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Oct. 24, 1944. L. P. MILLER 2,361,310

TEXTILE LAPS AND BATTS

Original Filed June 18, 1941 5 Sheets-Sheet 1

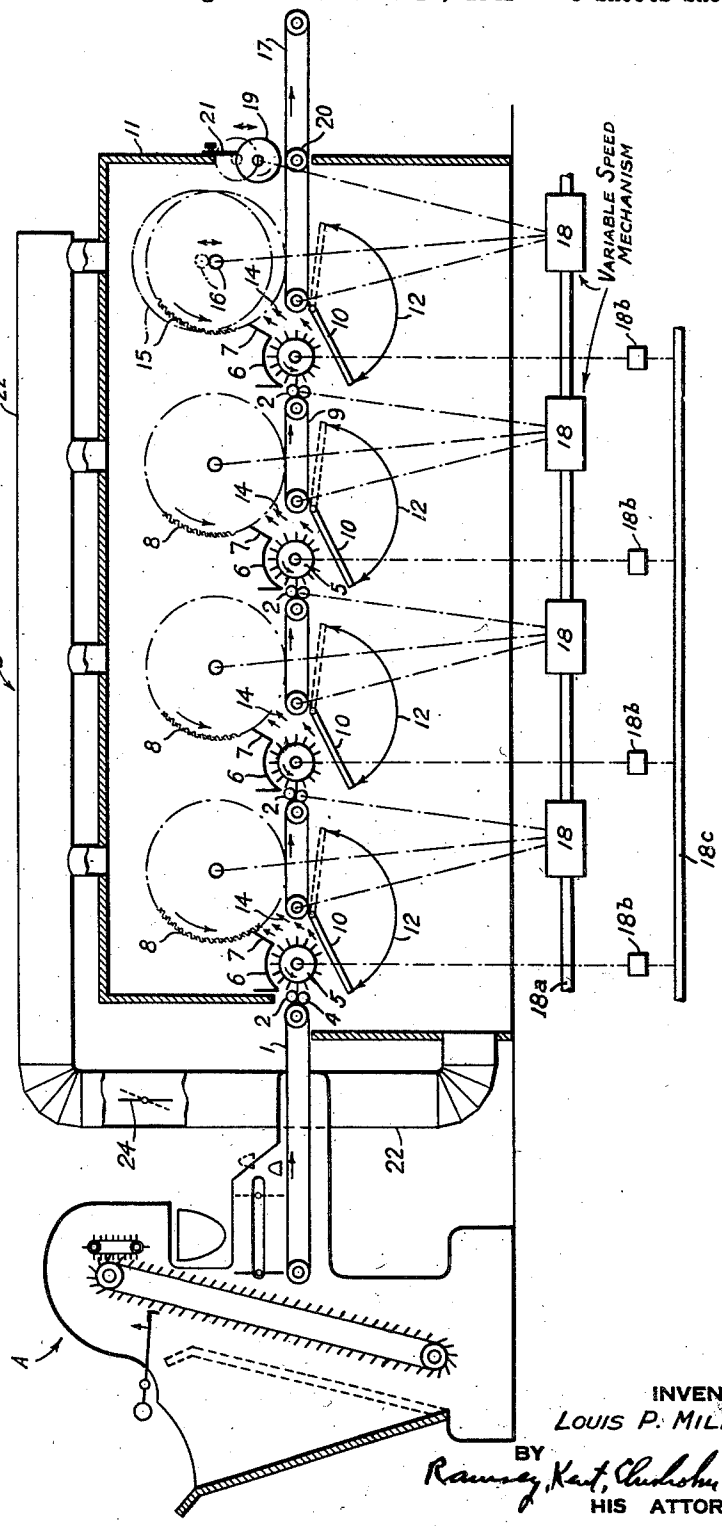


FIG. 1.

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Original Filed June 18, 1941 5 Sheets-Sheet 2

