

Jan. 26, 1926.

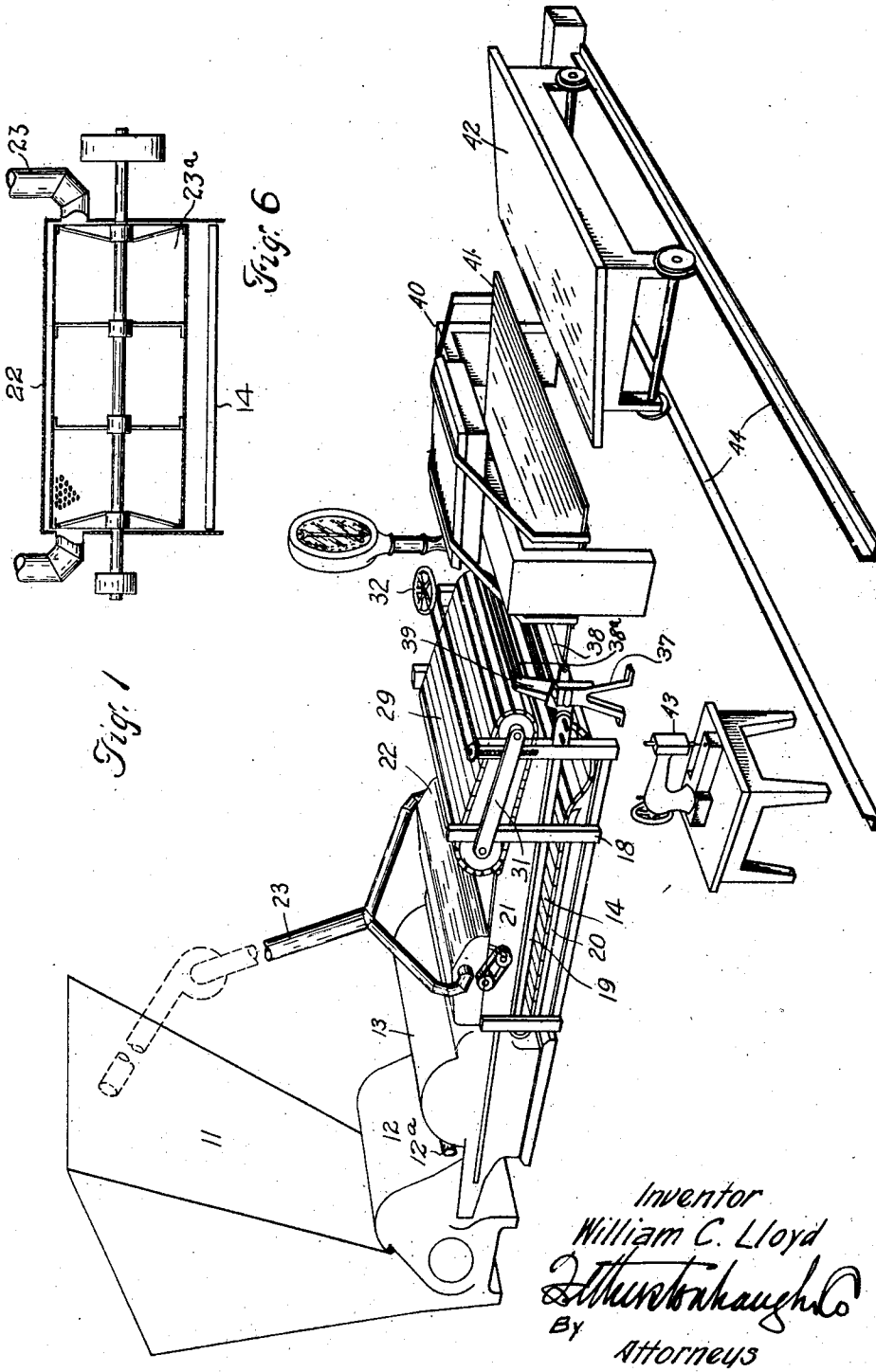
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METHOD OF AND APPARATUS FOR MAKING MATTRESSES

