June 24, 1969 H. H. LOVETTE ET AL 3,452,127

METHOD OF MAKING AN INNERSPRING BODY SUPPORTING ARTICLE

Original Filed Dec. 28, 1965

FIG 1

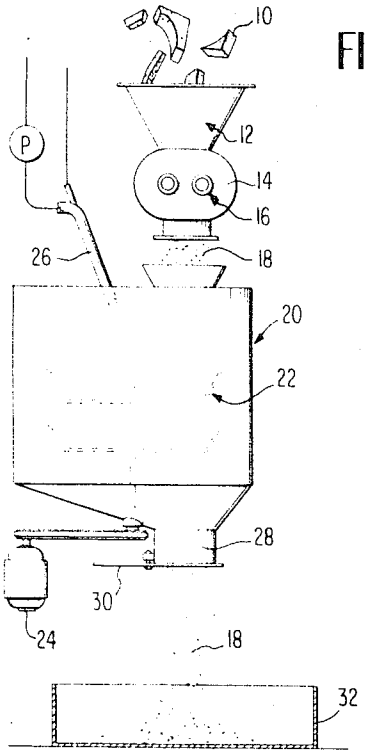


FIG 2

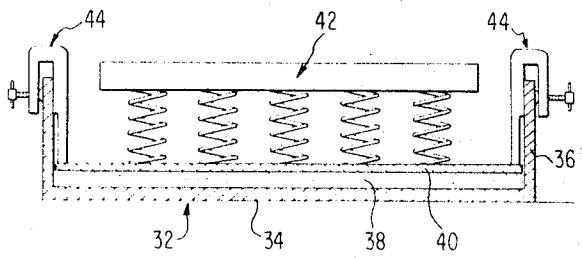
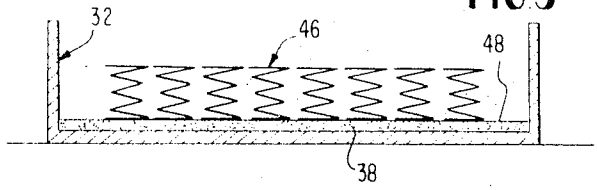


FIG 3



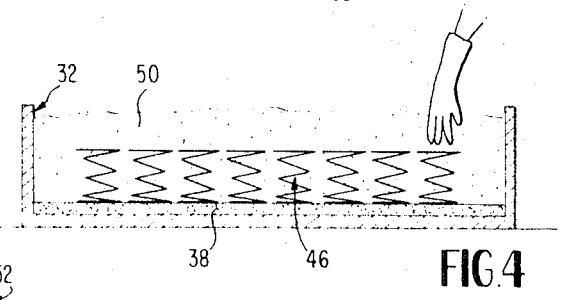


FIG 4

FIG 5

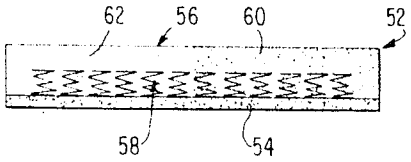
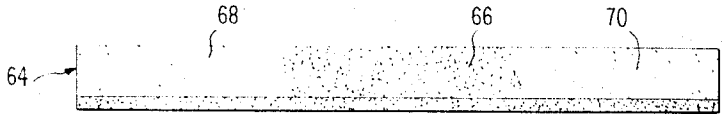


FIG 6



INVENTORS

HENRY H. LOVETTE

EARL W. HILL

BY Jennie and Smiley

ATTORNEYS

United States Patent Office 3,452,127
Patented June 24, 1969

3,452,127

METHOD OF MAKING AN INNERSPRING BODY SUPPORTING ARTICLE

Henry H. Lovette, 2431 English Road, High Point, N.C. 27260, and Earl W. Hill, Rte. 3, Box 1973, High Point, N.C. 27263