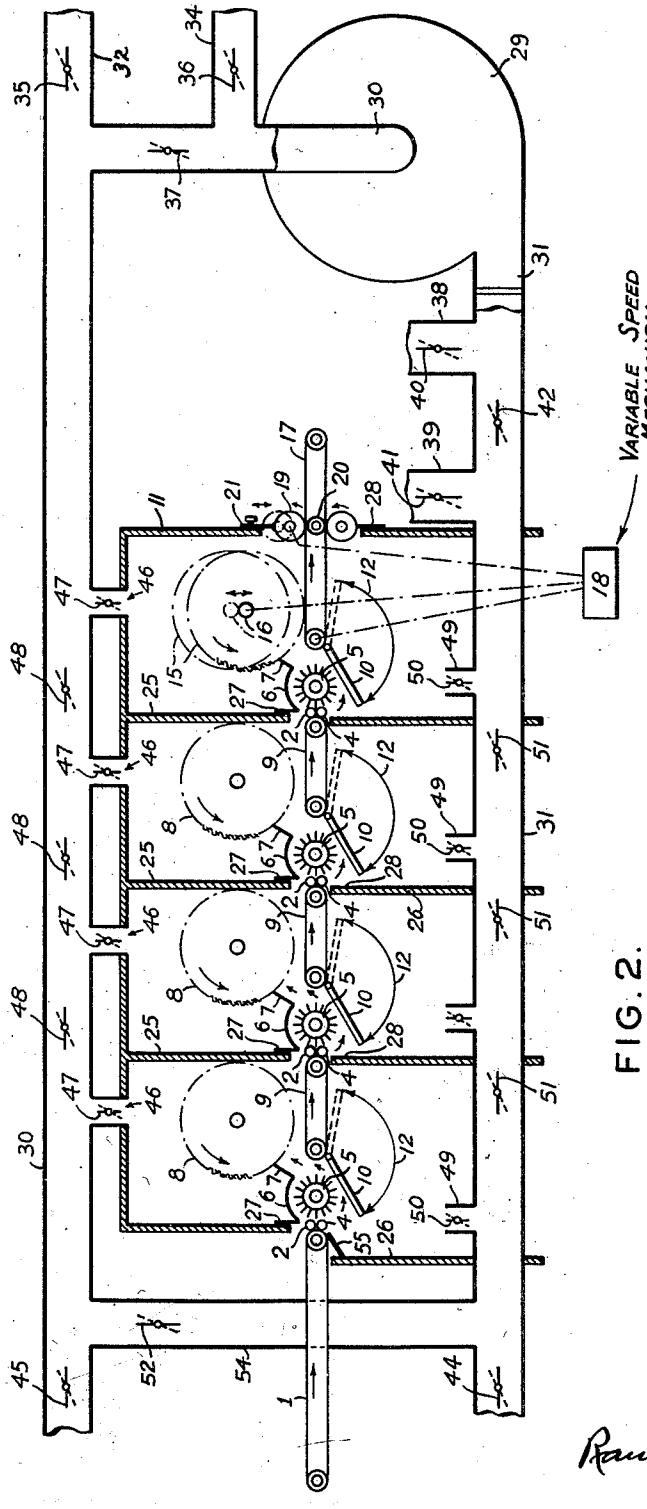


FIG. 2.



FIG. 10.

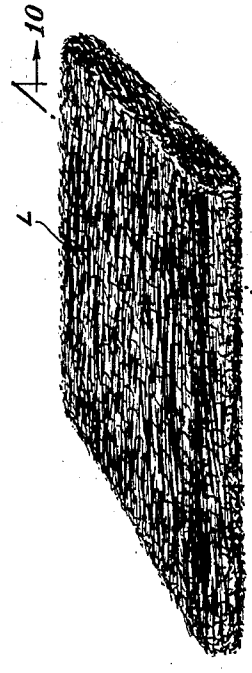


FIG. 9.

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Original Filed June 18, 1941 5 Sheets-Sheet 3