Filed April 23, 1921

2 Sheets-Sheet 1



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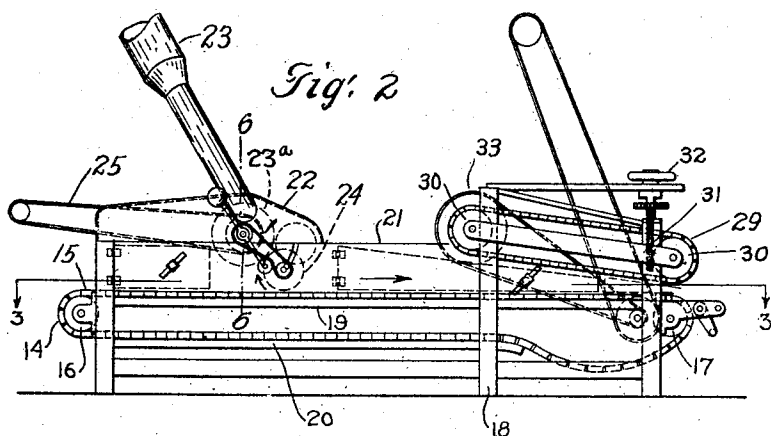
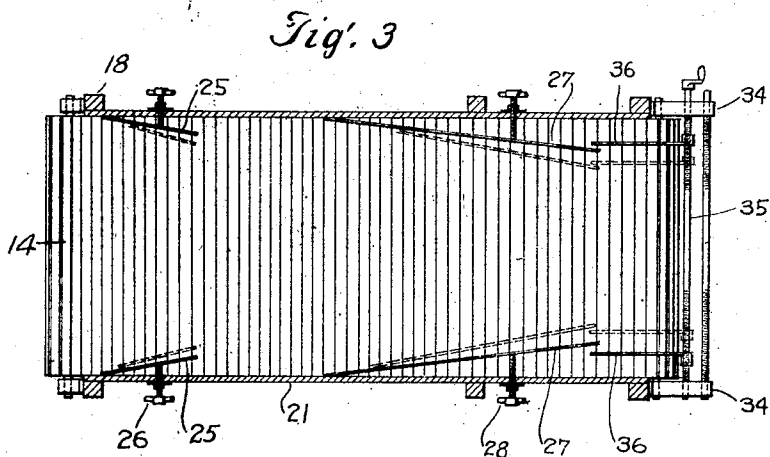
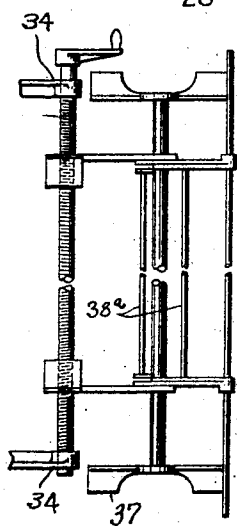
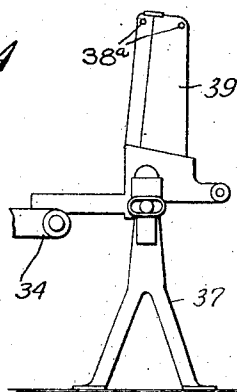
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METHOD OF AND APPARATUS FOR MAKING MATTRESSES

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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METHOD OF AND APPARATUS FOR MAKING MATTRESSES.

Application filed April 23, 1921. Serial No. 463,900.

To all whom it may concern:

Be it known that I, WILLIAM C. LLOYD, a citizen of the United States of America, and resident of the city of Montreal, in the Province of Quebec and Dominion of Canada, have invented certain new and useful Improvements in Methods of and Apparatus for Making Mattresses, of which the following is a full, clear, and exact description.

This invention relates to improvements in process and apparatus for making mattresses and relates particularly to the manufacture of mattresses from cotton wool or similar fibrous material.

The primary object of the invention is to provide for the distribution of fibre uniformly in a single layer of desired width, thickness and density and for the automatic introduction of this layer of fibre into a mattress casing.

A further object is to provide for the manufacture of mattresses at a much higher rate of speed than is possible by ordinary methods and furthermore for the making of mattresses more uniformly than is now possible.

