle punching operation to cause certain of the fiber elements of the two layers of fiber material to vertically engage each other. After the two layers of fiber material leave the second needle punching operation, synthetic material is applied to selected portions of the outside surface of the double density layer of fiber material. The pad is then advanced through oven means where the synthetic material is cured. The fiber material leaving the curing oven can be selectively cut into predetermined widths and can be selectively cut into predetermined lengths or can be wound onto reel means for storage.

11 Claims, 13 Drawing Figures
MATTRESS PAD AND METHOD AND APPARATUS FOR CONSTRUCTING THE SAME

BACKGROUND OF THE INVENTION

This invention relates to an improved pad and method and apparatus for forming same and is more particularly concerned with a pad used to cover a mattress spring assembly, or furniture utilizing springs in its construction.

The prior art mattress pad construction includes only a single density layer of material which is applied to the upper surface of the spring assembly. When the prior art pad is constructed of sufficient strength to prevent the springs from separating the pad construction, the pad will not offer a comfortable supporting surface, and if the pad is constructed sufficiently loose to provide a comfortable supporting surface, the pad is easily damaged when placed on the spring assembly.

Further, in the prior art construction of a mattress pad, the synthetic applicator means is not capable of applying synthetic material to only selected portions of the pad.

SUMMARY OF THE INVENTION

The above disadvantages have been overcome by the present invention which basically includes a pad constructed of two layers of fiber material, one layer being a resilient, single layer of fiber elements and the second layer being a firm more dense layer of fiber elements, and wherein synthetic backing means is applied to the outside surface of the firm, more dense layer. The pad is adapted to be supported on a mattress spring assembly with the synthetic backing contacting the springs, and with the lateral edges of the pad adapted to be folded around a border element provided on the spring assembly. The pad is then secured in place by inserting the retaining means, such as staples, through the folded portions of the lateral edges of the pad.

One important feature of the present invention resides in the method used in the pad construction, wherein a number of layers of the fiber material are applied to the upper surface of a conveyor mechanism, with the layers being needle punched to form a firm, dense layer of fibers. After the first firm dense layer of fiber materials is formed, a second layer of less dense fiber materials is applied to the pad, with the second less dense layer being needle punched to cause vertical engagement of certain of the fiber elements of the less dense layer with certain of the fiber elements of the firmer, more dense layer. The pad is then advanced to a synthetic applicator station wherein synthetic material is applied to selected portions of the outside surface of the firm more dense layer of fiber material.

It is therefore a primary object of the present invention to provide an improved pad for use in the construction of a mattress.

Another object of the present invention is to provide a mattress pad having a resilient less dense layer of material, a firm more dense layer of material and a synthetic backing.

A further object of the present invention is to provide a method and apparatus for constructing a mattress pad utilizing scraps of fabric or fiber materials.

A still further object of the present invention is to provide an arrangement of a fabric scrap disintegrator, a number of carding assemblies or other batt forming equipment, a number of needle punch looms, a synthetic material applicator and a curving oven all of which are conveniently located relative to conveying apparatus for defining a continuous run method of forming a mattress pad.

Yet another object of the present invention is to provide an improved applicator for use in applying synthetic material to selected portions of a surface of a fabric material.

An additional object of the present invention is to provide an improved pad construction, including method and apparatus for forming the same which are simple in construction and use, economical to manufacture and reliable in performance.

These and other objects and advantages of the details of construction will become apparent after reading the following description of the illustrative embodiment with reference to the attached drawings, wherein like reference numerals have been used to refer to like parts throughout the several figures, and wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a mattress utilizing a pad constructed in accordance with the principles of the present invention, with certain parts broken away and shown in section for purpose of clarity;

FIG. 2 is an enlarged fragmentary elevational view of the mattress shown in FIG. 1, with certain parts broken away and shown in section for purpose of clarity;

FIG. 3 is a fragmentary plan view as seen along line 3—3 of FIG. 2;

FIG. 4 is an enlarged vertical sectional view taken through the pad constructed in accordance with the principles of the present invention;

FIGS. 5A, 5B and 5C are top plane views, adapted to be connected along the indicated match lines, showing the layout of the apparatus used in constructing the mattress pad shown in FIGS. 1—4;

FIG. 6 is a schematic vertical sectional view taken along line 6—6 of FIG. 5A.

