Oct. 9, 1951 A. ELMENDORF 2,570,926

MACHINE FOR MAKING FLEXIBLE WOOD FILAMENTS

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Fig. 1.

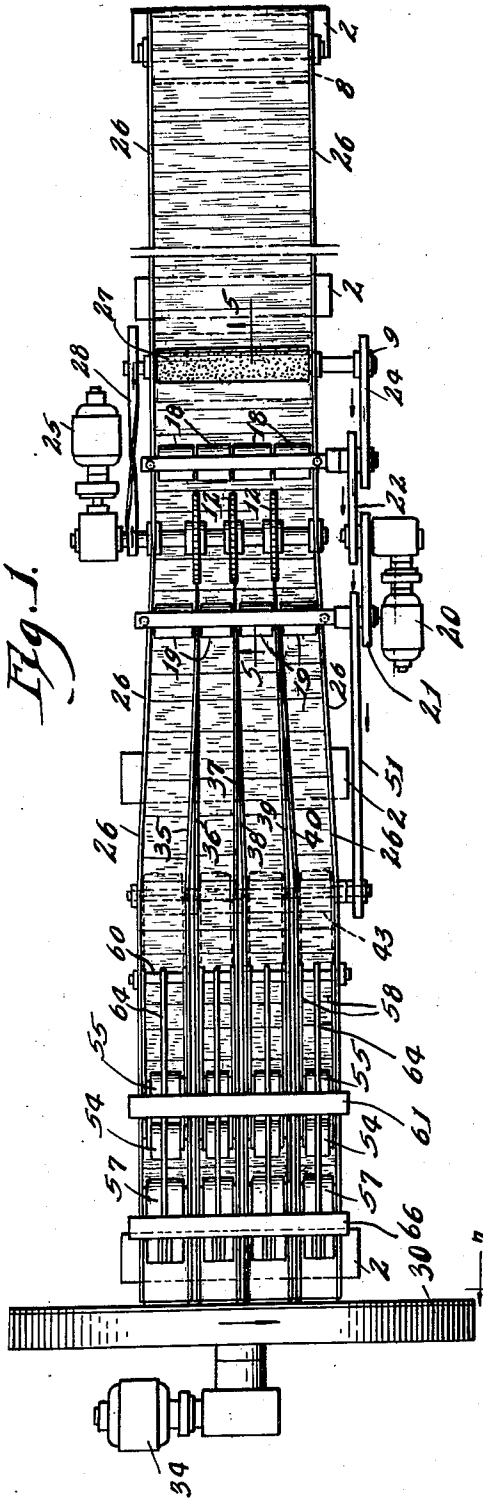
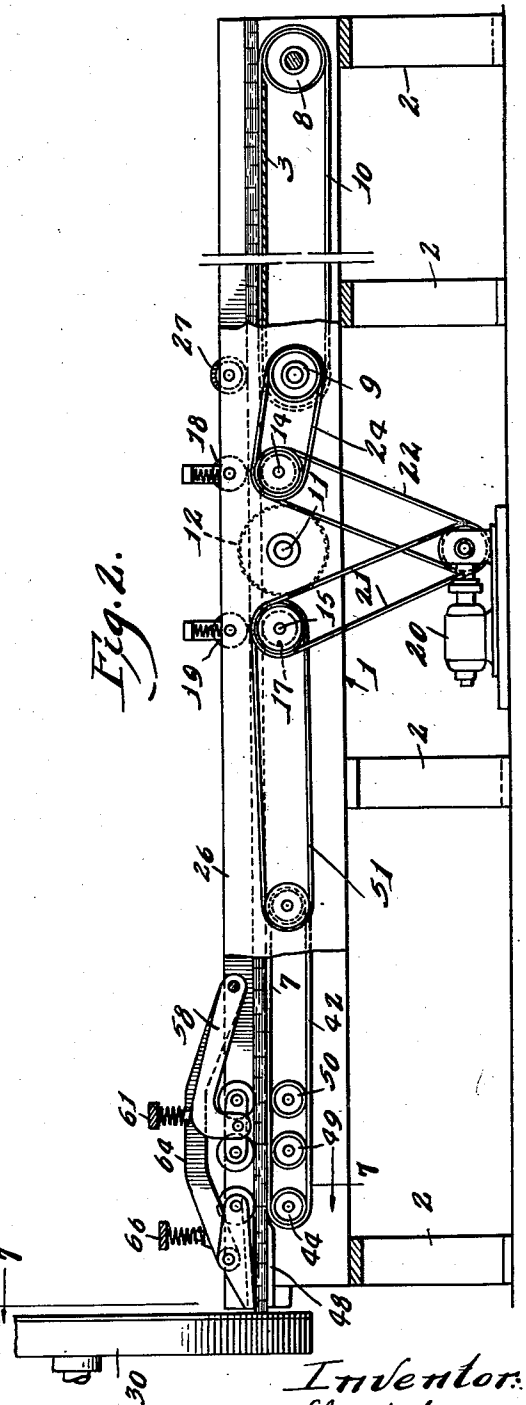