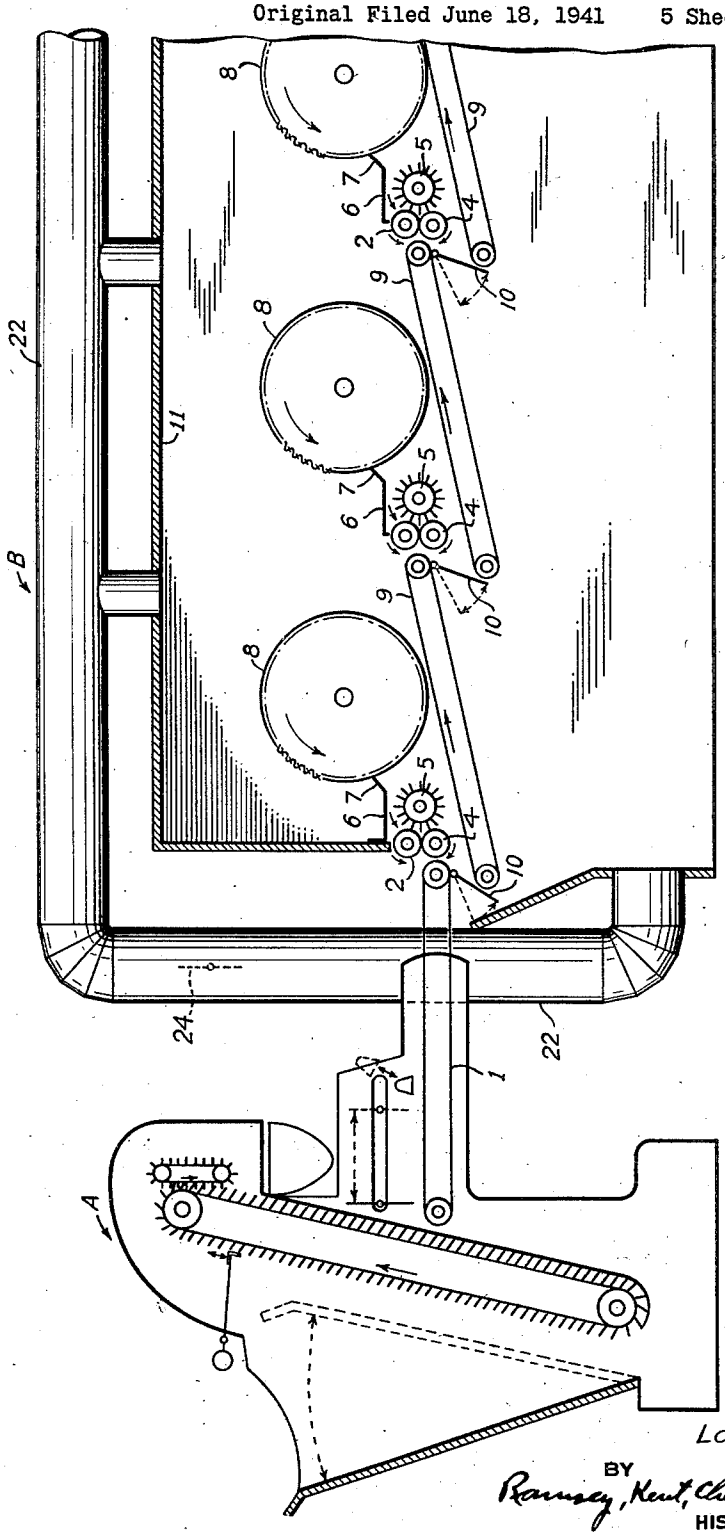


FIG. 3.

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TEXTILE LAPS AND BATTS.

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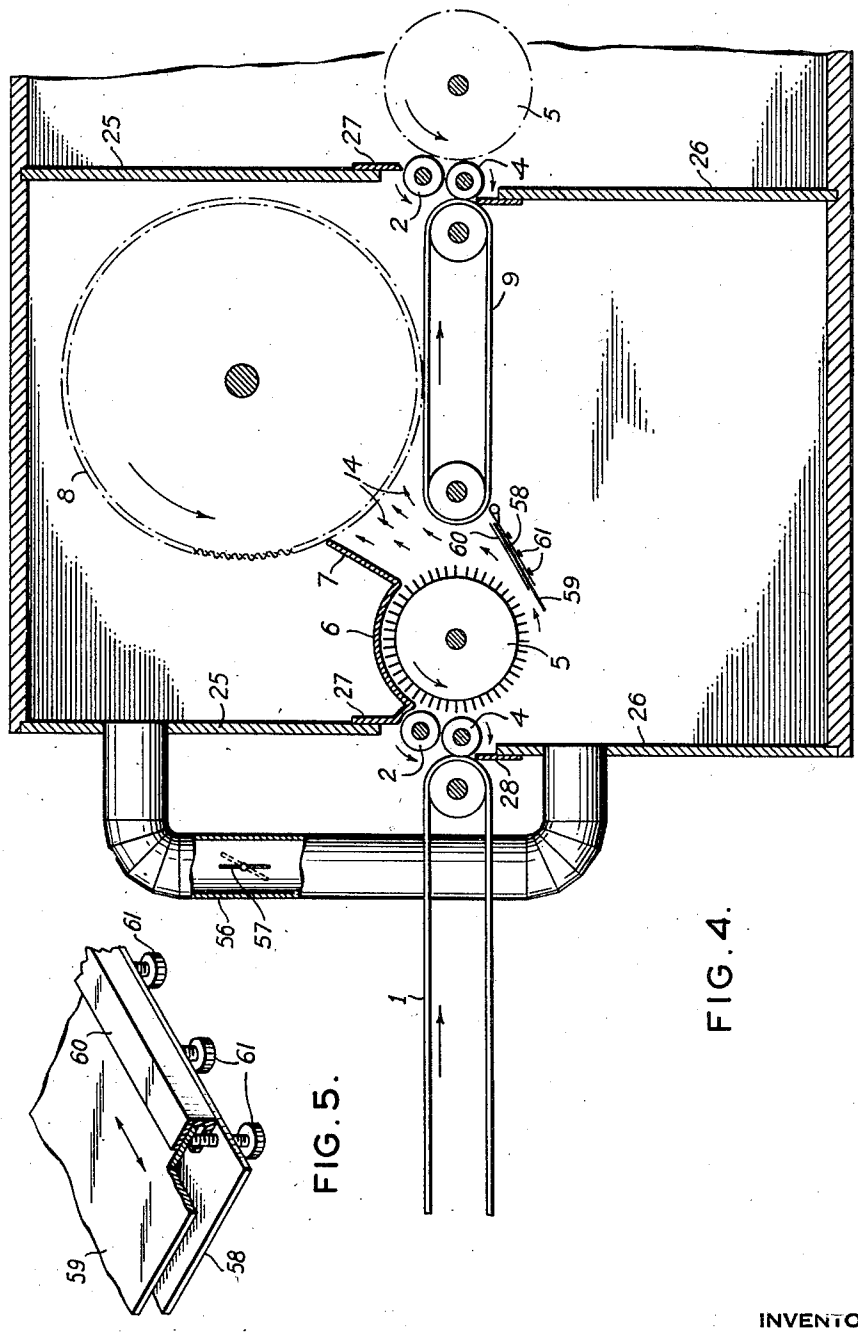


FIG. 4.

