

Sept. 7, 1954

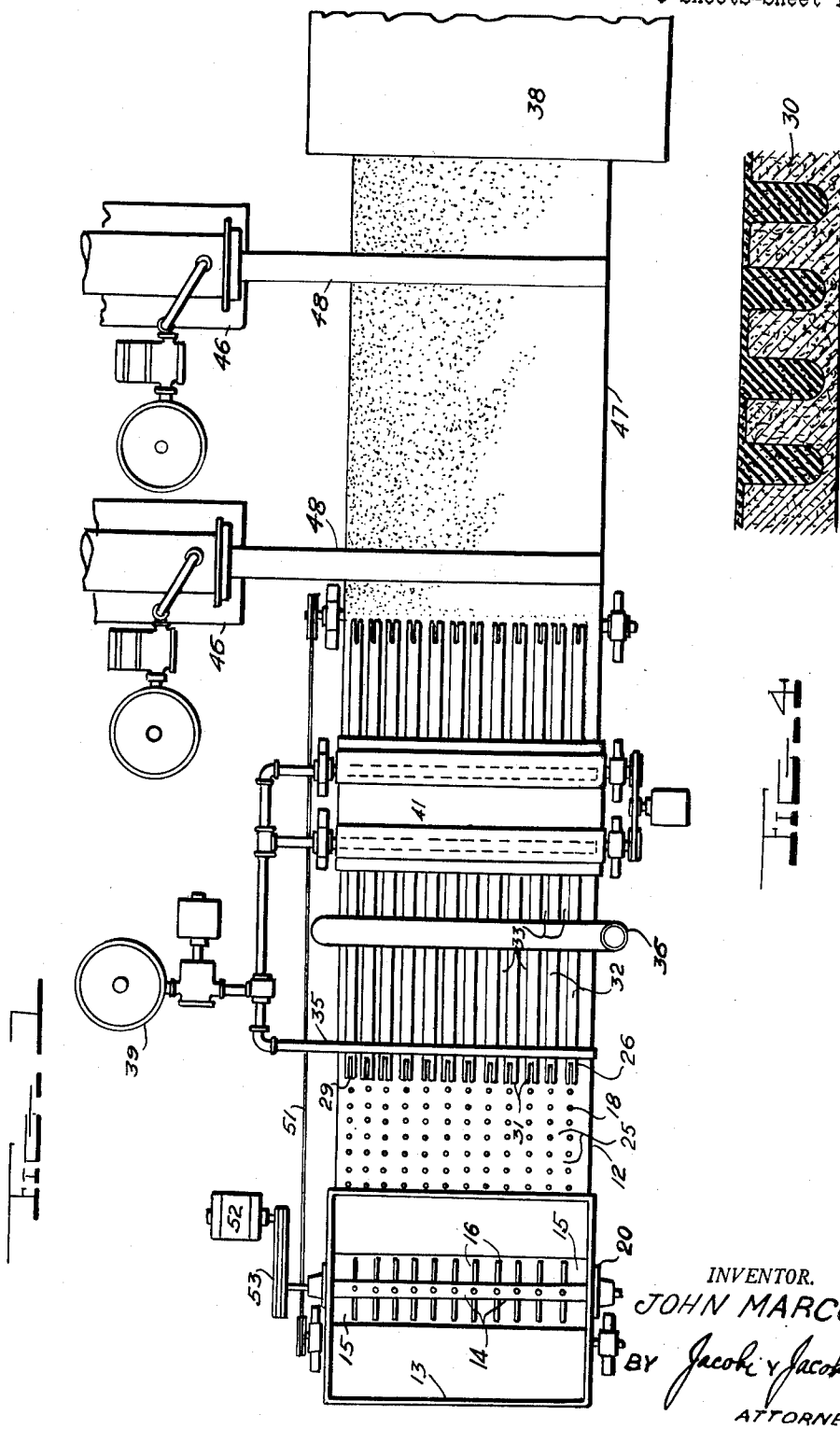
J. MARCO

2,688,152

MACHINE FOR MAKING FOAM RUBBER MATTRESSES AND THE LIKE

Filed June 14, 1950

3 Sheets-Sheet 1



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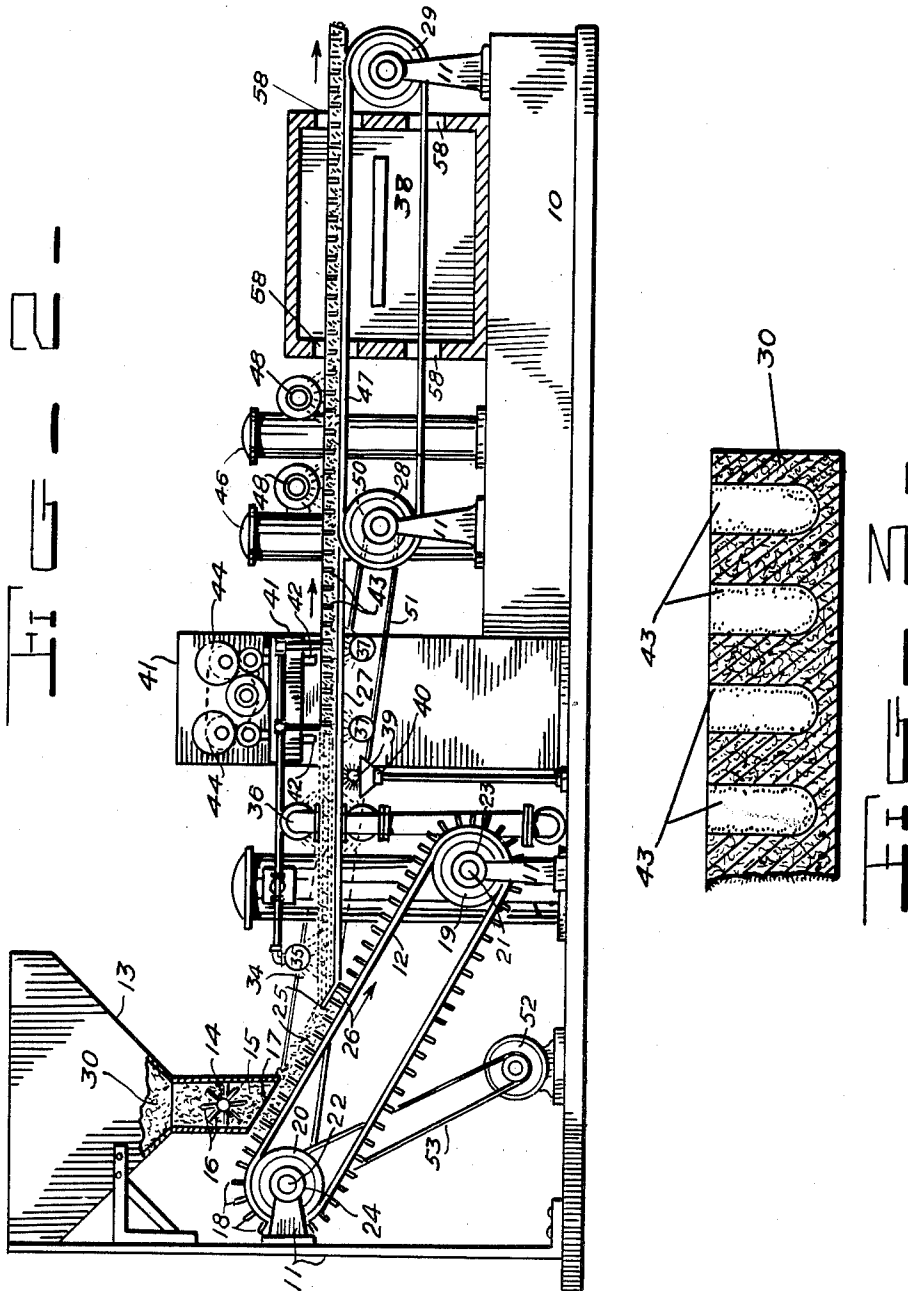
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MACHINE FOR MAKING FOAM RUBBER MATTRESSES AND THE LIKE

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MACHINE FOR MAKING FOAM RUBBER MATTRESSES AND THE LIKE

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FIG. 5.