At the present time, mattresses of the type known as felt mattresses are made by a combination of machine and manual operations, with the result that the manufacture is a slow and laborious process and a very considerable capital expenditure required as well as a great deal of factory space occupied. According to existing methods, bales of cotton are passed through an opening and willowing machine of any usual type, which tears up the lumps of cotton found in the bale and delivers the material in a lumpy condition to a Garnett machine, which is a species of carding machine and which further tears apart the cotton and eventually delivers the same in a very thin layer of suitable width. The two machines just referred to are ordinary textile machines. The layer of cotton fibre delivered from the Garnett machine is so tenuous that it will not support more than an inch or two of its own weight. In other words, the layer has no tensile strength whatever. The material in this condition is compounded by superposing a number of such layers, which are then rolled into large bats and transferred to the mattress making department where the compound layers are superposed upon one another to build up a loose felt of the de-

sired thickness. This operation is performed almost entirely by hand and, when the felt is built up, it is introduced into a mattress case until the proper weight is attained. The casing is then sewed up and tufted, the felt being worked around in the case by hand during the tufting operation to obtain as far as possible a uniform distribution in the case. This method of procedure as will be readily understood is very slow and the results obtained are far from what is to be desired. It is practically impossible to obtain uniform weight and elasticity between the different mattresses and equally difficult to obtain uniform elasticity and distribution of the felt in the individual mattresses. Furthermore, a large number of machines and a great deal of factory space is required to obtain even a moderate number of mattresses per day.

Preferably, according to the invention as now practiced, the output of a teasing machine is delivered onto a slowly moving belt or conveyor, in front of a floating condensing roll which holds back the loose fibre discharged from the machine until there is a sufficient accumulation to commence forcing itself under the roll. The result is that instead of a thin, tenuous layer of fibre, there is discharged from under the roll a thick soft layer of fibre of uniform density and elasticity throughout, which layer is advanced by the conveyor under a belt which is arranged at an angle to the conveyor and which operates to squeeze or condense the layer of fibre until it has sufficient body to be moved edgewise into a mattress casing. A mattress casing turned inside out is placed on a pair of fingers with its closed end presented to the advancing end of the condensed fibre layer. The mere advance of the fibre draws the casing off the fingers and turns the same right side out, so that an evenly and perfectly filled casing results. As the casing fills, it slides onto a scale platform, so that an operator by watching the weights indicated by the scale can regulate the filling to a nicety and produce mattresses of uniform weight. When a casing is full, the fibre therein is torn or cut off from the advancing layer and a fresh casing presented to the advancing fibre. The mattress may then be slid from the scale platform to a truck which will carry the mattress past a sewing machine for the purpose of closing

the open end. The closed mattress may then be transferred to a tufting table and the manufacture completed in the usual manner. Owing to the uniform consistency

5 of the fibre and the automatic manner in which it is introduced into the casing, each casing is filled clear to its edges with a uniform layer of fibre, so that no distribution is required in the tufting operation, where-
10 fore the tufting may be effected more quickly and perfectly than heretofore.

In the drawings which illustrate the invention;—

15 Fig. 1 is a perspective view illustrating a machine for making mattresses according to the present invention.

Fig. 2 is a side elevation of the squeezing portion of the machine.

20 Fig. 3 is a section on the line 3—3, Figure 2.

Fig. 4 is a plan view of the mattress casing holder.

Fig. 5 is a side elevation of the mattress casing holder.

25 Fig. 6 is a cross section on the line 6—6, Fig. 2.

Referring more particularly to the drawings, 11 designates a hopper or chute through which fibrous material, such as cotton, is delivered from an opener to a feeding machine 12. This machine delivers the fibre in a more or less opened and partly cleaned condition to a teasing machine 13, which completes the operation of tearing apart the lumps of cotton and throwing out stems, hulls, sand, etc., so that the fibre is uniformly clean and free from lumps. A floating roll 12^a may be disposed between the machines 12 and 13 to distribute the fibre uniformly to the teasing machine 13 and to ensure that the fibre enters the teasing machine in a sufficiently dense condition to enable the machine to operate properly. The fibre is delivered from the teasing machine on
45 to one end of a slowly moving endless conveyor 14 constructed preferably of transversely extending wooden slats 15 connected together in any suitable manner to form a wide endless belt. This conveyor passes over
50 rolls 16, 17 located at opposite ends of a frame 18 and the upper layer of the conveyor between the rolls 16, 17 is supported on guides or skids 19, so that the conveyor forms between the rolls a rigid moving table. The slats 15 are preferably arranged so
55 as to be in contact in the upper part of the conveyor and form what is for all practical purposes a continuous unbroken surface. The lower portion of the conveyor in whole or in part may be supported by skids or guides 20. Side boards 21 are provided at opposite sides of the machine above the conveyor and substantially in contact with the upper surface thereof, so that these side
65 boards and the upper part of the conveyor