Original application Dec. 28, 1965, Ser. No. 516,988, now Patent No. 3,325,834, dated June 20, 1967. Divided and this application May 8, 1967, Ser. No. 659,245
Int. Cl. B29d 27/00; B32b 25/02
U.S. Cl. 264—113 5 Claims

ABSTRACT OF THE DISCLOSURE

A method of preparing a mattress or similar article having innersprings embedded in adhering particles of multicellular resilient spongy material to provide a sturdy long-lasting resilient unitary structure in which particles of resilient spongy material coated with an adhesive are deposited and pressed in a mold, an innerspring structure is placed on the pressed material and is then covered completely with the coated particles and the article is pressed in its mold until the adhesive sets to form a unitary structure.

This is a division of application Ser. No. 516,988, filed Dec. 28, 1965, now issued as patent 3,325,834.

This invention generally appertains to improvements in a method of forming body supporting articles in the nature of seating, reclining or sleeping equipment and, more particularly, relates to new and novel improvements in a method for making innerspring seats, cushions, mattresses and the like articles.

It is an established commercial manufacturing practice to form seats, cushions, mattresses and the like articles for seating, reclining or sleeping purposes from multicellular spongy material, which is poured in a liquid state around a spring unit and then cured so that the resultant molded body encases and conceals the spring construction. Such articles have decided advantages over foam rubber or plastic articles, without an innerspring construction, inasmuch as they are more yieldable and comfortable and tend to maintain their shape for a longer period of time.

However, such foam rubber or plastic articles, which are molded around a spring construction, have decided disadvantages, from a standpoint of long lasting comfortable use, appearance and utility and also from a standpoint of production costs and times.

In the first instance, such innerspring articles, after a long period of use, tend to loose their resiliency and the edges thereof do not retain their shape but instead tend to sag, whereby firm and even, overall support is not provided. Furthermore, the springs of the spring unit have a decided tendency to squeak which is irritating, particularly when the article is in the form of a mattress.

In the second instance, the formation of the articles from virgin liquid foam, such as polyurethane, is expensive because of the cost of the material and the manner in which the article must be formed from the material, since the liquid must be poured into a mold having a spring unit disposed therein and then the mold must be subjected to a series of operations in order to achieve the final curing of the article and the resultant useful article. Therefore, from a viewpoint of materials and manhours, together with equipment, the cost of production is very high.

Having in mind the foregoing generally outstanding, though not complete, disadvantages of known foam rubber or plastic innerspring articles, it is an important object of the present invention to overcome such disadvantages by providing a method for forming an inner

spring body supporting article which is of a novel and considerably inexpensive, yet more comfortable and durable, construction and which method is new, novel and inexpensive.

In the trade, after foam articles, with or without an innerspring construction, are formed, it is usual to shape such articles on cutting tables and to treat the edges by cutting operations, which results in the creation of scraps of preset and preformed cellular or spongy material. In line with the above-stated objectives of creating a less expensive article and of reducing considerably the cost of production of an innerspring body supporting article and forming a better one, it is a purpose of the present invention to utilize the scraps as a basic material. However, it is to be understood that the basic material, while it is preferred to be of multicellular spongy material, does not necessarily have to be scraps from the cutting table but can be such material formed particularly for the purposes of the present invention. Also, it can be other types of known resilient padding or bedding material.

Another important object of the present invention is to provide a method for making an inner spring body supporting article which is formed so that the spring unit will not squeak and so that the edges of the article will not have any tendency to sag and the article will have a better resiliency so that it will provide a long lasting firm overall support.

A further important object of the present invention is to form such an article which, while of a unitary overall construction, can be formed with depth-wise portions thereof, from a length or widthwise direction, that are of relatively greater or lesser density, so that portions thereof can be firmer or softer than other portions, which is of particular importance in the bedding field.

Another object of the present invention is to form a body supporting article from multicellular, resilient spongy material, that is so related witth the spring unit that the article possesses greater inherent resiliency, prevents the springs of the spring unit from squeaking, supports the springs and, enables the springs to remain firm, with the spring unit, in turn, preventing the material from taking a set.