FIG. 7 is an enlarged fragmentary perspective view showing a portion of the conveying apparatus utilized in FIGS. 5A—5C.

FIGS. 8A and 8B are elevational schematic views, adapted to be connected along the indicated match lines, showing a portion of the apparatus used in constructing the mattress pad;

FIG. 9 is an enlarged fragmentary elevational view of the synthetic material applicator station, with certain parts broken away and shown in section for purpose of clarity; and

FIG. 10 is a schematic top plan view showing the cutting apparatus associated with the mattress pad construction.

DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENTS

Referring now to the drawing, the present invention will be described with reference to a mattress generally represented by the reference numeral 10 and shown in FIGS. 1—4; a fabric material disintegrator station generally represented by the reference numeral 30 and shown in FIG. 5A; a first carding station or other batt forming equipment, generally represented by the reference numeral 50 and shown in FIG. 5A; a first conveyor assembly generally represented by the reference numeral 70 and shown in FIGS. 5A and 7; a first needle punching station generally represented by the refer-
ence numeral 80 and shown in FIG. 5A; a second conveyor assembly generally represented by reference numeral 90 and shown in FIGS. 5A–5C and 7; a second carding station or other batt forming equipment, generally represented by the reference numeral 100; a second needle punching station generally represented by the reference numeral 110 and shown in FIGS. 5B and 8A; a synthetic material applicator station generally represented by the reference numeral 150 and shown in FIGS. 8A and 9, an oven curing station generally represented by the reference numeral 200 and shown in FIGS. 5B, 5C and 8B and a processing station generally represented by the reference numeral 230 and shown in FIGS. 8B and 10.

As shown in FIG. 4, the mattress pad 10 constructed in accordance with the present invention includes a top resilient less dense layer 11 of fiber elements and a bottom firm more dense layer 12 of fiber elements. A synthetic backing material 13 is applied to the outside surface of the firmer, more dense layer 12. In utilizing the mattress pad 10, the pad is supported on a conventional box frame assembly 14 having a number of coil spring elements 15 and including a border element 16. The pad is supported on the upper surface of the spring assembly with the synthetic backing 13 contacting the spring elements 15. The lateral edges of the pad 10 are folded around the border element 16, as shown in FIGS. 1 and 2, with staple means 17 being inserted therethrough for retaining the pad in place on the spring assembly. After the pad 10 has been secured to the spring assembly, a protective covering 18 is fitted over the pad and spring assembly, with the covering being secured to the bottom edges of spring assembly 17 by conventional means, such as staples (not shown).

The mattress pad 10 having the two layers of fiber materials will provide a top resilient layer 11 for comfort and will provide a more dense layer 12 for strength. The two layers 11, 12 are constructed of a plurality of fiber elements, in a manner as will be described in detail below.

As shown in FIG. 5A, the apparatus utilized in constructing the mattress pad embodying the principles of the present invention includes a fabric material disintegrator station 30. The fabric material disintegrator station 30 is of conventional construction and is adapted to receive a plurality of fabric scraps introduced through an infeed mechanism 31, with the disintegrator station being operable for separating the fabric scraps into a plurality of independent fiber elements which are transferred from a discharge end 32 by conventional pneumatic conveying conduit means 33 to a distribution hopper 34. Distribution hopper 34 is designed for storing a quantity of the fiber elements and includes a first discharge conduit 35 operable for pneumatically conveying a portion of the fiber elements to the first carding assembly 50 or other batt forming system and includes a second discharge conduit 36 operable for pneumatically conveying an additional portion of the fiber elements to the carding assembly 100 or other batt forming system. The internal mechanism of the material disintegrator station 30 is conventional in the textile machine art and the details will not be described herein.