Fig. 2.



Inventor:
Armin Elmendorf.
By. Wm. F. Frundenreich,
Attorney.

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Fig. 3.

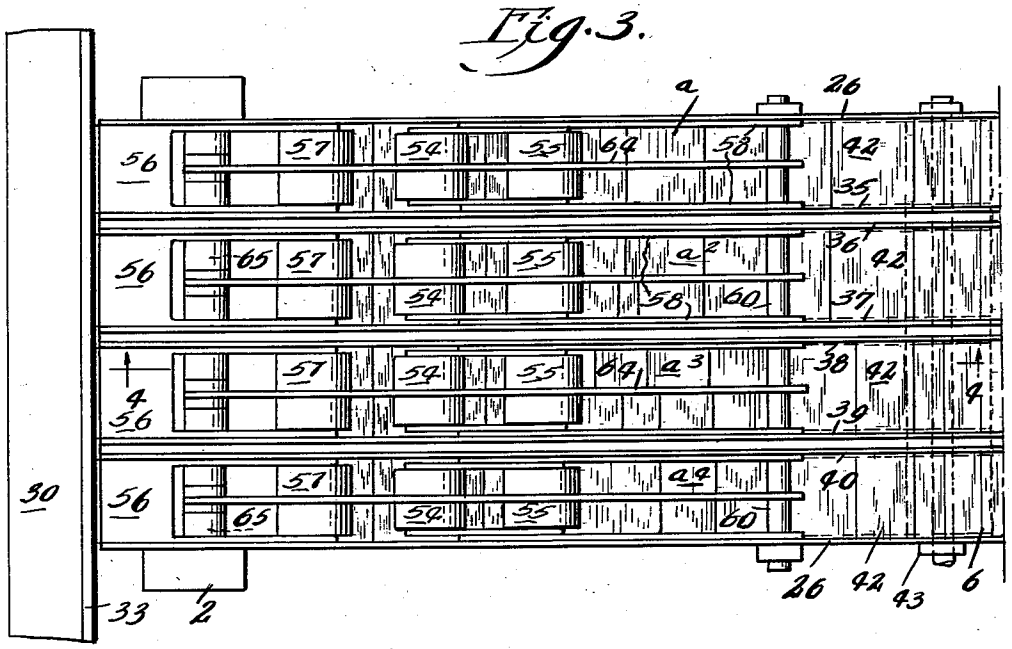
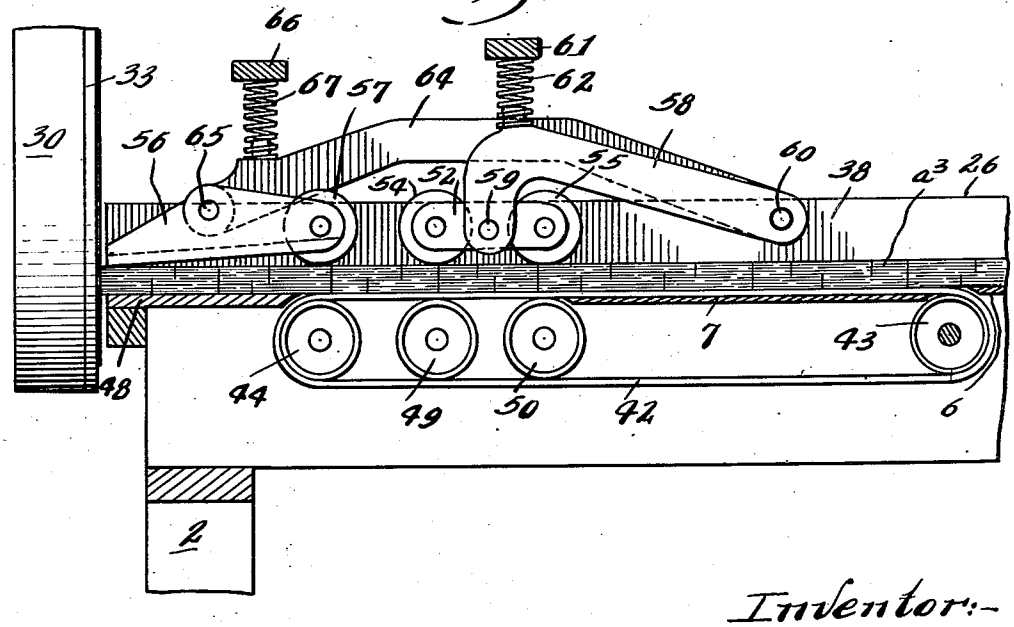