A further important object of the present invention is to provide a novel method of forming the articles from particles of preformed multicellular resilient or spongy material which method is very inexpensive and permits the articles to be formed in a more inexpensive and expeditious manner.

A further object of the present invention is to provide a novel method whereby such particles can be affixed to and through the spring unit in a manner to adhere to the individual springs of the unit, thereby giving better resiliency to the article, preventing squeaking of the springs, and forming the article so that it remains firm and is prevented from taking a set.

A further object is to provide a novel method whereby the article can be formed with portions thereof that are of differing density, so that the portions provide different types of supports, that is, either relatively firmer or softer.

A further important object of the present invention is to provide a novel method for making a sturdy, inexpensive and long lasting inner spring foam rubber or plastic body supporting article which is inexpensive and less time consuming and more efficient.

The foregoing and ancillary objects are attained by the present invention, the prefered embodiment of which is set forth in the following description and illustrated in the accompanying drawing, wherein:

FIGURE 1 is a side elevational view, somewhat diagrammatic, of one form of mechanical means used in connection with the practicing of certain of the steps of the novel method of the present invention;

FIGURE 2 is a cross-sectional view of a mold and associated equipment, showing the initial step of that portion of the method, after the particles have been deposited into the mold;

FIGURE 3 is a view similar to FIGURE 2, showing the subsequent step in the method;

FIGURE 4 is a view similar to FIGURE 3, showing a further subsequent step in the method;

FIGURE 5 is a vertical, cross-sectional view of a mattress, which is formed in accordance with the present invention and illustrating the difference in density between two side by side sections thereof, and

FIGURE 6 is a longitudinal, vertical sectional view of a mattress (with the spring unit not shown for purposes of clarity) illustrating how a transverse portion thereof can be of differing density from the top and bottom end portions.

Before specifically referring to the drawing, a general outline of the process of the present invention and general description of the resultant body supporting article, whether it be a chain cushion, vehicle seat, mattress or anything of that nature, will be given.

In the first place, the briefly mentioned disadvantages for forming an inner spring rubber or plastic foam article from virgin foam liquid, such as polyurethane, have been outlined and it can be recognized that the most serious disadvantages are from a production cost and from a standpoint of comfort in use and longevity in wear.

The present invention utilizes scraps of bonded foam material, such as polyurethane or the like, obtained from the cutting table or similar spongy material, which is in the form of relatively large chunks. The first step of the method involves the cutting or comminuting of the chunks into small particles of a size generally about 1/16 of an inch, the shape thereof being immaterial and usually being irregular. The particles are admixed with an adhesive, which is sprayed onto the particles in a foam or mist-like form so that the entire peripheral surfaces of the particles are covered, and the particles are blended with the adhesive, which is of such a nature that the particles do not tend to adhere together in the blending operation.

The particles are then deposited in a free gravitational flow into a mold, the shape of which is dependent upon the desired outline shape of the article and the nature and use thereof. A bottom or bed layer is formed first by compressing the initially deposited particles to the desired density and thickness. The adhesive is of such a nature that it will tend to set within about ten to twenty minutes and, after the expiration of such a period of time, a spring unit, which may be in the form of basic coil spring construction, is freely superimposed on the bed layer.

Then, an additional quantity of particles, under free gravitational flow, is deposited onto the bed layer in the mold covering over the spring unit. Either by hand or with mechanical means, the additional quantity of particles is worked into, through and around the coils of the spring unit and around the borders of the spring unit. Then the final buildup is realized, whereupon the particles are compressed to bind them together into a supporting layer which becomes adhered to the bed layer. The mold is then put into a curing chamber so that the article is cured or curing may take place in any known artificial or natural manner.