As shown in FFIGS. 5A and 6, some of the fiber elements from distribution hopper 34 are transferred through pneumatic conduit means 35 to the carding station infeed end 51 or other batt forming equipment. Infeed end 51 is provided with a discharge hopper 52. Carding station 50 includes a pair of carding machines 53, 54 or other batt forming equipment. Each of the carding machines 53, 54 or other batt forming equipment is of conventional construction and are readily available in the textile machine art. Discharge hopper 52 includes means for discharging the fiber elements onto the infeed conveyors 55 of the two carding machines 53, 54 or other batt forming equipment. The machines 53, 54 are operable for forming a web or batt of material containing fiber elements. The web or batt of fiber elements are transferred to a reciprocally operable feeding station 65 having a conveyor 66 and a number of feeding roller means 67, 68. The length of material passing through feeding rollers 67, 68 is introduced to a reciprocally operable carriage 64. Carriage 64 is supported by conventional guide means and includes power means (not shown) for effecting cyclic reciprocating movement of the carriage so that the length of fiber material can be reciprocally applied across the upper surface of a first conveying assembly 70. Since the carding station 50 includes a pair of carding machines 53, 54 or other batt forming equipment with each machine, including a reciprocally operable feeding station 65, the conveying assembly 70 will receive two layers of fiber material which are reciprocally fed back and forth across the upper surface of the conveying apparatus to form a dense layer of fiber material.

As shown in FFIGS. 5A and 7, the conveyor assembly 70 includes an endless conveyor 71 supported by conventional frame means 72 and a number of roller guide means 73 (only one roller is shown in FIG. 7; however, it is to be understood that the conveyor would include a number of roller guide means 73.) Endless conveyor 71 is supported in a horizontal plane and includes a receiving end 74 located adjacent carding station 50 or other batt forming equipment and discharge end 75. Conveyor 71 is driven in clockwise direction, as shown in FIG. 7, so that the upper run of the conveyor will be operable for advancing supported material beneath a needle punching station 80. The needle punching station 80 includes a conventional needle punch loom having a plurality of needle elements 81, with the needle elements 81 being driven in vertical translating motion by conventional drive means (not shown). The needle elements 81 are detailed in operation for vertically engaging the two layers of fiber material being advanced along the upper run of conveyor 71 to cause certain of the fiber elements of the two layers to vertically engage each other to form a single dense layer of fiber material.

As shown in FFIGS. 5A and 7, the conveyor assembly 70 is supported for conveying the single dense layer of fiber material along a predetermined path in a first direction with the single dense layer of fiber material being inverted and advanced along a second predetermined path in an angular disposed direction by a second conveyor assembly 90. The material is transferred from the first conveyor assembly 70 to the second conveyor assembly 90 by an inverting guide means 76. Inverting guide means 76 is supported above the discharge end of the upper run of endless conveyor 71 and above the layers of supported material. Guide means 76 includes a guiding roller supported for rotary movement in a horizontal plane and in an orientation angularly disposed at substantially 45° relative to the longi-
tudinal axis of conveyor 71. The single dense layer of fiber material is conveyed beneath the guide means 76 with the single dense layer of fiber material being guided around roller 77 for movement along the second predetermined path by the conveyor apparatus 90. Conveyor apparatus 90 includes an endless conveyor member 91 supported by conventional frame means (not shown) and a number of roller guide elements 92, 93.