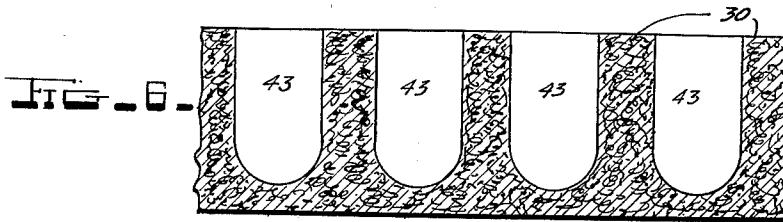
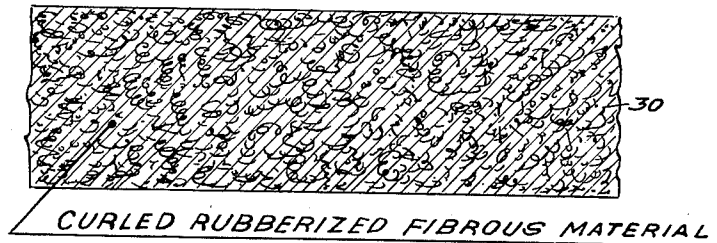
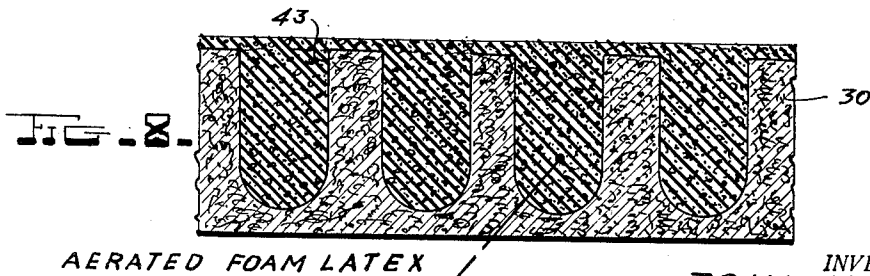
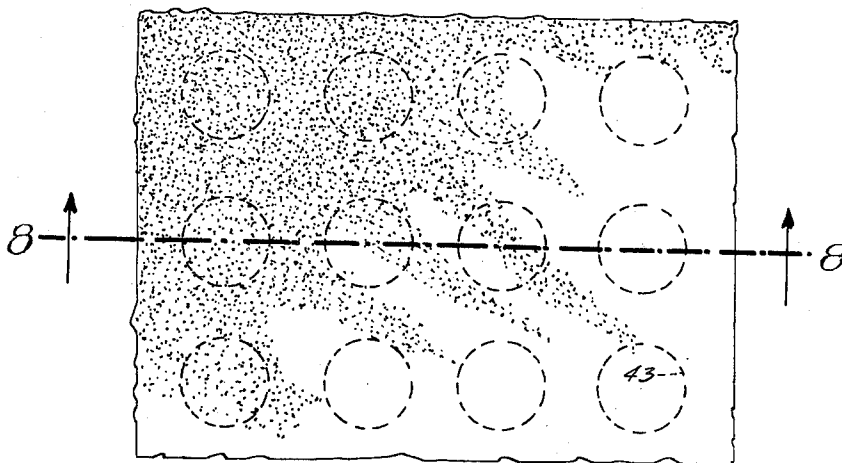


FIG. 7.