Fig. 4.



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Armin Elmendorf,

By. Wm. F. Freudenreich
Attorney.

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Fig. 5.

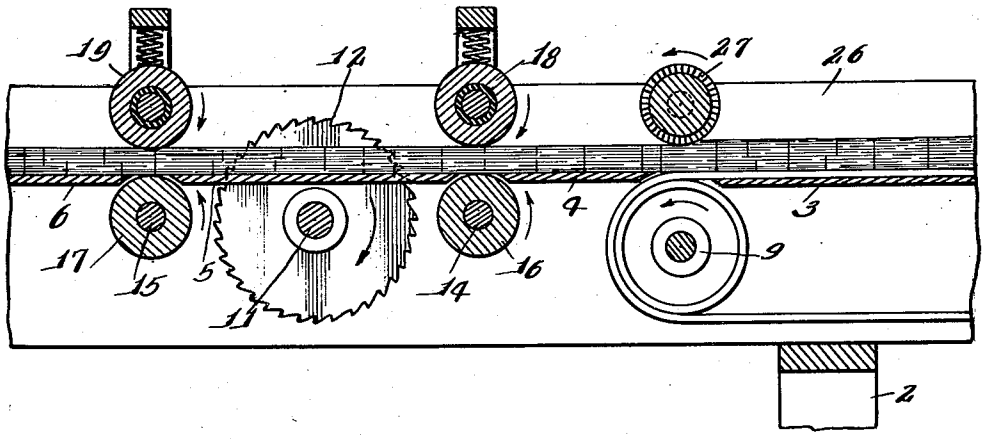
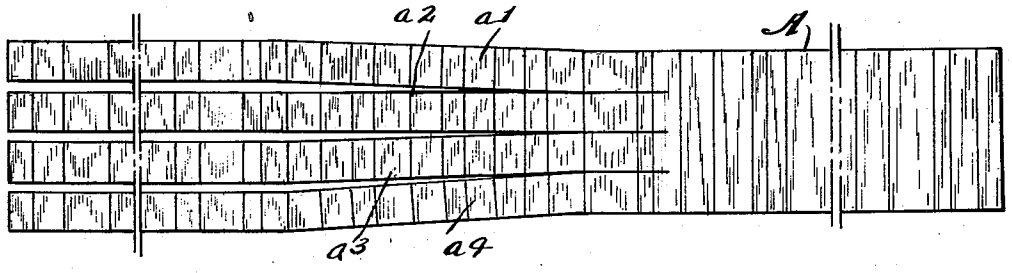


Fig. 6.



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Armin Elmendorf.
By. Wm. F. Frendenreich
Attorney.

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Fig. 9

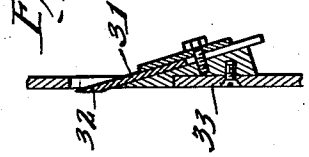
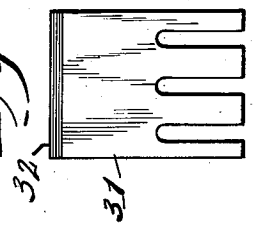