FIG. 5.

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TEXTILE LAPS AND BATTS

Original Filed June 18, 1941 5 Sheets-Sheet 5

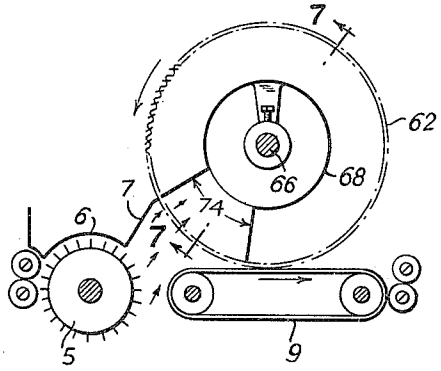


FIG.6.

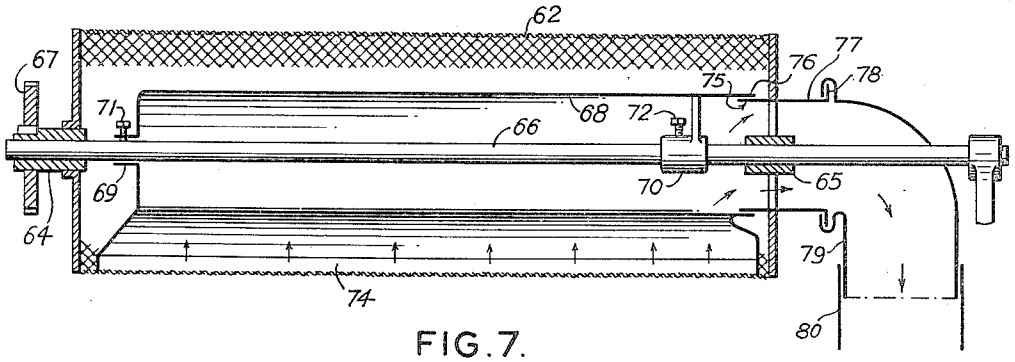


FIG.7.

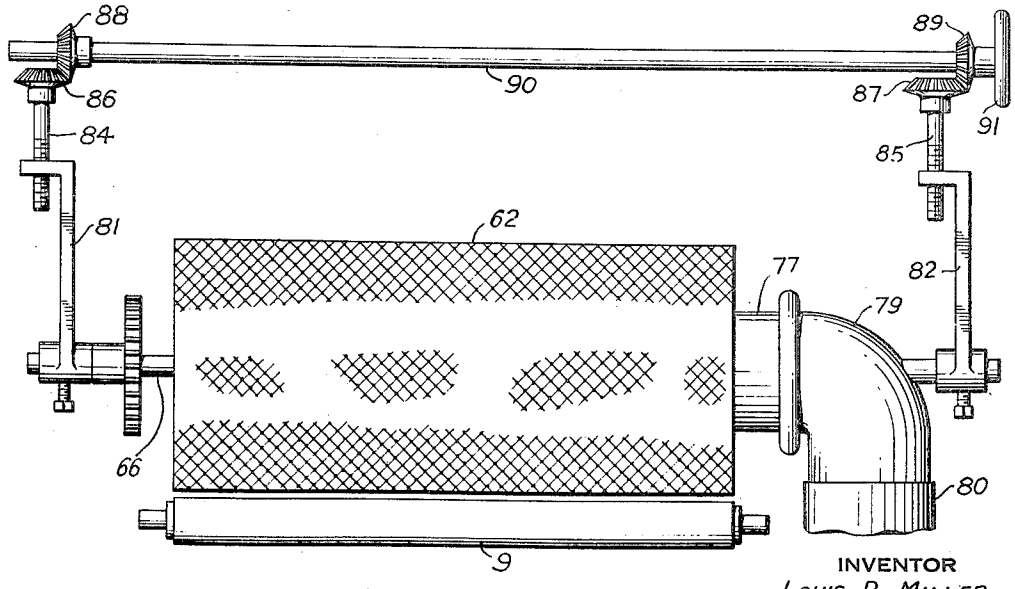


FIG.8.

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Patented Oct. 24, 1944

2,361,310

UNITED STATES PATENT OFFICE

2,361,310

TEXTILE LAP AND BATT

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Original application June 18, 1941, Serial No. 398,534, which is a division of application Serial No. 340,048, June 12, 1940, now Patent No. 2,280,250, dated April 21, 1942. Divided and this application February 26, 1942, Serial No. 432,391

2 Claims. (Cl. 19—155)

The present invention relates broadly to textiles and more especially to laps from fur or from textile material which may be easily dispersed in air.