As shown in FIGS. 5A and 8A, a second carding station 100 and other batt forming equipment is located adjacent the second conveyor assembly 90. Carding station 100 includes a single carding machine 101 or other batt forming equipment identical in construction to machines 53, 54, utilized in carding station 50. Machine 101 is adapted to receive a plurality of fiber elements transferred through the pneumatic conveying means 36 and discharged into a discharge hopper 102. The discharge hopper 102 is adapted to feed the fiber elements into the infeed mechanism of machine 101 with the fiber elements being advanced through the machine for formation of a web or batt of fiber material which is then transferred to a reciprocally operable feeding station 105. Feeding station 105 is identical in construction to feeding stations 65 utilized in station 50. Feeding station 105 is operable for reciprocally feeding the length of material formed by machine 101 so that the length of material will be reciprocally applied across the upper surface of the dense layer of fiber material being advanced along the upper run of endless conveyor 91. After the two layers of material leave station 100 and the reciprocally operable feeding means 105, the layers of material are then advanced beneath a second needle punch loom means 110. The second needle punch loom means 110 includes a plurality of needle elements (not shown) and is operable for needle punching the two layers of fiber material to cause the fiber elements in the single less dense layer to vertically engage certain of the fiber elements in the more dense layer so as to interconnect the two layers of fiber material. The needle punch loom means 110 is of conventional construction in the textile art and is substantially the same as the needle punch loom 80 utilized for needle punching the layers of material leaving station 50.

As shown in FIGS. 5B and 8A, the apparatus utilized in the mattress pad of the present invention includes a pair of material reeling stations 120, 121. Reeling stations 120, 121 are selectively operable and can be utilized when it is desirable to reel a length of material onto winding beams or spools 123, 124, respectively. Reeling stations 120, 121 can be used when it is desirable to receive and store a quantity of the fabric material or can be used should the applicator station 150 and/or oven curing station 200 down line from the reeling means be inoperative for any reason. However, in a continuous run process of the mattress pad construction, the length of material is advanced past the reeling stations 120, 121 by a framework assembly 125 having a plurality of guide rollers 126. The length of material is then advanced to an accumulator station 130. Accumulator station 130 includes a number of guide rollers 131, with the accumulator station 131 being operable in a conventional manner for accumulating a predetermined quantity of the length of material during a material feeding operation. The length of material leaving the accumulator station 130 is then advanced to the synthetic material applicator station 150, as shown in FIGS. 8 and 9. The synthetic material applicator station 150 includes a structural framework having a plurality of vertical frame members 151 and a plurality of horizontal tubular frame members 152. The frame members 151, 152 are connected adjacent their junctures by conventional welding or nut and bolt connecting means (not shown). Material applicator station 150 is provided with a vat or trough means 154 operable for containing a predetermined quantity of synthetic material 155. An applicator roller 156 is supported for rotary movement through the synthetic material 155 in such a manner that a quantity of synthetic material will adhere to the peripheral surface of roller 156 and will be carried up for deposit on the underside of the length of material 10 being advanced through the applicator station. Applicator station 150 includes a number of fixed guide rollers 157, 158 and 159. Applicator station 150 also includes a plurality of adjustable guide rollers 160, 161 and 162. Adjustable guide rollers 160, 161 are supported on the extended ends of piston rod means associated with conventional cylinder means 164, 165, respectively. Cylinders 164, 165 are supported adjacent their upper or base end by a horizontal frame member 166. A fluid or air medium for effecting operation of cylinders 164, 165 is introduced through supply lines 167, 168. Adjustable guide rollers 160, 161 are operable for effecting engagement and disengagement of the length of material 10 with the surface of the applicator roller 156. When the roller guide elements 160, 161 are adjusted in a manner as shown in the solid line position of FIG. 9, the length of material 10 will be moved into engagement with applicator roller 156. However, when the roller guide elements 160, 161 are adjusted to the phantom line position as shown in FIG. 9, the length of material will not contact the peripheral surface of synthetic material applicator roller 156. Thus, by adjustment of guide rollers 160, 161 the length of material 10 can be selectively engaged with synthetic material applicator roller 156 so that synthetic material can be applied to selected portions of the length of material 10. Adjustable roller 162 is supported by a conventional crank and threaded screw adjusted means 170 so that roller 162 can be adjusted in a vertical plane. Roller 162 is detailed in vertical adjustment for effecting correct alignment between the length of material 10 and applicator roller 156 when moved to a material applying position.