Fig. 10



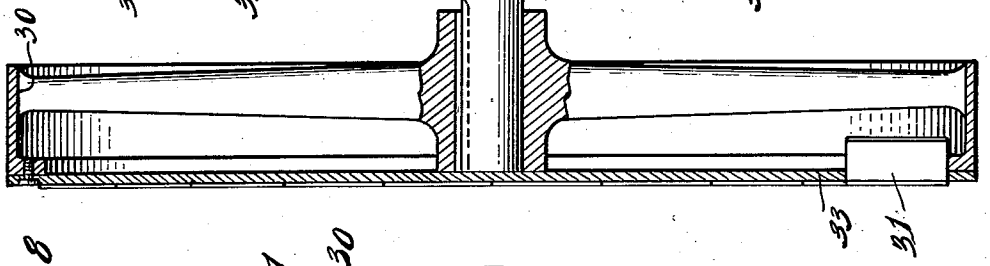


Fig. 8

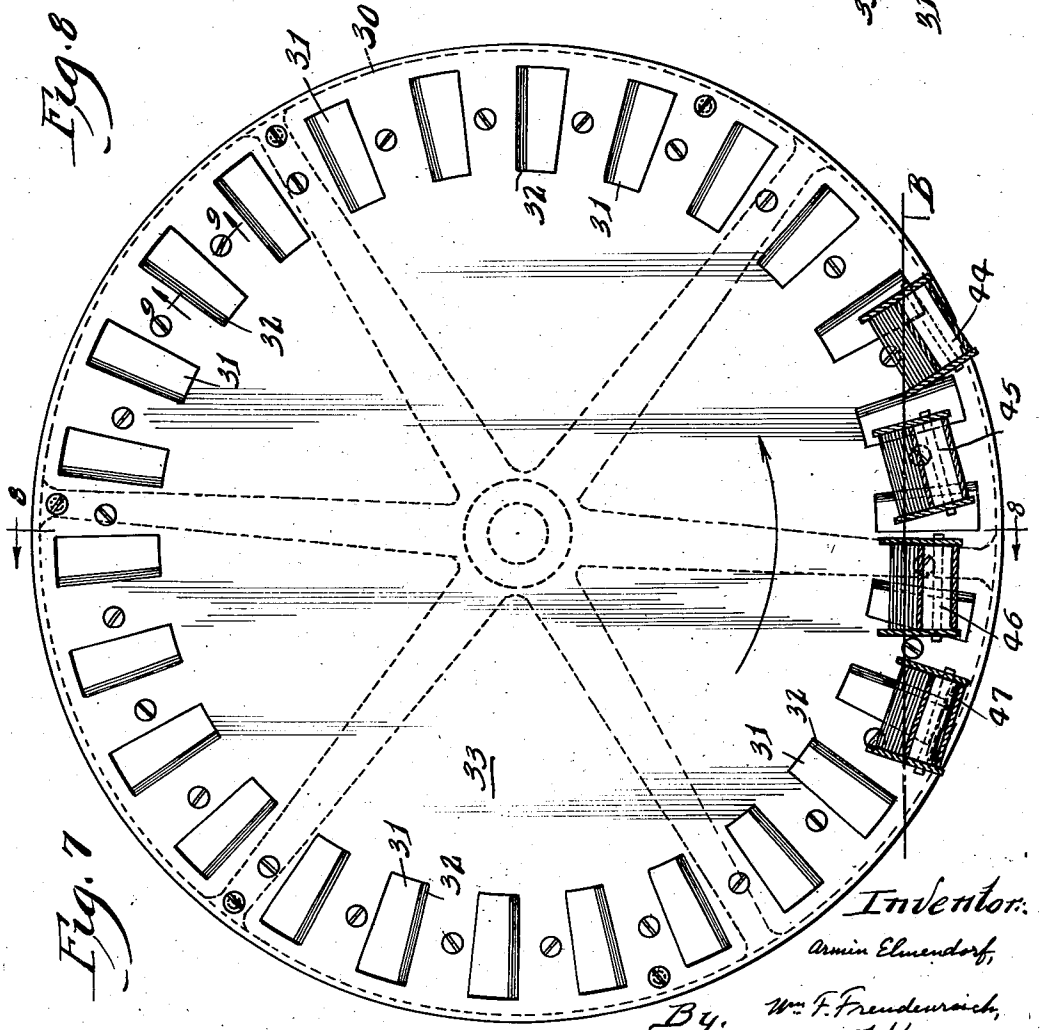


Fig. 7

Inventor:
Armin Elmendorf,
By. Wm. F. Freudenreich,
Attorney

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MACHINE FOR MAKING FLEXIBLE WOOD FILAMENTS

Armin Elmendorf, Winnetka, Ill.