The making of the laps comprising the present invention may be carried out by various types of mechanisms but preferably is carried out by the use of the mechanism hereafter disclosed in detail, which mechanism is similar to machines known in the art as "blowers."

The present invention is concerned primarily with a lap of substantially uniform density, which lap may be utilized as such in the textile art, as for example, for the production of sheet or roll felt or for feeding a sliver producing mechanism or other textile uses where uniformity of mass is of importance.

In making the laps comprising the present invention, it is particularly desirable that mechanism be provided in which eddy or turbulent air currents are avoided in the zone where the air is carrying the textile fibers, as for example, a construction for making the laps of the present invention is one wherein a picker cylinder is so arranged relative to the collector screen that there are no undesirable eddy currents between the picker cylinder and the screen.

It is to be understood that the disclosure herewith of an apparatus for making the laps according to the present invention is largely diagrammatic and that omitted features are those which are well known to persons skilled in the art and are omitted herefrom for the purpose of clarity.

Fig. 1 illustrates diagrammatically one form of apparatus which may be utilized for producing laps or batts of textile fibers according to the present invention.

Fig. 2 illustrates a slight modification of apparatus for carrying out the present invention and wherein the different stages or units of construction are housed in separate compartments with which suitable air controlling mechanism is provided.

Fig. 3 illustrates another construction for carrying out the present invention which is similar to that shown in Fig. 1 with the exception that the conveyor belts extend beneath the feed rolls and the picker cylinders.

Fig. 4 shows another modification of construction similar to that shown in Fig. 1 and wherein the baffle plates are shown as adjustable in width.

Fig. 5 is a detail view with parts of the apparatus in section and are the preferred baffle plate construction.

Fig. 6 illustrates a section of a suction conduit mounted within a collector screen.

Fig. 7 is a longitudinal sectional view on line 7—7 of Fig. 6.

Fig. 8 diagrammatically illustrates a construction whereby the collector screen shown in Figs. 6 and 7 may be raised and lowered relatively to the conveyor belt in further carrying out of the present invention.

Fig. 9 is a perspective view of a portion of a lap or batt according to the present invention wherein the lap is substantially without folds or grain.

Fig. 10 is a cross-section on line 10—10 of Fig. 9.

Referring now to the drawings, which illustrate a preferred form of apparatus for making the laps of the present invention, and more especially to Fig. 1, the textile fibers, which may comprise carroted rabbit fur, wool, or other suitable material, are placed in the weighing feeder A, which may be a machine known in the art as "Bramwell" type feeder, and the material from this machine A is fed into the blower lap former B.

The textile fibers from the weighing feeder A are dropped upon a conveyor belt 1 which transports the fibers to a pair of feed rolls 2 and 4 that are adjacent a rapidly revolving picker cylinder 5. In practice, the feed rolls 2 and 4 are of relatively small diameter, as for example, approximately one inch, and may rotate at a peripheral speed of substantially seventy-five inches per minute, which speed may be varied according to the wishes of the operator. The picker cylinder preferably is about four and one-half inches in diameter and rotates at speeds between from two to six thousand revolutions per minute. The feed rolls 2 and 4 are preferably spring pressed together in order to feed the fur to the rapidly revolving picker cylinder 5.

The picker cylinder 5 is very closely set to the feed rolls so that there is a picking or pulling action on the fiber as it is removed from the rolls by the high speed picker. This high speed of the picker produces a substantial air current and this air current is controlled in such manner that the fiber is positively carried by this air current and deposited on a screen before the direct force of the air current is dissipated and the air is permitted to form undesirable eddies. To this end, a baffle plate 6 is preferably curved to fit closely over the upper part of the picker cylinder and to closely approach the upper feed roll 2. The terminal edge of the baffle plate 6 comprises an upward extension 7 which closely approaches a revolving screen drum 8. This screen drum may