form between them a comparatively wide and shallow trough into one end of which fibre is delivered directly from the teasing machine.

At the entrance end of the trough, a hood 70 22 is provided thereover having a suction flue 23 leading therefrom for the purpose of carrying away dust and lint to the hopper 11. This flue communicates with the interior of a large perforated drum 23^a located under the hood and revolving about a normally stationary but adjustable axis. The lower part of this roll moves in a direction contrary to the movement of the conveyor 15 and operates to hold back the fibre and also to expose the fibre through the whole width of the machine to the air suction through the flue 23, so that dust is effectually removed. A heavy roll 24 is disposed transversely of the conveyor under the hood 22, the mounting of this roll being such that it may float or ride upon the conveyor or material transported by the conveyor. Any suitable form of driving mechanism 25 is provided for the rolls 23^a and 24 to drive the same in a direction contrary to the movement of the conveyor and at a suitable speed. The surface speed of the roll 24 is preferably greater than the surface speed of the conveyor so that it exerts an ironing or smoothing action on the fibre as well as a compressing action. Between the entrance end of the conveyor and the rolls 24, a pair of wings 25 are hinged to the side boards at their ends adjacent the entrance and are provided with adjustable means 26 for swinging them inwardly over the conveyor, as shown in Figure 3, so as to contract in width the layer of fibre passing from the teasing machine to the roll 24. Between the roll 24 and the discharge end of the conveyor a second pair of similarly disposed wings 27 are provided having adjusting means 28.

Above the discharge end of the conveyor, 110 an endless belt 29 is mounted on rollers 30, one at least of which is journaled in a sub-frame 31 pivotally or hingedly mounted on the frame 18 for example on the shaft 30^a of the rear roller 30, so as to swing in a vertical direction toward or away from the conveyor 14. This belt 29 is preferably of a construction similar to the conveyor and is so disposed that its lower portion slopes downwardly toward the discharge end of the conveyor 14. The amount of slope on the belt 29 and the distance between its lower end and the discharge end of the conveyor may be regulated by any suitable means 32 arranged to regulate the inclination of the sub-frame 31 carrying the belt. The belt 29 is provided with any suitable driving means 33 designed preferably to keep the belt moving at the same surface speed as the conveyor. 130

At the discharge end of the conveyor, brackets 34 are provided on the frame 18 and carry threaded guides 35 upon which a pair of throat plates 36 are mounted. These throat plates lie parallel with the side boards 21 and are located between the side boards and the swinging ends of the wings 27, as shown in Figure 3. The position of the throat plates may be adjusted to correspond with the position of the wings by rotating the threaded guide with which the throat plates engage in the manner of nuts.

A short distance from the discharge end of the conveyor a stand 37 is provided carrying a pivoted frame 38 including a pair of case holding fingers 39, which are merely smooth flat plates mounted at one end in the frame 38, and a pair of spaced parallel rods 38^a extending between the fingers and with the fingers defining a rectangular opening over which the closed end of a casing may be stretched. These plates are adjustable toward and away from one another either by adjusting means of their own or by the adjusting means of the throat plates 36. The frame carrying these fingers is pivotally mounted so that the fingers may be swung to the vertical position shown in Figure 1 to facilitate the application of an empty mattress case thereto and may then be swung to horizontal position to present the closed end of the casing in alignment with the space between the conveyor and the belt 29 and the throat plates.