During the step of working the second depositing of the particles into the mold box, desired portions of the article can be built up to a higher depth and compressed to a greater density so that it is possible to build up the particles in one portion or place and lessen the particles in another portion or place, giving higher and lesser densities to such portions or places, with the result that the portions or places will be firmer or softer. This is of particular significance in the formation of a mattress, where it is desired to make one side harder than the other or

to make the center section harder and give more firm support than the head and foot sections of the mattress.

Referring now more particularly to the accompanying drawing, and initially to FIGURE 1, large pieces or chunks **10** of a pliable, resilient, spongy nature (being formed preferably from a preset and preformed multicellular rubber or plastic material are deposited in any size into a cutter **12**. The cutter **12** is in the form of a receiving hopper and a cutting chamber **14**, wherein cooperating cutting means **16** (not shown in detail) are operatively disposed so as to comminute the chunks into tiny particles **18**. The particles **18** are generally of a size of approximately 1/16 of an inch but the exact size of the particles is not of any criticality, it only being important that the particles are rather small. Obviously, the particles will be of irregular shape.

The particles **18** are discharged, under gravitational flow, from the outlet of the chamber **14** into a blender **20**, wherein blending means **22** is operatively mounted and is driven by a motor **24**, for example.

The particles **18** are blended with an adhesive that is sprayed into the blender **20** through a pipe **26**. The adhesive is emitted under pressure from the discharge mouth of the pipe in the form of a fine mist or fog.

Various adhesives may be used. An adhesive formed from commercially known and available Polyall 3001 (organic isocyanates) and commercially known and available TDI (toluene-2,4-diisocyanate) has been found to be extremely effective, practical and inexpensive. The preferred portions are Polyall 3001 per 100 lbs. and TDI per 32.5 lbs. mixed together for approximately 45 minutes. The liquid adhesive is then sprayed, under pressure, onto the particles in the blender, in a proportion of approximately one pound of such adhesive per 14 pounds of particles.

The adhesive is of such a nature that the coated particles will not stick together to form globs in the blender but will maintain their separate relationship.

The blender **20** is formed with a gravity discharge **28**, controlled by a control or shut off means **30** and the particles, with the adhesive in intimate contact or association with their entire peripheral surfaces, are discharged from the discharge **28** in a free gravitational flow into a mold box **32**. The adhesive covered particles gravitate into the mold box simulative of the falling of snow.

After a sufficient amount of particles have been deposited in the mold box, which comprises a flat base **34** and upstanding sides **36**, the next step is to treat the initially deposited particles so as to form the bed layer **38** of the article.

While the sides **36** of the mold box are shown as being straight it is obvious that the sides can be curved and that the overall plan form or outline of the mold box will be dependent upon the desired plan form or outline of the article being made. But, it is preferred that the sides be of a height to extend a few inches above the desired thickness of the article to be formed.

The bed layer **38** of the article is formed from the initially deposited particles in a manner, such as shown in FIGURE 2.

As shown in FIGURE 2, a flat lid **40** is superimposed on the bed layer **38** and is tightly pressed against the bed layer by a mechanically or otherwise controlled spring pressure means **42**, whereby the lid exerts an even and constant pressure on the bed. Once the pressure has been established, clamps **44** are utilized to hold the lid in place, until the bed layer is set. Because of the nature of the adhesive, the setting up time is generally about 10 to 20 minutes.

After the bed layer **38** has been set, the lid clamps **44** are removed to permit removal of the lid **40**. Then, spring unit **46**, which may be a conventional or standard coil spring unit, as shown, is superimposed on the upper surface **48** of the bed layer, care being taken to insure that the spring unit is so disposed as to leave side and end por-

tions of the bed layer exposed to form the border of the resultant article. It is to be noted that the upper surface **48** is even and flat, providing a firm and even support for the spring unit **46**.

