United States Patent

Yamamoto

[15] **3,643,308**

[45] **Feb. 22, 1972**

[54] METHOD FOR MANUFACTURING MATTRESSES

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[22] Filed: **June 24, 1970**

[21] Appl. No.: **49,010**

[52] **U.S. Cl.**.....**29/91.1**, 53/24, 53/30

[51] **Int. Cl.**.....**B68g 9/00**, B65b 43/00

[58] **Field of Search**.....29/91.1, 91.5; 5/351; 53/24, 53/30, 114, 125; 206/65 S, 45.33; 229/DIG. 12

[56] **References Cited**

UNITED STATES PATENTS

3,146,143	8/1964	Bolesky	29/91.1
3,187,477	6/1965	Dreyfus	53/30
3,309,835	3/1967	Peppler	53/30

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[57] **ABSTRACT**

A method for manufacturing mattresses including a cushion member wrapped in a cover which comprises receiving the cushion member in the cover initially having a larger inner capacity than the volume of the cushion member and formed of fabric woven from heat shrinkable fibers and subjecting the cover to heat shrinkage until the inner capacity of the cover becomes slightly smaller than the volume of the cushion member.

4 Claims, 7 Drawing Figures

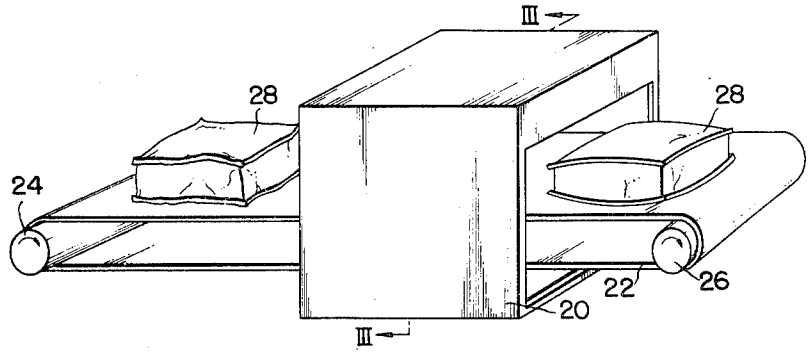


FIG. 1

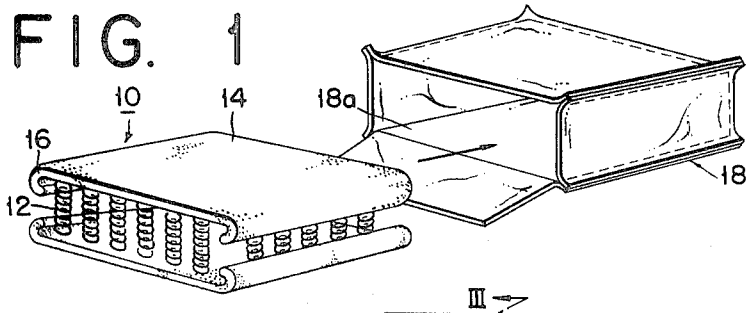


FIG. 2

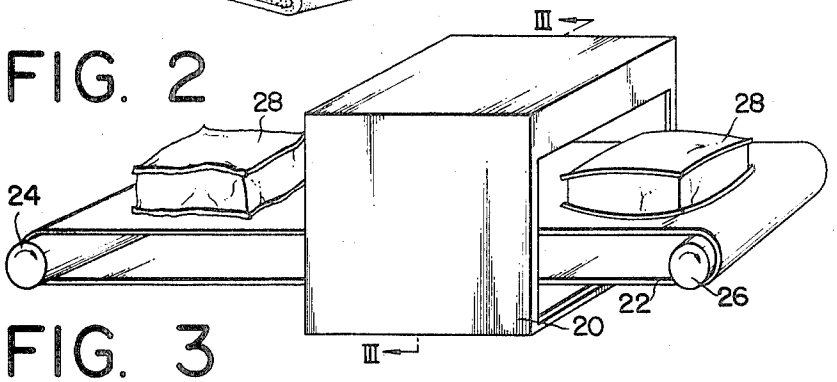


FIG. 3

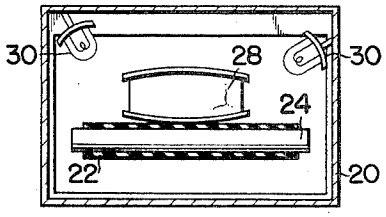


FIG. 4

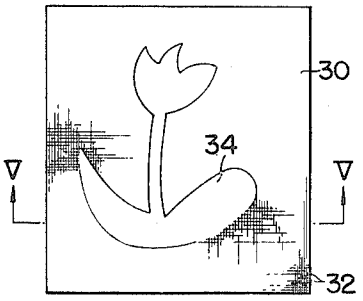


FIG. 6

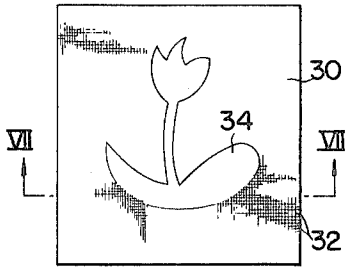


FIG. 5

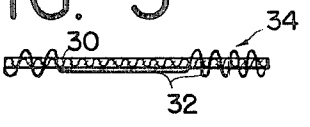
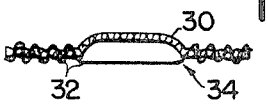


FIG. 7



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METHOD FOR MANUFACTURING MATTRESSES

The present invention relates to a method for manufacturing mattresses having a cushion member wrapped in a cover formed of woven fabric.