be made from screen material, or of perforated metal, so as to provide a supporting surface for the textile fibers and at the same time provide suitable openings or perforations through which the current of air from the picker cylinder may pass. This screen cylinder preferably is approximately twenty-one inches in diameter and rotates with a peripheral speed substantially the same as the peripheral speed of the feed rolls 2 and 4. A conveyor belt 9 is located beneath the screen drum 8 with the upper run of the conveyor belt being separated slightly from the lowermost portion of the screen drum so that when the machine is operating, the space between the upper run of the conveyor belt 9 and the screen drum will be filled with textile fiber which drops by gravity from the screen drum as the drum rotates. The longitudinal speed of the upper run of the conveyor belt is substantially the same as the peripheral speed of the screen drum. An adjustable baffle board 10 is provided adjacent the forward end of the conveyor belt 9 and is adapted to swing upon an axis substantially coincident of the upper edge of the baffle board. This baffle board is connected with a suitable handle outside the housing 11 so that the board may be swung in the arc 12 and positioned stationary at any point within this arc according to the wishes of the operator. Preferably, the board normally occupies substantially the full line positions as shown in Fig. 1. When this occurs, the air current produced by the picker cylinder is substantially as indicated by the arrows 14 in Fig. 1. The space between the picker cylinder 5, the upper portion of the baffle board 10, the screen drum 8 and the conveyor belt 9, is somewhat triangular in cross-section with a portion of the periphery of the screen drum forming the base of the triangle. Since the screen drum is revolving counter-clockwise (as shown in Fig. 1), the textile fiber builds up thickest adjacent the lower portion of the drum and is thinnest adjacent the extension 7 on the baffle plate 6. Therefore, this thinnest portion provides the least resistance to the passage of the air from the picker cylinder and consequently the majority of the air flow from the picker cylinder is near or adjacent to that part of the screen drum which is passing the edge of the extension 7 on the baffle plate 6.

The construction of the parts described is such that the textile fibers are positively carried against the screen drum by the air currents and consequently the opportunity for the fibers to collect together and bunch in air is absent, the result being that the fibers are deposited substantially uniformly on the screen drum 8. The conveyor belt 9 leads to a second pair of feed rolls of a second stage in the machine. The second stage is a duplicate of the first stage and so on throughout the various stages of the machine. It, therefore, becomes unnecessary to specifically describe the additional stages of the apparatus, with the exception of certain features which apply only to the last stage. It is to be understood that the machine may comprise one or more duplicate stages. The purpose of the series of stages is to secure more uniformity to the final lap L (Figs. 9 and 10) which leaves the machine.

The position of the baffle board 10 in the various stages of the machine may or may not be the same depending upon the wishes of the operator. Where the baffle board 10 is swung to a position away from the picker cylinder 5, the throat, through which the air current produced by the picker passes, is enlarged and the velocity of the air between the baffle board and the picker is reduced. The function of this swinging of the baffle board is that where the baffle board is substantially ineffective as indicated by the dotted lines in Fig. 1, heavy material will fall away from the upward air current produced by the picker cylinder and dust and dirt will also be thrown out, whereas when the baffle board is set close to the picker cylinder in the position shown in full lines in Fig. 1, substantially all material taken from the feed rolls 2 and 4 by the picker cylinder 5 is carried upwardly and deposited on the screen drum 8.

The last stage of the machine comprises a screen drum 15, which may be the same as the preceding screen drums 8, with the exception that it may be constructed so that the axis 16 of this drum may be raised or lowered to change the space between the drum and the outlet conveyor belt 17 which removes the batt or lap from the machine.

The screen drums, the conveyor belts, and the feed rolls for each unit are preferably driven through variable speed units 18 whereby each unit is under complete control of the operator. These units are operated at a relatively low speed from a common drive shaft 18–*a*. The picker cylinders operate at a high speed and are preferably driven through variable speed units 18–*b* that are driven from a common high speed drive shaft 18–*c*. The variable speed drives 18 and 18–*b* make the entire machine very flexible. This enables the operator to control operating conditions throughout the several stages of the machine. This permits either slowing down or speeding up the travel of the fibrous material relative to the amount fed into the machine and in this way, the lap L coming from the machine may be relatively thick or thin as the operator desires.

The outlet from the machine through which the conveyor belt 17 extends may be substantially closed by a roller 19 above the conveyor belt 17 and another roller 20 within the conveyor belt 17. A closure plate 21 is mounted on the housing 11 to bear upon the roller 19 to close the gap between this roller and the housing and thereby confine the air within the housing. The roller 19 is adjustable vertically so that the roller just touches the top surface of the lap being conveyed from the machine by the belt 17. Preferably, the roller 19 is also connected with the variable speed mechanism 18 so that the peripheral speed thereof is the same as the peripheral speed of the conveyor belt 17.

In making the laps L, as has been pointed out, it is particularly desirable that there shall be no undesirable eddy currents of air between the picker cylinder and the collector screens 8 and 15. The high speed of the picker cylinders establishes a blast of air and in order for the screens to function properly, it is helpful to provide an air duct 22 leading from the upper part of the housing 11 to the lower part of the housing. In order that the amount of circulation of air may be controlled, a damper 24 may be provided in the air duct 22.

Referring now to Fig. 2, the stages of mechanism in the lap blower is exactly the same as those shown in Fig. 1, and, therefore, the same numbers are applied to like parts, but the description need not be repeated.

The construction disclosed in Fig. 2 differs from that shown in Fig. 1 in that each stage or unit of the machine is mounted in a separate compartment which is established by partitions

25 extending across the housing 11 above the feed rolls 2 and partitions 26 extending across the housing below the feed rolls 4. Closure plates 27 and 28 are mounted on the partitions 25 and 26 respectively in order to close the air space adjacent the feed rollers so that each compartment is substantially a separate unit, (see Fig. 4).

