

May 11, 1965

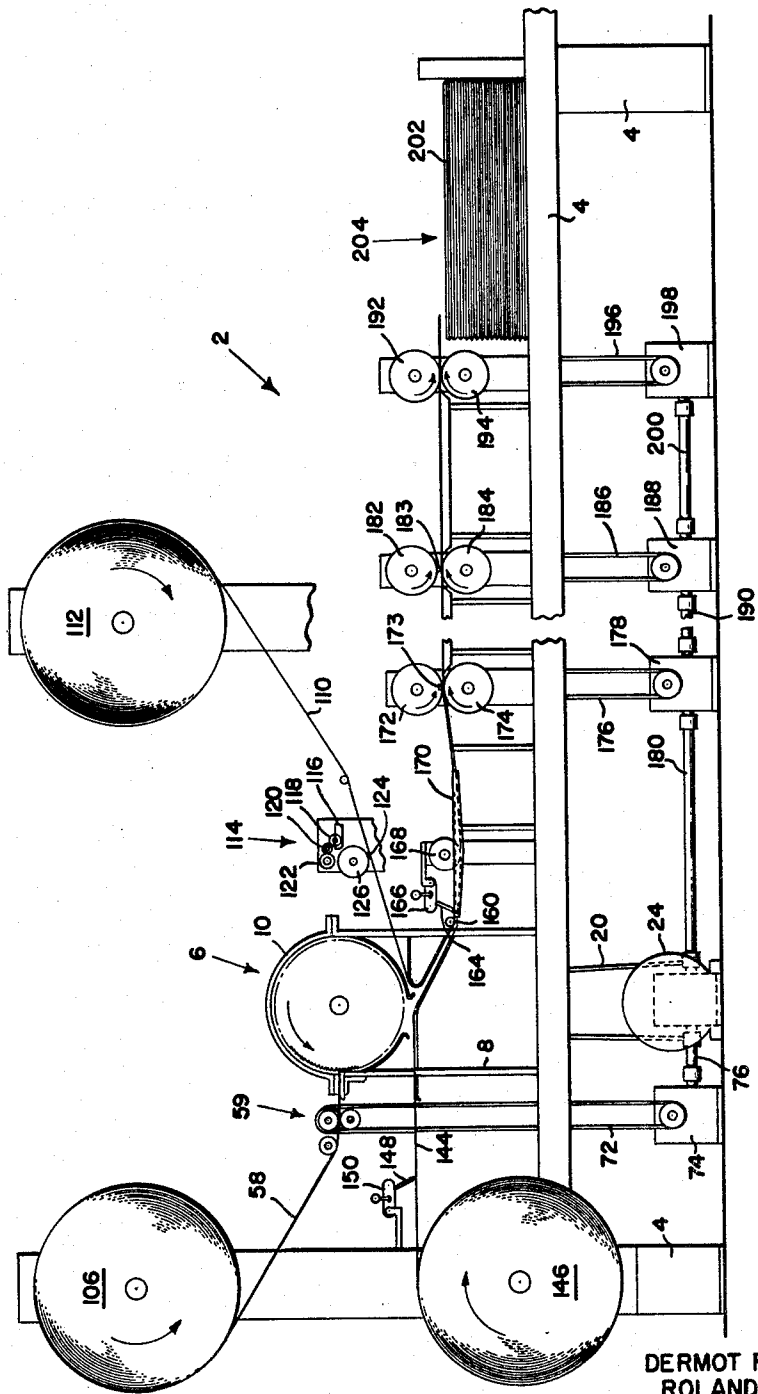
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3,183,141