A weighing scale 40 is provided in alignment with the machine, having the platform 41 thereof positioned to receive a mattress as the same is filled. A truck 42 is provided which may be placed in alignment with the scale platform to facilitate the transfer of a mattress from the platform to the truck. This truck may then be run past a sewing machine 43 conveniently located and specially adapted for sewing up mattress casings. The best results will be obtained if the truck is guided by means of rails 44 upon which it runs, so that it may always come into the same relation with the scale platform and sewing machine.

The operation of the machine and the carrying out of the process are extremely simple and may be readily understood. The cotton or other material passes through the machines 12 and 13 and is discharged on to the conveyor in a completely opened and very fluffy condition. The conveyor transports this toward the roll 24, which if the conveyor is empty is resting on or very close to the conveyor. The roll 24, which has a higher surface speed than the conveyor throws the fibre back toward the teasing machine as fast as the conveyor advances it, so that in a short time a considerable quantity of fibre collects under the hood 22. This accumulation of fibre gradually forces

itself under the roll lifting the same and advances with the conveyor in a layer of fibre of uniform consistency and of suitable thickness for the manufacture of mattresses. The width of the layer is regulated by means of the wings 25 and 27 and the thickness thereof is regulated by the weight and surface speed of the floating roll 24. The conveyor eventually carries the layer of fibre under the elevated end of the belt 29 and, as this belt slopes down toward the discharge end of the conveyor and travels at substantially the same surface speed, it is evident that the fibre will be squeezed together or condensed by the time it emerges from between the conveyor and belt. The amount of squeezing and in a measure the thickness and hardness of the mattress to be made may be regulated by adjusting the distance between the conveyor and belt. The felted fibre passes between the throat plates 36 and comes in contact with the closed end of a mattress casing supported inside out and closed end foremost on the fingers 39. The advancing fibre layer presses the closed end of the casing between the fingers and bars 38^a, so that the casing is turned right side out and the mattress passes onto the scale platform 41. By observing the proportion of the mattress on the platform and the weight indicated by the scale, the operator can determine with surprising accuracy whether the mattress will be over or under weight. The weight of the mattress may be most easily regulated by controlling the speed with which the casing is turned inside out and over the fingers 39. Thus, if a mattress shows indication of being under weight, a suitable resistance may be offered to the slipping of the casing over the fingers 39, with the result that the movement of the casing will be impeded while the movement of the felt continues unabated. Conversely, if the mattress shows indication of being overweight, the movement of the casing over the fingers will be slightly expedited, so that there will be less tendency for the felt to pack in. The regulation of the casing movement may be effected by hand or by moving the fingers toward or away from one another, so as to be either a tight or a loose fit in the casing as may be desired. As soon as the casing is filled, the fibre therein is separated from the advancing layer of fibre and the mattress slid from the scale platform to the truck 42. The separation of the mattress from the body of fibre is automatically accomplished when the casing is filled by operators moving filled casing onto truck 42, the fibre layer tearing off at the point where it is gripped between the conveyor and belt 29. The truck is now moved at a suitable rate past the sewing machine and the open end of the casing is closed. The mattress may then be slid from the

truck to a tufting table located at any suitable distance from the machine and the truck returned to position in line with the scale platform. As soon as one mattress casing is completely filled and separated from the fibre layer, the fingers 39 are swung to vertical position and a fresh casing placed over them and the fingers then returned to horizontal position. The process then continues as already described.

According to this invention and with the use of a single machine as illustrated, four operators can produce approximately fifty mattresses per hour, whereas under existing conditions, as described in the forepart of this specification, two opening and willowing machines and fifteen Garnett machines, three filling machines and eighteen operators are required to produce the same number of mattresses hourly. It will therefore be evident that mattresses may be produced more quickly and cheaply according to this invention and it is obvious that, as the condensing or packing of the fibre is mechanical, the mattresses will be of more uniform thickness and elasticity than is obtainable by existing methods.

It must be understood that the mattress filling made according to this invention is entirely different from what is known in the trade as "felt." Felt, in the trade, is a body composed of a series of superposed thin sheets of fibre in which the individual fibres are in somewhat orderly arrangement, with the result that the felt is comparatively dense and inelastic. The filling produced according to this invention is in a single layer and the fibres are not in any sense in orderly arrangement, with the result that the sheet of filling is not dense but is very light and fluffy and extremely elastic. Therefore, the filling must not be confused with felt.