Another feature wherein the machine illustrated in Fig. 2 differs from that illustrated in Fig. 1 is the provision of forced air draft under control of the operator. This is accomplished by means of a power driven air fan 29 which may be of any well known type suitable for the purpose. Preferably, the suction side of the air fan 29 is connected with a duct 30 that leads to the upper portion of the housing 11 and the outlet side of the fan connects with a duct 31 leading to the lower portion of the housing 11. The intake duct 30 is provided with outlets 32 and 34 which may lead to open air and which are provided with dampers 35 and 36. An intermediate damper 37 is provided between the dampers 35 and 36. The outlet or pressure duct 31 is also provided with two ducts 38 and 39 which open to air, each equipped with dampers 40 and 41 and with an intermediate damper 42 between the ducts 38 and 39. The terminal ends of the ducts 30 and 31 also lead to open air and may be provided with dampers 44 and 45. It is to be understood that where desirable any or all of these open air ducts may be led to dust collectors or to filters or any other devices that may be desirable for supplying fresh air or disposing of dusty air relative to the machine. The suction duct 30 is connected by passageways 46 with each unit or stage of the machine and dampers 47 are provided in each of the passageways 46. Main dampers 48 are provided in the exhaust duct 30 between each stage of the machine. Similarly the pressure duct 31 is provided with outlets 49 into each stage of the machine and each of these outlets is provided with a control damper 50 whereas the main dampers 51 are provided in the pressure duct 31 between the outlets 49 to the several stages of the machine.

A damper 52 is provided in the cross duct 54 which connects the exhaust 30 with the pressure duct 31.

Where pressure or suction is used inside the housing relative to the atmosphere surrounding the machine, it is desirable to maintain this condition without disturbance from the outside air flowing into or out of the housing and to this end a closure plate 55 extends from the front wall of the housing to substantially in contact with the feed roll 4.

From the foregoing, it will be observed that by manipulating the various dampers in the several ducts provided, various conditions of pressure or reduced pressure may be obtained. For example, by opening the damper 41, closing the damper 42, both in the pressure duct and by closing dampers 35 and 36, and opening damper 37 in the suction duct and closing dampers 45 and 52, while leaving the dampers 47 and 48, 40, and 51 open, each stage of the apparatus will be subjected to suction whereby air is withdrawn from the upper portion of each compartment or unit and is admitted through the ducts 49 into the lower portion of each stage. This has a tendency to increase the velocity and volume of air from the picker cylinders to and through the collector screens. The various dampers may be manipulated to control the air currents in each unit of the machine as the operator may desire so that a very flexible adjustment as to air conditions in the machine may be obtained.

It will also be observed that by the manipulation of the various dampers illustrated in Fig. 2, the forward units of the machine may be operated under natural draft such as is produced by the rotation of the picker cylinders alone while the last unit, for example, may be operated under pressures, either negative or positive, produced by the blower fan 29.

Fig. 4 illustrates a single stage, for example, the initial stage or unit, of a closed unit machine such as illustrated in Fig. 2, wherein the air currents are produced by natural draft due to the operation of the picker cylinder 5, which natural draft passes through a duct 56 that may be controlled by a damper 57. It is to be understood that similar ducts extend from the sides of the tops of the housing to the sides of the lower portions thereof for each unit of a multiple unit machine such as is illustrated in Fig. 2.

In Fig. 4, the baffle board 58 which corresponds to the baffle board 10 illustrated in the other figures of the drawings, is preferably constructed in telescoping sections 58 and 59 and may be formed of sheet metal or other suitable material. These sections 58 and 59 are slidable one over the other and the section 59 may slide in channels 60 carried by the section 58. Suitable clamp screws 61 are mounted on the channels 60 so that the section 59 may be clamped in any desired telescoping relation to the plate 58. The purpose of this construction is to enable the baffle board 58 to be narrowed or widened in any position beneath the picker cylinder 5. When the baffle board 58 is narrowed and brought into a close proximity to the picker cylinder, heavy material of the fibrous mass will tend to drop from the picker cylinder and will pass beneath the edge of the narrowed baffle board 58 and thereby drop to the bottom of the unit.

The constructions illustrated in Figs. 6, 7, and 8 comprise a suction conduit mounted within the collector screen thus making direct suction effective to collect fibers on the screen in the zone where fibers normally collect under natural draft.