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## UNITED STATES PATENT OFFICE

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MACHINE FOR MAKING FOAM RUBBER  
MATTRESSES AND THE LIKEJohn Marco, Wilmington, Del., assignor to Marco  
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Application June 14, 1950, Serial No. 167,945

1 Claim. (Cl. 18—4)

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This invention relates to the manufacture of foam rubber commodities and more particularly to the combining of foam rubber with curled hair to make the resultant product suitable for use as fillers for cushions, mattresses, seats or other resilient articles employed for personal comfort.

The use of curled hair in conjunction with steel springs in the manufacture and use of mattresses, has been involved over a considerable period, as an improved arrangement over the use of springs alone. The addition of the hair by incorporating it in the coil springs used in steel spring mattresses was found to give a number of characteristics found desirable in promoting comfort and is considered necessary in the better designs of spring mattresses. However, the advance of rubber into the mattress field in recent times has introduced special problems and the need for adherence to some of the structural features of the previous structures for mattresses employing springs. Foam rubber for mattresses and the like, alone, lacks the tensile strength and the frictional toughness to withstand the stresses, and wear and tear arising in its use as a mattress when the basic material is made under conventional formulae. To meet this situation, it has been found that the introduction of curled hair into the foam rubber in a limited extent, proportioned to suit the needs and in predetermined layers, locations and amounts, will meet requirements equivalent to those arising in the use of steel spring mattresses. The hair may be introduced into the basic foam rubber in isolated form in spaces and spacings provided in the matrix so it will be incorporated therewith and held yet not intimately mixed in the material. To introduce the hair into the mixture during the manufacture of the foam rubber would result in too stiff and reinforced structure. The resiliency of the foam rubber would be reduced and its natural stretch greatly interfered with. Also the use of the hair in the intimate mixture would tend to tear and crumble the foam rubber and shorten its useful life. To avoid these difficulties this invention intersperses the curled hair in open spaces left in the molded foam rubber or vice-versa, and integrally joins them to the basic material. To prevent the hair from flattening or mashing, it is lightly coated with a rubber cement that stiffens it moderately in its natural shape. This retains its form without interfering with its physical characteristics and the purposes for which it is intended. It is of course understood

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that the term mattress or slab throughout, is made in a broad sense.

It is therefore an object of this invention to provide a new and improved machine and process for manufacturing foam rubber mattress material that will avoid some of the objections and limitations of the previous art.

Another object of the invention is to provide a new and improved machine and process for manufacturing foam rubber slab that will employ hair filler suitable for use therein for improving its structure to meet its conditions of use.

A further object of the invention herein described is to provide a new and improved machine for manufacturing foam rubber slab with hair incorporated therein to make it suitable for mattress uses.

Still another object of the invention is to provide a new and improved machine for making foam-rubber-hair mattress slab that will be resistant to undue collapsing without materially affecting its resilient characteristics.

An additional object of the invention is to provide a new and improved machine that will enable foam rubber mattresses to be aerated and reinforced through the use of hair, kept light and varied in firmness, softness and other desirable qualities to suit many and useful requirements in their particular uses, without materially adding to the cost of production.

A still further object of the invention is to provide a new and improved machine for the manufacturing of foam-rubber hair slab without mixing the hair intimately with the foam rubber although integrally attaching it to it, and to provide for variable thickness of hair and foam rubber in an accurate and facile manner.

The invention also includes in its objects to provide for a process for the manufacture of combining hair and foam rubber into a slab of predetermined intermingling and segregative distribution of the hair therein to retain qualities of aeration, lightness, strength and controllable resiliency and toughness.

Other objects will become apparent as the invention is more fully set forth.

For a clearer understanding of the invention, its objects principles and the operation thereof, reference is made to the accompanying drawings. These drawings in conjunction with the following description outline a particular form of the invention by way of example, not of limitation, while the appended claims emphasize the scope of the invention.