Application November 1, 1946, Serial No. 707,224

1 Claim. (Cl. 144—185)

1

In the manufacture of cement-fiber boards ordinary excelsior has long been used as the fiber component. Such excelsior is made in long strands that come in tangled, matted masses and are difficult to untangle and separate. It is practically impossible to obtain uniformity of product or uniformity of structure within an individual cement-fiber board made of conventionally manufactured excelsior, the strands of which are generally from sixteen to twenty-four inches long. I have discovered that both of these difficulties can be overcome if the fibers or filaments are made fairly short, say from two to eight inches long; but know of no commercial method or machine used by others for producing such material, although in my prior Patent 2,349,034 I have disclosed a machine for directly cutting small, short logs into fibers that are highly curled.

The object of the present invention is to produce a simple and novel method of manufacturing flexible wood filaments of uniform thickness and length and, also, a novel and simple machine for carrying out the new method.

In accordance with my new method wood is first cut into veneers as thick as the width of ribbon-like filaments into which the wood is to be transformed. Thin slices are then cut, lengthwise of the grain, to divide the veneer into thin, flexible, ribbons. I do not cut up each piece of veneer separately, but pile them one on top of another and slice through the pile. As the number of veneers through which a cut can satisfactorily be made is limited, I assemble the veneers in a mat form, cut slices from one end of the mat and build on at the other end; so that the slicing operation may be continued indefinitely, without stopping. The assembly of veneers into an ever growing mat, with the wood grains running crosswise, permits the use of veneers of random widths and irregular shapes, as well as "fish tails" and other waste pieces that are incident to rounding a log before peeling the same into veneers. It also permits easy and rapid assembly of the component parts of a mat, because edges need not be matched and only approximate parallelism of the wood grains is required.

The various features of novelty whereby the present invention is characterized will hereinafter be pointed out with particularity in the claim, but, for a full understanding of the invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawings, wherein:

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Figure 1 is a top plan view of a machine for carrying out my improved method on a commercial scale; Fig. 2 is a view of the machine, partly in side elevation and partly in section; Fig. 3 is a top plan view of the delivery end of the machine on a larger scale than Fig. 1; Fig. 4 is a section on line 4—4 of Fig. 3; Fig. 5 is a section, on the same scale as Figs. 3 and 4, on line 5—5 of Fig. 1; Fig. 6 is a diagrammatic plan view of the mat of veneers, from the assembly end to the end from which slices are cut, as it appears when at full length; Fig. 7 is a section on line 7—7 of Fig. 2, but on a larger scale; Fig. 8 is a section on line 8—8 of Fig. 7; Fig. 9 is a section on line 9—9 of Fig. 7; and Fig. 10 is an elevational view of one of the cutting blades that are shown in Figs. 7–9.

As the method can best be explained by the operation of the machine illustrated, the construction and operation of the machine will now be described.

The support for the moving parts of the machine and the veneers to be sliced is a long, relatively narrow rectangular open frame 1, supported in a raised, horizontal position by legs 2. Spanning the width of the frame is a flat bed that is in sections separated from each other lengthwise of the frame by gaps. The first bed section 3, at the right hand end as viewed in Fig. 2, constitutes a table on which wood veneers are assembled in mat form; and, in this use of the word, veneers is intended to include "fish tails" and other sheet waste material heretofore mentioned. A little beyond the inner end of bed section 3, as best shown in Fig. 5, is a short bed section 4 that is raised a little above section 3. Beyond section 4 is section 5 that is somewhat longer than section 4, and then comes section 6 which, as shown in Fig. 4, stops short a considerable distance from the left hand end of the machine; sections 4, 5 and 6 being at the same level. Beyond section 6 is another bed section 7 which, as shown in Fig. 2, is at the same level as section 3.

At opposite ends of bed section 3 are transverse rollers 8 and 9, so placed that the upper surface of the former is tangent to the tops of the rollers. An endless conveyor belt 10, with one run resting on bed section 3, embraces the two rollers.

Below bed section 5 is a transverse shaft 11 on which are fixed a plurality of circular saws 12, three such saws being shown. The saws project up through the bed through a distance somewhat greater than the thickness to which a mat of wood veneers is to be built for passage through the machine.