The screen 62 is mounted to rotate on bearings 64 and 65 on a stationary supporting rod 66 that is suitably supported in the machine frame. The bearing 64 may be provided with a suitable drive wheel 67 through which the screen cylinder 62 may be rotated. A suction conduit 68 may be mounted on the stationary rod 66 by collars 69 and 70 through which extend clamp stub bolts 71 and 72 so that the mouth 74 of the conduit 68 may be correctly adjusted relatively to the baffle 6, over the picker cylinder 5, and the conveyor belt 9. The outlet end 75 of the conduit 68 is a cylindrical member 76 which extends over a short pipe section 77 that is mounted to revolve with the screen 62. This pipe section may have a flange 78 that extends into a two piece hood 79 that in turn is telescopable in a suction pipe 80 which leads to a suitable source of suction, not shown. This suction conduit 68 within the revolving cylindrical screen 62 produces an air flow through the portion of the screen subtending the open mouth 74 of the conduit 68 that is greatly in excess of the air flow produced by the picker cylinder 5, and thus a very substantial amount of fibers may be collected on the screen over the area of the mouth 74 of the conduit 68. As soon as the surface of the screen passes beyond the mouth 74, the fibers drop by gravity from the screen to the conveyor belt 9.

It is desirable that the distance between the collector screen and the conveyor belt may be varied to suit the wishes of the operator and to this end, Fig. 8 illustrates diagrammatically a form of mechanism by which this may be accomplished. The stationary supporting rod 66 may be mounted in suitably guided hangers 81 and 82 which are supported by screw shafts 84 and 85. These screw shafts carry bevel gears 86 and 87 that mesh with operating bevel gears 88 and 89 on the shaft 90 which may be operated by the hand wheel 91. When the hand wheel 91 is rotated the connected parts raise or lower the screen 62 relatively to the conveyor belt 9, dependent upon the direction that the hand wheel is rotated.

In making the laps L (Figs. 9 and 10) comprising the present invention, the amount of material discarded may be controlled by controlling the amount of stock deposited on the drums 8 and also by controlling the volume of air which passes through the drums 8. As the stock is applied to these drums, the available clear spaces on the screens decrease, and as the clear spaces on the screens decrease, the volume of air passing through the screens is to a certain extent blocked and therefore the volume and the velocity of the air passing through the screens decrease. This condition may be brought about by various controls provided in the mechanism disclosed for making the laps L herein specified. For example, the linear surface speed of the screens may be decreased by the variable speed gear, while maintaining the feed of material constant; or the feed of material may be increased while maintaining the linear speed of the screens constant; or the baffle boards may be adjusted to restrict the air flow; or the various dampers may be adjusted to increase or decrease the air flow through the screens.

In making fur laps for felting, it is preferred that the fur used shall be carroted, in a manner well known in the art, which facilitates felting of the fur.

Since the thickness of the continuous blanket of fur issuing from the apparatus specified may be provided in the manner above indicated, this blanket or lap becomes a solid continuous layer of fibers without grain. This is particularly noticeable where the herein disclosed procedure is employed in making wool laps or batts. Heretofore in making such wool laps, the material was usually laid in folds of relatively short lengths. The present lap contains no folds and may be built up to a substantially desired thickness as a single non-grain structure which, when felted down, becomes a very strong felt for the reason that no grain exists.

The fibers in the present laps are so arranged as to lie in substantially uniformly heterogeneous relation in layers. Assuming that the lap is considered as lying horizontal and flat, the construction of the lap is better understood by the fact that the heterogeneous arrangement of the fibers in horizontal planes permits the lap to be split horizontally. It is to be understood that theoretically the lap may be separated horizontally at any plane in its thickness. It is also to be understood, however, that this explanation is directed toward an understanding of the physical structure of the lap and the arrangement of the fibers therein, and the splitting is not to be understood as being an operation necessary in the normal use of the lap. In other words, this substantially uniformly thick lap of indefinite length is normally to be used as an entity, but the physical characteristics are such that as a matter of demonstration it may be separated into horizontal layers.

It is to be understood that the construction illustrated in Figs. 6, 7, and 8 may be applied to any or all the several stages of the machine if so desired.

The foregoing specification described a mechanism which may be used to make the laps of the present invention and which mechanism is very flexible as to its adjustments so as to be capable of producing a continuous lap or batt in accordance with the present invention of substantially uniform thickness and density.

Various drives for the several driven parts are omitted from the mechanism herewith illustrated in order to facilitate clarity and because proper drives for the several parts will be apparent to those skilled in the art.

This is a division of my application for patent Serial No. 398,534, filed June 18, 1941, which in turn is a division of application Serial No. 340,058 filed June 12, 1940, now Patent No. 2,280,250, issued April 21, 1942.

What I claim is:

1. An article of manufacture comprising a continuous longitudinally extending lap of indefinite length, of fur fibers in which the fibers are substantially uniformly heterogeneously arranged in layers in a uniformly thick lap with the fibers being sufficiently entangled and interlocked in each layer to make the lap self-sustaining, the relation of the fibers between the several layers permitting the lap to be split into independent layers.

2. An article of manufacture comprising a continuous longitudinally extending lap of indefinite length, of carroted fur fibers in which the fibers are substantially uniformly heterogeneously arranged in layers in a uniformly thick lap with the fibers being sufficiently entangled and interlocked in each layer to make the lap self-sustaining, the relation of the carroted fibers between the several layers permitting the lap to be split into independent layers.

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