As shown in FIG. 9, material applicator station 150 includes a number of horizontally spaced doctoring blades 173. The doctoring blades 173 are operable for removing excess synthetic material from the applicator roll. Thus, when the length of material is in contact with the applicator roll, that portion of the applicator roll which has not been in contact with a doctoring blade will deposit a coating of synthetic material, while that portion of the applicator roller which has been in contact with a doctoring blade will not deposit the synthetic material i.e. there will be a void or absence of synthetic.

After the length of material 10 leaves the synthetic material applicator station 150, the length of material is transferred through a curing oven 200 or other means of curing and drying. Curing oven 200 is of conventional construction and includes an entrance opening 201 having a roller guide element 202 supported adjacent the opening 201 for guiding the length of ma-
material into the curing oven. Curing oven 200 includes a plurality of guide rollers 203 for guiding the length of material along a predetermined path through the oven. Oven 200 is provided with conventional heating medium hot air, infrared or radio frequency for heating the synthetic material to cause the material to cure and be fixed to the bottom surface of the double density layer of material. Curing oven 200 is detailed in dimension and the period of time the material is maintained in the curing oven is sufficient to effect a cure and fixation of the synthetic material to the layers of fiber elements.

After the length of material 10 leaves the curing oven 200, the material is transferred to an accumulator means 210. Accumulator means 210 includes a plurality of accumulator rollers 211 supported in a conventional manner on a framework support means 212. The length of material leaving the accumulator 210 is fed onto the upper run of an endless conveyor 220. endless conveyor 220 is supported by a number of roller guide elements 221 and is operable for conveying the length of material to a material cutting station 230.

As shown in FIG. 10, the material cutting station includes a number of cutting elements 231, 232 which are operable for trimming the length of material to a predetermined width. Also, the cutting station cutting means 231, 232 are supported for lateral adjustment across the material for varying the width of material and can be provided with additional cutting means (not shown) for cutting the material into a number of predetermined widths as it is moved or advanced by the endless conveyor 201. The material cutting station 230 also includes a cutting element 233 operable for making selected transverse cuts across the length of material 10 to divide the length of material into a number of predetermined length mattress pads. The material cutting element 233 is selectively operable and when it is not desired to cut the length of material into a number of predetermined length mattress pads, the length of material can be transferred to a reel station 240 having a beam or reeling spool 241. Reeling station 240 is utilized when it is desired to transfer a quantity of the mattress pad material to a remote location.

The above described apparatus for effecting the formation of a mattress pad embodying the principles of the present invention are driven by conventional motor drive means (not shown) such as electric motors, and the various components of each station operate in a conventional manner and are readily available in the textile machine industry. Therefore, the details of construction of each of the station components have not been described, but only the general arrangement of the components relative to each other are shown and described so that a continuous mattress pad forming operation can be effected to economically construct a mattress pad having a resilient less dense layer of fiber elements and a firmer, more dense layer of fiber elements and including a synthetic backing.

It now becomes apparent that the above described illustrative embodiments of a mattress pad and the method and apparatus used in the mattress pad construction are capable of obtaining the above stated objects and advantages. It is obvious that those skilled in the art may make modifications in the details of construction without departing from the spirit of the invention which is to be limited only by the scope of the appended claims.