The mold box is then filled with a further deposit of the same particles and the particles infiltrate the coils of the spring unit **46**, as they gravitate down over the spring unit and onto the bed layer **38**. The particles which have filtered down into and around and over the spring unit are worked by hand, as shown in FIGURE 4, or may be worked by any mechanical means to ensure that the particles are disposed within and between each coil of the separate spring coils and that the particles are packed in tight around the springs.

Because of the adhesive surfaces of the particles, the particles will adhere to the springs, which will keep the springs from squeaking when the final article is used. The particles act as an insulation, in this regard. The springs are completely filled which helps the springs to remain firm and the springs aid the particles in remaining firm and preventing them from taking a set in the final formation of the article. In this respect, the particles, having been formed from solid material chunks **10**, have less set because they have already been compressed.

After the second or body supporting layer **50** has been built up and around and through the spring unit **46**, as shown in FIGURE 4, the lid **40** is then placed on top thereof and subjected to compression and the clamps utilized, whereby the second or body supporting layer **50** is given a set and the upper surface thereof is formed flat and smooth. The lid is then removed and the mold is placed in an oven at a curing temperature of approximately 250° F., where it can be cured by steam or any other heat. Obviously, other curing means, either natural or artificial, can be used.

In order to demonstrate the advantages of the process, from a standpoint of making a single inner spring body supporting article, which can have portions of lesser and greater firmness, examples are shown in FIGURES 5 and 6, with respect to mattresses. Obviously, such examples are to be considered as only exemplary and not restrictive since the same concept can be utilized in the formation of any type of body supporting article.

With reference to FIGURE 5, the mattress **52** has a bed or bottom layer **54** and an upper or body supporting layer **56** with a spring unit **58**, interposed between the layers. The upper layer **56** surrounds the spring unit and cooperates with the bed or bottom layer **54** in forming the borders or edges of the mattress and the spring unit **58** is completely enclosed and encased. The coils of the spring unit are completely filled with the particles forming the upper layer **56** and, as aforestated, each individual convolution of each coil and the connections between the coils have particles completely insulating and covering them.

In the formation of mattress **52**, the side **60**, while the upper or body supporting layer **56** was being worked in the mold **32**, was piled to a greater height than the side **62** and, when the lid **40** or other compression means was applied, the result achieved was that the side **60** had a greater or higher density than the side **62**. Therefore, the side **60** will be harder than the companion side **62** and will provide a harder and more firm support.

This is advantageous, since two persons using the same single mattress **52** could have the desired support, one side being relatively harder than the other side.

As shown in FIGURE 6, the same idea can be carried over into the formation of a mattress **64**, wherein the center portion **66** is of a greater density than the ends **68** and **70**. Such a mattress would be of considerable value for a person, who needed or desired a firm support for his back.

It can be realized, from considering FIGURES 5 and 6 and the foregoing brief descriptions thereof, that by piling the foam particles at any desired place and making the thickness at such point greater or lesser, an article can be formed which will have a desired density at such place.

Thus, an important objective, which can be realized by virtue of the material nature of the adhesive coated individual particles, is that an article can be formed, as a unit with an encased spring construction, which article can have portions of varying densities. In carrying out the method, it is only required that the particles be piled up to a greater extent at any desired place. Then when the particles are compressed and set and the article is cured, such place will have a greater density and will be harder.

This is of tremendous value in making a therapeutic mattress wherein certain sections thereof, such as the intermediate portion **66** of the mattress in FIG. 6, can be harder than other sections, though the mattress is of unitary construction.

While the mattresses **52** and **64** will be compressed, as by the flat lid **40** or its functional equivalent, it is understood that a compression lid or member, which is undulated or has curved sections can be used. For example, this could result in the production of a mattress having a built-up raised top end, which would serve as a built-in pillow.

Because of the nature of the particles and the adhesive surfaces thereof and the manner in which they are worked into, through and around the coils of the spring unit, the coils become part of the curved foam article and a better all around article is realized. The particles and spring unit become one and act as one.