Under the bed, just below the gaps in the latter at opposite ends of section 5, are transverse feed roller shafts 14 and 15 respectively; rollers 16 and 17, on these shafts, projecting up into the gaps far enough to engage the under side of a mat of veneers in the machine. Above the feed rollers are idle pressure rollers 18 and 19, respectively.

A motor 20 drives the conveyor belt 10 and feed rollers 16 and 17, through any suitable transmission means as, for example, belts 21, 22 and 24. The saws are preferably driven by a separate motor 25.

In using the machine, the operator lays wood veneers and waste pieces on the conveyor belt, with the wood grains extending crosswise of the latter, building up a mat A best shown in Fig. 6, which is preferably not more than two or three inches thick; the individual veneers being of any desired thicknesses, usually from one sixteenth inch to three sixteenths inch. Then, when the machine is started, the mat is moved lengthwise into the saws and is sawn lengthwise into sections, a^1, a^2, a^3 and a^4, the mat being kept from moving sidewise off the belt by upstanding side walls 26, 26 on the frame.

If desired, means may be provided to skim from the mat any excess material that makes it too thick. In the arrangement shown, there is a transverse rotary brush 27 extending between the side walls 26, 26, with its axis in the same vertical plane as the axis of conveyor roller 9; the brush being sufficiently far above the conveyor belt to allow a mat that is not too thick to pass freely underneath the same, but skimming off and throwing back any superfluous material. This brush may be driven from the saw shaft by a belt 28.

After the mat has been divided into longitudinal sections, each of the latter must be cut transversely into thin slices each composed of thin ribbons or filaments that are as wide as the thicknesses of the individual pieces and most of which are as long as the width of the mat section from which they were severed. In the arrangement shown, the cutting means consists of a large vertical wheel-like element 30 (to which I shall refer as a wheel), provided on the side toward the delivery end of the machine with many blades 31, the cutting edges 32 of which lie in a vertical plane close to and parallel with the plane face 33 of the wheel from which they protrude; the cutters being near the periphery of the wheel with their cutting edges radially arranged. A motor 34 rotates the wheel at high speed, the axis of rotation being parallel to the direction of movement of the mat. It will be noted that the wheel stands almost entirely above the plane of the sectional bed heretofore described, only a small portion thereof extending below the said plane.

The machine illustrated has been designed to move the longitudinal mat sections against or into the wheel in a manner best adapted to slice them properly, it being desirable that there shall be no upward thrust by the cutters on the mat during such slicing. Consequently, the longitudinal mat sections are first fanned out a little and then twisted in a manner to have the same angle of incidence whenever any cutting edge engages any one of the four mat sections. To bring this about I cause the side walls 26 to flare from points directly above the saw shaft to the far end of bed section 6 and provide between them progressively laterally inclined partition walls 35, 36, 37, 38, 39 and 40 which divide the space between the side walls into four gradually diverging channels of

uniform widths. The walls and partitions then extend straight ahead to the delivery end of the machine, parallel to each other. The straight portions of the four channels have bottoms consisting of the upper runs of conveyor belts 42 that pass over a transverse roller 43 located below and extending a little in advance of the adjacent end of bed section 6; these conveyor runs overlying bed section 7 and continuing beyond the latter to individual, short transverse rollers 44, 45, 46 and 47, located a short distance from the adjacent end of the machine. These four short rollers, as shown in Fig. 7, are inclined at various angles relative to each other, only roller 46 having a horizontal axis; the disposition being such that each cutting edge, with the wheel turning in the direction of the arrow in Fig. 7, stands at a small angle to the near side or edge of each mat section as it strikes the upper near corner of the latter. In other words, each blade slices into the mat through a side edge, first starting at the top and then coming progressively into engagement from the top of the mat to the bottom. Thus there is a little downward component of the force applied by a blade to cut the mat, which component serves to press the mat down against an anvil 48 which is a short sturdy bed section at the very end of the machine.

As a further aid in securing uniformity of slicing at all four mat sections, the rollers 44—47 are so located that the center of each mat section, looking directly at the advance end, is on the same transverse horizontal line B as are the centers of the others.

It will be seen that there is a wide gap between bed section 7 and anvil 48. Not only the rollers 44 to 47, but also a pair of similar, idle rollers 49 and 50, behind each of these rollers, are disposed below this gap; rollers 49 and 50 supporting the upper runs of belts 42. Roller 43 is driven by a belt 51 that is in turn driven by the shaft of feed roller 17, and thus drives the four conveyor belts 42.