What is claimed is:

1. A method of forming a pad for use in covering a spring assembly used in the construction of a support, such as a mattress or seating means utilizing spring constructions, including the steps of:
   a. forming a first web or a first layer of fiber material having a plurality of fiber elements;
   b. reciprocally feeding said first web or a first layer of fiber material along equal opposite first and second directions a predetermined distance while advancing said material in a third angularly disposed direction along a predetermined path to form a first layer of fiber material having overlapping fiber elements;
   c. forming a second web or a second layer of fiber material having a plurality of fiber elements;
   d. reciprocally feeding said second web or a second layer of fiber material along said equal opposite first and second directions said predetermined distance while applying said second web or a second layer of fiber material to the upper surface of said first layer of fiber material;
   e. moving said predetermined path to form said second layer of fiber material supported on said first layer of fiber material, each having a plurality of overlapping fiber elements;
   f. needle punching said second and third layers of fiber material moving along said predetermined path so as to vertically engage certain of the fiber elements of said first and second layers whereby a single layer of more dense fiber material is formed;
   g. forming a third web or a third layer of fiber material having a plurality of fiber elements;
   h. reciprocally feeding said third web or a third layer of fiber material along equal opposite first and second directions a predetermined distance while applying said third web or a third layer of fiber material to the upper surface of said layer of more dense fiber material to form a first more dense layer of fiber material and a second resilient less dense layer of fiber material with said single resilient less dense layer supported on said more dense layer;
   i. applying synthetic backing forming material to at least a portion of an outer surface of said more dense layer of fiber material for forming a synthetic backing along said surface; and
   j. curing said synthetic backing forming material.

2. A method of forming a pad as defined in claim 1 including a further step of cutting said layers of fiber material into predetermined lengths.

3. A method of forming a pad as defined in claim 2 including a further step of cutting said layers of fiber material into a predetermined width.

4. A method of forming a pad as defined in claim 1 including a further step of winding said layers of fiber material with said synthetic backing onto reel means.

5. A method of forming a pad as defined in claim 1 further characterized in that said synthetic material is selectively applied to predetermined portions of the outer surface of said more dense layer of fiber material, as said material is moved along said predetermined path.

6. A method of forming a pad as defined in claim 1 further characterized in that said more dense layer of
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fiber material is angularly advanced along a second predetermined path prior to receiving said less dense layer of fiber material.

7. A method of forming a pad as defined in claim 6 further characterized in that said more dense layer of fiber material is inverted for movement along said second angularly disposed path.

8. A method of forming a pad as defined in claim 1 further characterized in that said lengths of fiber material are formed by disintegrating scraps of material and with the fiber element obtained from said scraps of material processed to form said web or batt of fiber material.

9. A method of forming a pad as defined in claim 8 further characterized in that said fiber elements obtained from said scraps of material are carded to form said said web or batt of fiber material.

10. A method of forming a pad for use in covering a spring assembly used in the construction of a support, such as a mattress or seating means utilizing spring constructions, including steps of:

a. forming a first web or batt of fiber material having a plurality of fiber elements;

b. reciprocally feeding said first web or batt of fiber material along equal opposite first and second directions a predetermined distance while advancing said material in a third angularly disposed direction along a predetermined path to form a first layer of fiber material having overlapping fiber elements;

c. forming a second web or batt of fiber material having a plurality of fiber elements;

d. reciprocally feeding said second web or batt of fiber material along said equal opposite first and second directions a predetermined distance while applying said second web or batt of fiber material to the upper surface of said first web or batt of fiber material moving along said predetermined path to form a second layer of fiber material supported on said first layer, each having a plurality of overlapping fiber elements;

e. needle punching said two layers of fiber material moving along said predetermined path so as to vertically engage certain of the fiber elements of said first and second layers to form a layer of dense fiber material;

f. forming a third web or batt of fiber material having a plurality of fiber elements;

g. reciprocally feeding said third web or batt of fiber material in opposite directions an equal predetermined distance while applying said third web or batt of fiber material to the upper surface of said more dense layer of fiber materials moving along said predetermined path to form a number of layers of fiber material, one layer being of more dense fiber elements and a second layer being of more resilient, less dense fiber elements;

h. needle punching said two variable density layers of fiber materials moving along said predetermined path so as to vertically engage certain of the fiber elements of said two layers.

11. A method of forming a pad as defined in claim 10 including a further step of winding said layers of variable density fiber material onto reel means.

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