Referring to the drawings:

Figure 1 is a plan view of a foam-rubber and hair combining machine embodying this invention;

Figure 2 is a diagrammatic side elevation of the machine;

Figure 3 is a sectional view through a slab of hair ready for the placement of foam-rubber therein;

Figure 4 indicates the slap after placement of the foam rubber;

Figure 5 is a sectional view of a piece of rubberized curled hair;

Figure 6 is a sectional elevation through Figure 5;

Figure 7 is a plan view of a piece of foam-rubber-hair slab, and

Figure 8 is a sectional view through 8—8 of Figure 7.

Similar reference numerals refer to the same parts throughout the drawings.

In the construction shown in the drawings, a machine for combining foam rubber and curled hair is illustrated. It is built on a suitable framework 10, on which are mounted and supported by suitable brackets 11, the various functional mechanisms and parts that serve to make the combined machine. The parts include a hopper 13 of suitable form, designed to hold an adequate quantity of curled hair 30 and delivers it through a measuring wheel 14 in its throat 15 to a conveyor belt 12. The wheel 14 has radial spokes 16 suitably spaced to deliver the hair in predetermined quantities continuously through the throat 15. The latter conforms to the wheel to prevent any undue amount of hair escaping without passing through the wheel properly. The delivery orifice 17 at the bottom of the throat is cut at a slant to cooperate with the angular travel of the conveyor belt 12 and the spikes 18, that it carries transversely across its exterior belt surface. The belt 12, is of the continuous type and is propelled by drums 19, 20 respectively in the direction of the arrow indicated adjacent it. The drums 19, 20 have their supporting shafts 21, 22, rolling in journals 23, 24 supported on their respective brackets 11. The drums are positioned to run the belt 12 downwardly from the drum 20 to the drum 19, and carry the hair 30 in its spaces 25 between the spikes 18, at a slant, to the forked or slotted apron 26 on the table 27. The apron 26 has slots 29 arranged in it to register with the spikes 18 and allow them to pass without obstruction as they rotate therein, although their propelling action on the hair is not interfered with.

The apron 26 through the use of its fingers 31 cleans off the hair and places it on the top surfaces of the rails 32. This causes the hair to move in long lines along the rails leaving spaces in between, similar to the spaces 33 between the rails longitudinally.

The hair 30 is sprayed with liquid latex 34 from a spraying pipe 35 extending transversely across the apron and its table. The pipe has holes suitably spaced in it for the purpose and latex and air under pressure are supplied from a conventional source (not shown) to it. This latex provides a thin coating over the fibers of the hair as it progresses along the rails. An instant later the latex covered hair is dried by the use of heated air passing to it from the ducts 36. The ducts 36 are disposed transversely across the rails 32, both above and below them. Spraying pipe 35 and ducts 36 are held in place over

the machine by suitable brackets, attached to the framework 10, and the supply of heated air is brought from a suitable extraneous source to the ducts 36 under proper control, not shown.

The next step in the process is provided by a rotary brush 39 having one half dipped in a trough 40 filled with lubricant to prevent the latexed hair from sticking to the table as it is pushed over the latter. The application of the lubricant is applied to the underneath surfaces, for the purpose. The brush and the trough are suspended from the table underneath, by suitable brackets. The following step in the process consists in impressing the plungers 42 through the latexed hair and forming holes 43 therein. The holes in the hair are made permanent by the spraying of more latex on it. The plungers 42 are operating by a mechanical stamping machine 41 supported on the frame 10 and employing the rotating cams 44 to operate the plungers intermittently, and returning them as the cams permit it. The hair 30 is now in condition to combine with the foam rubber, as it is carried along by a conveyor belt 47 placed adjacent the table.

The foam rubber from the source 46 is applied by spraying pipes 48, 37 above and between the rows of hair 30 as the latter is carried along, thus to surround the hair and embed its end portions tight in the foam rubber, as well as provide a top lining of the material over the combined product.