While the filling is preferably introduced into the casing as and at the point of making, it will be understood that the filling may be separated into portions of mattress size and introduced into casings at a remote point.

Having thus described my invention, what I claim is:—

1. In a mattress making machine, a framework, an endless conveyor therein, side boards forming with the upper surface of the conveyor a trough, and a floating roll disposed transversely of said trough above the conveyor and adjacent the inlet end of the trough.

2. In combination with a device according to claim 1, a hood covering the inlet end of the trough and the floating roll therein.

3. In combination with a device according to claim 1, means for revolving said floating roll at higher surface speed than the conveyor and in the opposite direction.

4. In combination with a device according to claim 1, wings hingedly attached to the side boards at the ends thereof adjacent the inlet of the trough, and means for adjusting said wings over the top of the conveyor at an angle to the direction of movement thereof.

5. In combination with a device according to claim 1 means for condensing a layer of material on the conveyor in width and thickness.

6. In a mattress making machine, a fibre feeding means and a fibre teasing means, the former being arranged to discharge directly into the latter, an endless conveyor positioned to receive material discharged from the teasing means and to convey the same away from the teasing means, and yielding means for retarding movement of material to said conveyor and producing an accumulation of material between said means and the teasing means, and a mounting for said retarding means permitting vertical movement thereof after a sufficient accumulation of material to give passage to said material.

7. In combination in a single machine for making mattresses, a moving conveyor, means for teasing and cleaning fibre and depositing the fibre on said conveyor as it moves, means for retarding movement of fibre on said conveyor for regulating the thickness of a layer of fibre, and means for compressing the layer of fibre on the conveyor.

8. In a mattress making machine, a framework, an endless conveyor therein, a perforated roll above the conveyor, and means driving said roll in a direction contrary to the conveyor.

9. In combination with a device according to claim 8, suction means arranged to withdraw air, dust and lint from within the roll.

10. In combination with a device according to claim 8, a second roll arranged to float on material on the conveyor.

11. In combination with a device according to claim 8, a second roll arranged to float on material on the conveyor, and means for driving said roll at a higher surface speed than the speed of the conveyor.

12. In combination with a device according to claim 8, a hood over the conveyor and over said perforated roll, a second roll under said hood parallel with the first and adapted to float on material on the conveyor, and means for driving said second roll.

13. A continuous process of making mattresses which comprises, opening, cleaning and teasing fibrous material, depositing the cleaned and opened fibre in a continuous manner on a moving conveyor, forming the fibre in a single layer of thickness sufficient

for a complete mattress filling by retarding movement of fibre on the conveyor.

14. A continuous process of making mattresses, which comprises opening, cleaning and teasing fibrous material, depositing the cleaned and opened fibre in a continuous manner on a moving conveyor, forming the fibre in a single layer of thickness sufficient for a complete mattress filling by retarding movement of fibre on the conveyor, and compressing the layer into a ribbon of substantially mattress thickness and width.

15. A process of making a series of mattress fillings of density uniform throughout each filling and throughout the series, which comprises depositing cleaned and teased fibre at a uniform rate on a moving conveyor, compressing the material while in movement directly into a single ribbon of proper width and thickness for mattress fillings and separating the ribbon into portions of mattress length.

16. A process of making mattress fillings

which comprises depositing suitable treated fibre and advancing the deposited fibre resistance, whereby the deposit is increased in thickness and density until capable of overcoming the resistance, and separating the advancing dense mass into portions of mattress size.

17. A filling for mattresses being a unit of treated fibre loosely felted, by compression flatwise and edgewise to substantially mattress width and thickness, designed for separating into portions of mattress length.

18. A process of making a mattress filling in one operation, which comprises depositing loose fibrous material in a layer of approximately uniform thickness and advancing the layer against resistance thereby to thicken the same, and compressing the thickened fibre layer flatwise and edgewise thereby to form a loosely felted unit of mattress width and thickness.

In witness whereof, I have hereunto set my hand.

WILLIAM C. LLOYD.