It is of particular importance to note that the specified adhesive, or other equivalent adhesive, presents a working time of approximately 10 to 20 minutes before the deposited particles tend to adhere to each other. Therefore, in the step, diagrammatically illustrated in FIGURE 4, the second or body supporting layer **50** of the article can be worked so as to pack the particles into, through and around the convolutions of the coils of the spring unit and the layer can be built up at any desired place before the particles tend to adhere to each other.

While specific disclosure has been made of the utilization of scraps of foam materials, such as polyurethane, it is to be understood, as aforementioned, that any pliable cellular or spongy material can be utilized and, in this respect, the cutting step is not necessarily important, since the particles may be made in the desired minute size and then blended in the blender with the adhesive so that each particle has its peripheral surface coated with the adhesive.

Furthermore, other types of material can be employed, which materials would be well known for use as padding or stuffing for cushions and mattresses and which would have the attributes of being pliable, resilient and sponge-like.

It has been described that the bed layer is first formed and has an even upper surface on which the spring unit, which can be of any basic construction, is placed. The superimposed spring unit seats firmly and evenly on the upper surface of the bed layer and then the particles gravitate, similar to falling snow, onto the spring unit and are worked by hand or by any mechanical means, in the manner specified so that the layer **50** surrounds, encompasses and fills the voids of the coils of the spring unit. However, it is within the scope of the present invention that the particles can be freely deposited in a mold and, then, without compressing them, the spring unit is placed therein and the flow of particles is continued and the entire unit placed under compression, without the separate formation of distinct layers.

While a particular mechanical means has been shown and described for practicing the novel process, such should be considered as merely exemplary and, in this respect, a mold can be filled with the particles and the particles can be compressed into a cohesive adherent mass, with a spring unit encased therein by other mechanical means.

Of course, the mattresses **52** and **64**, as well as other

types of body supporting articles, which are formed in the manner shown and described, will be covered with a fabric type covering in the formation of the final, finished commercial product.

What is claimed is:

1. The method of forming a unitary body supporting article comprising the steps of depositing a quantity of adhesive coated individual particles of a pliable, resilient, spongy nature in a mold; compressing said particles to a desired density so as to cause the particles to adhere together in a cohesive, multicellular, resilient mass to form a bed layer; freely superimposing a spring unit on the bed layer; depositing a second quantity of said adhesive coated particles in the mold so as to pile up on the bed layer and to cover over and enclose the spring unit, and compressing said further quantity of particles to a desired density so as to cause the particles to adhere together and to the spring unit in a cohesive, multicellular, resilient mass to form a body supporting layer which adheres as a unit with the bed layer.

2. The method of claim 1 wherein said particles are derived from chunks of material of such stated nature and prior to the depositing of the particles in the mold, the steps of comminuting the chunks into particles and admixing the particles with a pressure setting adhesive so that the peripheral surface of each particle is coated with the adhesive.

3. The method of claim 1 wherein prior to the depositing of the adhesive coated particles in the mold, the particles are blended with an adhesive so that the peripheral surface of each particle has an adhesive coating.

4. The method of claim 1 wherein during and immediately subsequent to the depositing of the second quantity of particles in the mold, such particles are manipulated to disperse them into and around the spring unit so that they become interengaged with and completely encase the entire structure of the spring unit.

5. The method of claim 1 wherein said second quantity of particles are deposited in selected fashion over the spring unit and onto the bed layer, whereby relatively greater and lesser amount of the particles overlie the spring unit and bed layer so that after the compressing of the second quantity of particles the body supporting layer has portions of greater and lesser density.

References Cited

UNITED STATES PATENTS

1,387,219	8/1921	Weiss	264—112
2,700,796	2/1955	Roman	264—113

FOREIGN PATENTS

1,001,625	7/1965	Great Britain.

ROBERT F. WHITE, *Primary Examiner.*

J. R. HALL, *Assistant Examiner.*

U.S. Cl. X.R.

5—251; 264—120, 123, 321