The conveyor belt 47 is of the endless belt type, running on drums 28, 29 and actuated by a pulley 50, belt 51 from the first drum 20, which in turn is actuated by a motor 52 and transmission 53. The shafts of the drums 28, 29 are run in journals also supported from the framework 10. The belt 47 has its upper section running parallel to the table and almost on the same level, so as to receive the combined hair and foam rubber as a slab and carry it to a curing over 38 where the combination is vulcanized or put into its stable condition, ready for its final use.

The conveyor belt 47 is of material that is heat resisting for use in the curing over 38. Also, the over is provided with openings 58 through which the belt can travel unimpeded and unharmed. The latexed hair is of the form shown in Figure 3, as it arrives at the end of the table close to its passage on to the endless belt 47. Close to this location the foamed latex is applied and fills the holes in the latexed hair mass, and the spaces about it are filled to make the complete slab with a covering lining on top, as shown in Figure 4.

Figure 1 shows, in a general way, the apparatus for feeding latex foam, the source being indicated at 46. This apparatus, more or less of conventional type, has the necessary elements to mix, deliver and deposit the latex and the details thereof being generally understood by those familiar with the art will not be further outlined, except to state that the foam latex is delivered through the perforated piping 48. The use of plural foam latex applying equipment is disclosed in order to establish a more even distribution of the hair mass, facilitate its settlement uniformly and provide for a top covering layer to finish off the slab, leaving it ready for more effective curing application as it reaches the oven.

The slab resulting from the use of the machine and its manner of operation produces a

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laminated product throughout its length, where-  
in the cemented layer of hair is integrally joined  
to a layer of foam rubber in an uniformly strati-  
fied arrangement. The processed hair and foam  
rubber project into the space adjacent each other  
transversely to form a columnated formation  
having such strength and resiliency as the manu-  
facture may predetermine as required for the  
particular duties that it is intended for. The  
columnated arrangement can be appreciated  
and observed in Figs. 3, 4, 6, 7 and 8, and dis-  
tinguished from the general conglomerated con-  
struction previously used in the art.

While some of the details of the mechanisms  
have not been specifically detailed, it is believed  
that sufficient structure has been included to  
make the operation thereof plain and under-  
standable. The machine is connected with its  
functional parts into a homogeneous unit adapt-  
ed to operate cooperatively together, with or  
without the sources of supplies used assembled  
with it. Complete individual control is retained  
for each item so that variation in the applica-  
tion of the products each uses, can be given to  
meet a considerable field of requirements.

While I have particularly described the ele-  
ments best adapted to perform the functions  
set forth, it is apparent that various changes in  
form, proportion and in the minor details of  
construction may be resorted to, without depart-  
ing from nor sacrificing any of the principles  
of the invention.

I claim:

A machine for making a laminated fabric of  
fibrous material and foam rubber comprising in  
combination a frame, an elongated table carried  
by said frame, a container for fibrous material  
spaced from one end of said table, a conveyor  
disposed beneath said container, means for dis-  
charging material from said container onto said  
conveyor, said conveyor being operatively as-  
sociated with said table to deliver fibrous ma-

terial in the form of a continuous mat onto the  
upper surface of said table, spray means dis-  
posed over said table for distributing liquid latex  
over the surface of said mat as the same moves  
beneath said spray means, means spaced from  
said spray means longitudinally of said table for  
drying the latex, means for applying lubricant  
to the lower surface of said mat to prevent adher-  
ence of the same to said table, a stamping device  
disposed over said table and including a plu-  
rality of punches mounted for vertical movement  
toward and away from said table, means for  
moving said punches downwardly and into en-  
gagement with the upper surface of said mat to  
form a plurality of upwardly opening recesses  
therein, a second conveyor for receiving said mat  
from said table, means disposed above said sec-  
ond conveyor for distributing foam rubber over  
the upper surface of said mat to fill said recesses  
and provide a layer of foam rubber on the upper  
surface of said mat integral with the foam rub-  
ber in said recesses and a curing oven associated  
with said second conveyor for curing said foam  
rubber.

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