It is necessary that the sections of the mat be clamped, near the plane where the slicing into fibers is done, as firmly as is practicable in the case of a continuously moving mass, to keep them compact as thin slices are cut therefrom. To accomplish this I place in each of the channels, through which the mat sections travel, a suitable yieldable pressure means. Each such means is shown as being composed of two devices, one of which is a little carriage 52 provided with rollers 54 and 55 directly above and paralleling the corresponding rollers 49 and 50, respectively; the mat passing under rollers 54 and 55. The other pressure device is a shoe 56 the advance end of which rests on the mat just where the latter leaves the anvil, while the trailing end is supported by a roller 57 that rests on top of the mat above and parallel to the roller 44.

Each carriage 52 is connected at the middle to the advance end of a swinging bracket 58 by a pin 59 that permits it to rock, relatively to the bracket, about an axis parallel to the roller axes. The inner or trailing ends of the brackets are journalled on a transverse shaft 60 that passes through and is supported by the stationary side walls 26 and the intervening partitions. There is a stationary, transverse bar 61 above and spaced apart from the advance ends of the brackets 58 and, between each bracket and this bar is a compression spring 62. Thus the carriages can move bodily up and down under the influence of the springs, and may also rock about

their own transverse axes to adjust themselves to the work.

Each shoe 56 is supported in a manner very similar to that in which the corresponding carriage is supported. Thus, each of these shoes is connected at the middle to the advance end of a long lever 64 by a pivot pin 65 that permits the shoe to rock about a transverse axis relatively to the lever. The inner or trailing end of the lever is journalled on shaft 60, and the shoe may therefore move bodily up and down as well as rock about its own axis. Above the advance ends of the levers 64 is a stationary bar 66, similar to bar 61 and, between each lever and this bar is a compression spring 67.

The rollers 54, 55 and 57 cooperate with the underlying rollers 44, 49 and 50 to clamp the mat sections against the belts 42 and thereby insure a positive drive, while the noses of the shoes press the mat sections firmly against the anvils very close to the plane in which the slicing cutting edges revolve.

It will thus be seen that I have made it possible to use all of the wood in a log economically to manufacture short flexible ribbon-like fibers or filaments, none of which is too long to be easily handled to create the uniform fluffy mass so essential to the production of strong fiber cement-boards of uniform texture; the great majority of the fibers being of predetermined lengths; and there being some shorter fibers as the result of working up "fish tails" and other waste. Ordinarily these shorter fibers are not present in sufficient volume to be in any way objectionable. Of course, if desired, only pieces of veneer of uniform length can be used in making a mat assembly, thereby practically eliminating fibers that are shorter than the widths of the longitudinal sections into which the mat is divided before slicing. I mention this only to show that, while ordinarily all waste in cutting veneers may be utilized to advantage, my method requires nothing more than a selection of the veneers used to insure that all fibers may be caused to be of a given length.

It will also be seen that the thickness of the filaments cannot exceed the distance that the cutting edges project beyond the plane face 33 of the rotatable wheel. Therefore, since the cutter blades are shown as being of a type and so mounted that adjustments can easily be made, the filament thickness may be accurately fixed.

While I have illustrated and described with particularity only a single preferred form of my

invention, I do not desire to be limited to the exact details thus illustrated and described, but intend to cover all forms and arrangements that come within the definitions of my invention constituting the appended claim.

I claim:

In a machine for manufacturing flexible wood fibers, a vertical rotatable wheel-like member having thereon, on the front face thereof, many short radial slicing blades distributed angularly along the periphery, an anvil means close to the paths of the cutting edges of the blades, said anvil means spanning the distance between a few of the lowermost blades, a long work support in front of the anvil, said work support comprising three horizontal table sections arranged end to end, endless conveyors arranged lengthwise of said support and each embracing one of the endmost sections of the work support and having its upper run overlying the corresponding section, saws under the intermediate section and projecting up through the same to divide a mat of veneers on said support into a plurality of narrow mats, devices to apply a constant yieldable pressure on the top of the veneers adjacent to the saws and above the anvil means, means to rotate said member and said saws, and means to drive the conveyors continuously in the direction to carry the work to said wheel-like member.

ARMIN ELMENDORF.

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