Such type of mattress is generally manufactured by wrapping a cushion member in a baglike cover open on one side and sewing together both ends of the opening directly or with the aid of an ornamental tape. The greatest problem with the customary process of manufacturing a mattress arises from the request that when there is inserted a cushion member into a cover, the inner capacity of the cover has to be made slightly smaller than the volume of the cushion member so as to leave no loose portions in the cover. This naturally leads to a great deal of time and labor in fitting the cushion member into the cover and thereafter sewing up the cover opening. Conversely, if there was used a cover whose inner capacity was sufficiently large to facilitate these operations, then the resultant mattress would present an undesirable appearance due to loose portions remaining in the cover.

The primary object of the present invention is to provide a method for manufacturing an attractive mattress by a simple process. The invention relates to a method for manufacturing a mattress consisting of a cushion member wrapped in a cover so as to be compressed thereby. More particularly, the method of the invention comprises wrapping the cushion member in a cover which initially has a larger inner capacity than the volume of the cushion member and is formed of heat shrinkable fabric, fully heating the cover to effect its heat shrinkage until the inner capacity of the cover finally becomes smaller than the cushion member.

One of the great advantages obtained by the present invention is that the insertion of the cushion member into the cover and the final closing of the cover can be carried out very easily. Such advantage is realized by the use of a cover which, according to the present invention, initially has a slightly larger inner capacity than the volume of the cushion member and is formed of heat shrinkable fabric. Since the cover used has a large inner capacity than the volume of the cushion member, it still retains some loose portions after it receives the cushion member. These loose portions, however, are eliminated by the heat shrinkage to which the cover fabric is subjected during the subsequent heating process. At the final stage, therefore, the mattress of the present invention has a shrinked cover which compresses the cushion member from its surface and is itself stretched by the repulsive force of the cushion member just as is the case with the conventional mattress prepared by forcibly inserting a cushion member into a cover which originally has a slightly smaller inner capacity than its volume.

The present invention can be more fully understood from the following detailed description when taken in connection with reference to the accompanying drawing, in which:

FIG. 1 is a perspective view schematically showing the process of inserting a cushion member into a cover;

FIG. 2 is a schematic perspective view of a heating device for heating the cover in which the cushion member is wrapped so as to effect the thermal shrinkage of the cover;

FIG. 3 is a sectional view taking along the line III—III in FIG. 2;

FIG. 4 is a fragmental plan view of a cover fabric usable in the invention before it is subjected to thermal shrinkage;

FIG. 5 is a sectional view along the line V—V in FIG. 4;

FIG. 6 is a fragmental plan view of the cover fabric shown in FIGS. 4 and 5 after its thermal shrinkage; and

FIG. 7 is a sectional view along the line VII—VII in FIG. 6.

Referring to FIG. 1, numeral **10** generally denotes a cushion member, which comprises a spring assembly **12** consisting of a plurality of coil springs arranged in parallel and layers of cushion material **14** and **16** positioned on the top and bottom sides of the spring assembly **12**. Numeral **18** shows a cover, which is prepared, for example, by sewing together the adjacent edges of six pieces of fabric so as to assume a hexahedral form. The interior space of the cover has a slightly greater capacity than the uncompressed volume of the cushion member, namely, about 10 to 20 percent larger in width, length and thickness. The six pieces of fabric are made of the later described heat shrinkable fibers. One of them is sewn with an adjacent piece only on one side and the three other sides are left unfastened, thereby forming an opening **18***a*. The method of the present invention starts with the step on inserting the cushion member **10** into the cover **18** through the opening **18***a*, sewing the three unfastened edges of the aforesaid piece of fabric with the corresponding edges of the other adjacent pieces of fabric to close the cover opening **18***a*. It will be noted that since under such condition, the inner dimensions of the cover **18** are slightly larger in width, length and thickness than the uncompressed volume of the cushion member **10**, the cover **18** still has loose portions.

There is heated an assembly of the cushion member **10** and cover **18** by a heating device illustrated in FIGS. **2** and **3**. The heating device comprises a tunnel type heating chamber **20** and conveyor belt **22** stretched across a pair of a feed roller **24** and discharge roller **26** by being wound about them in a manner to penetrate the heating chamber **20**. A mattress assembly **28** consisting of the cushion member **10** shown in FIG. **1** and cover **18** preliminarily wrapping it is mounted on the belt **22** at a point adjacent to the feed roller **24** and travels through the heating chamber **20** as the result of the movement of the belt **22**. While passing through the heating chamber **20**, the assembly **28** is heated by a plurality of infrared lamps **30** fitted to the inner wall surfaces of the heating chamber **20**. The amount of heat applied to the assembly **28** is adjusted by the amount of heat radiated from the infrared lamps **30** as well as by selection of the time the assembly is retained in the heating chamber **20** thereby sufficiently heating the assembly **28** to allow the cover fabric to be thermally shrinked in two directions parallel to the warps and woofs constituting the fabric. After leaving the heating chamber, therefore, the cover **18** is brought to a state slightly to compress the cushion member **10** due to the shrinkage of its fabric and kept stretched by the repulsive force of the cushion member **10** wrapped therein.

For practising the present invention, there may be used any kind of fabric, provided that it is woven from fibers which are thermally shrinkable in the lengthwise direction without losing their original fundamental properties. Preferable heat shrinkable fabrics include those prepared from fibers, for example, polyvinyl chloride, polyethylene, or polystyrene. These fibers have a nature to be easily heat shrinked in the longitudinal direction. For example, the polyvinyl chloride fiber marketed by Societe Rhovyl of France under the trade name "Rhovyl" shrinks itself longitudinally about 15 percent at 80° C. and about 38 percent at 100° C. when heated in the dried state for 5 minutes with both ends left free. While the heat shrinkability of fibers widely varies with their forms or hysteresis, selection of fibers having a desired heat shrinkability will be apparent to those skilled in the art.

In this connection it is desired that a heat shrinkable cover fabric used in the present invention be shrinked substantially to an equal extent in both directions of warps and woofs. From this point of view, therefore, it is preferred that the cover fabric be woven under the same condition from the warps and woofs prepared according to the same specification. Even where such conditions may very, the lengthwise and crosswise shrinkability of the fabric can be properly controlled by changing the materials of warps and woofs, number of their twists, their morphological forms or the degree of their arranged compactness. Such control may also be effected by preparing either or both of warps and woofs selectively from composite spun yarns consisting of two or more different fibers. Alternatively, it is an effective means to use a cover fabric woven from a mixture of two or more yarns made of different materials. In any case, it should be avoided to carry out mixed spinning or weaving in preparing the cover fabric in such form as will seriously obstruct the original heat shrinkability of the fibers used.

A modification of mixed weaving may be realized by preparing warps and woofs from heat shrinkable and substan-

tially non-heat-shrinkable fibers respectively, thereby forming a desired fabric pattern. When subjected to heat shrinking treatment, such fabric not only displays lengthwise and crosswise shrinkage as a whole, but also presents protuberances or depressions corresponding to said pattern. Such convex and concave forms will furnish the cover with a unique appearance as illustrated in FIGS. **4** and **5**.

Referring to FIGS. **4** and **5**, the base fabric **30** is first woven only from substantially non-heat-shrinkable fibers. Then into said base fabric **30** are additionally woven yarns made of heat shrinkable fibers **32** longitudinally and transversely by mechanical means. Referring to the desired pattern **34**, the heat shrinkable yarns **34** are disposed on the underside of the base fabric **30**. When the cover fabric is sufficiently heated to permit the lengthwise shrinkage of the additionally incorporated fibers, said fibers **32** shrink themselves, whereas the base fabric **30** remains substantially unshrinked, so that those portions of the base fabric **30** corresponding to the pattern are raised as shown in FIGS. **6** and **7**.

The aforesaid preferred embodiment uses infrared lamps housed in the heating chamber **20** to heat the cover. However, heating for the shrinkage of the cover may be effected by other means, for example, a gas burner, hot air or steam. In this connection it is preferred that the assembly of the cushion member and cover be placed on the surface of a separate member which will not obstruct the shrinkage of the cover. The desirable surface may be such as will be presented by rollers or netting.

As mentioned above, the present invention enables the cushion member to be easily inserted into the cover whose

inner capacity is larger than the volume of the cushion member and facilitates the subsequent operation of closing the cover. Further, the finished mattress has a cover tightly wrapping the cushion member, so that it presents an excellent appearance and gives the user a pleasant feeling as is realized in the case where there is prepared a mattress by forcibly inserting a cushion member into a cover which is originally designed to have a slightly smaller inner capacity than the volume of the cushion member.

I claim:

1. A method for manufacturing mattresses consisting of a cushion member wrapped in a cover so as to be compressed thereby, which comprises the steps of inserting the cushion member into the cover which initially has a larger inner capacity than the volume of the cushion member and is formed of heat shrinkable fabric, heating the cover to a sufficient temperature to effect its shrinkage until the inner capacity of the fabric finally becomes smaller than the volume of the cushion member.

2. A method according to claim **1** wherein the cover fabric is woven from warps and woofs having substantially the same heat shrinkability.

3. A method according to claim **2** wherein the warps and woofs constituting the cover fabric respectively consist of a plurality of fibers prepared from a single kind of material.

4. A method according to claim **2** wherein the warps and woofs constituting the cover fabric are respectively formed of a plurality of fibers prepared from two or more different materials.

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