SHREDDED PULP AND METHOD FOR MAKING SHREDDED PULP BATS

Filed March 17, 1960

5 Sheets-Sheet 1



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5 Sheets-Sheet 2

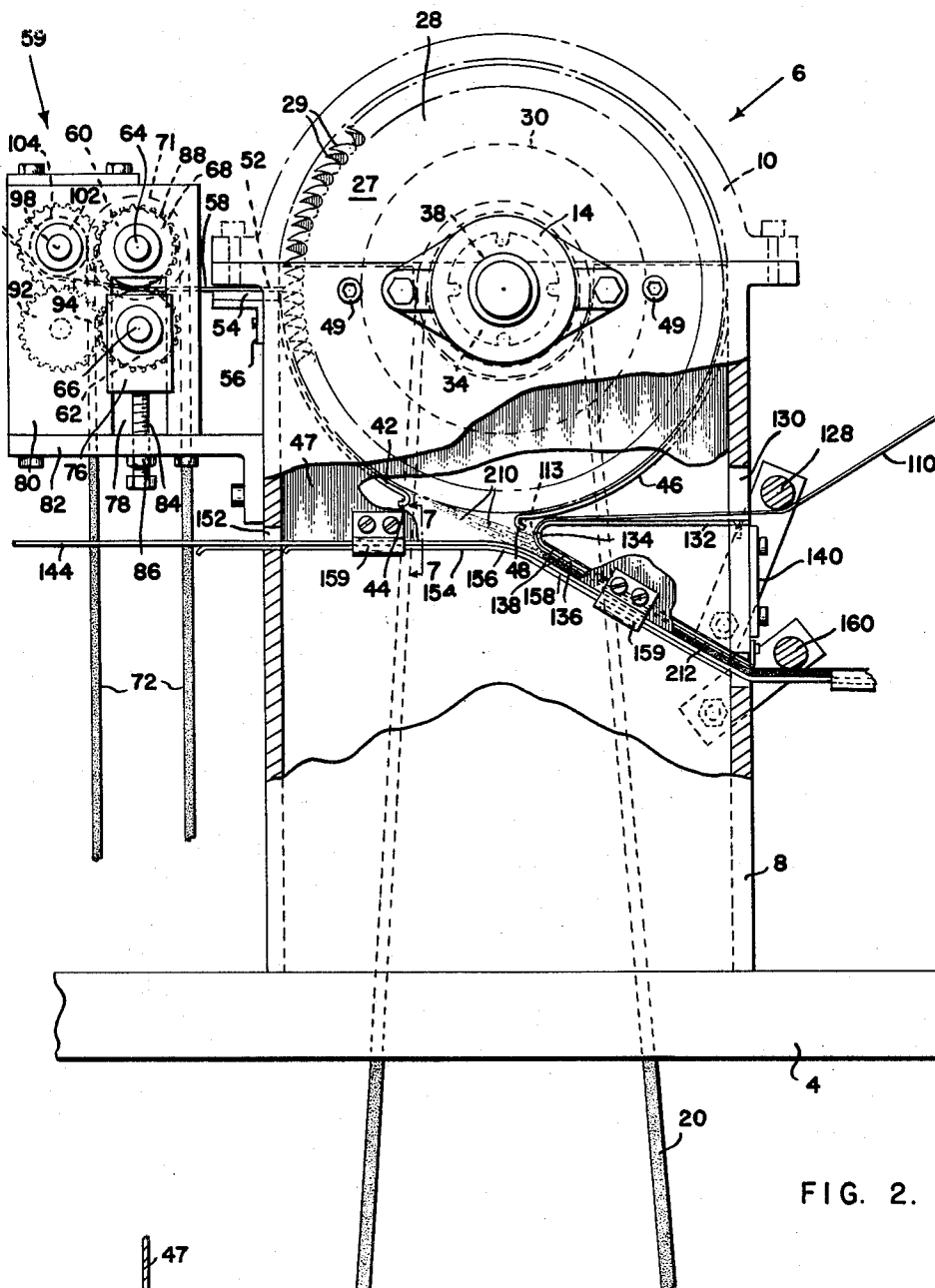


FIG. 2.

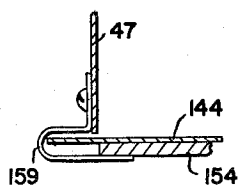


FIG. 7.

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SHREDDED PULP AND METHOD FOR MAKING SHREDDED PULP BATS

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5 Sheets-Sheet 3

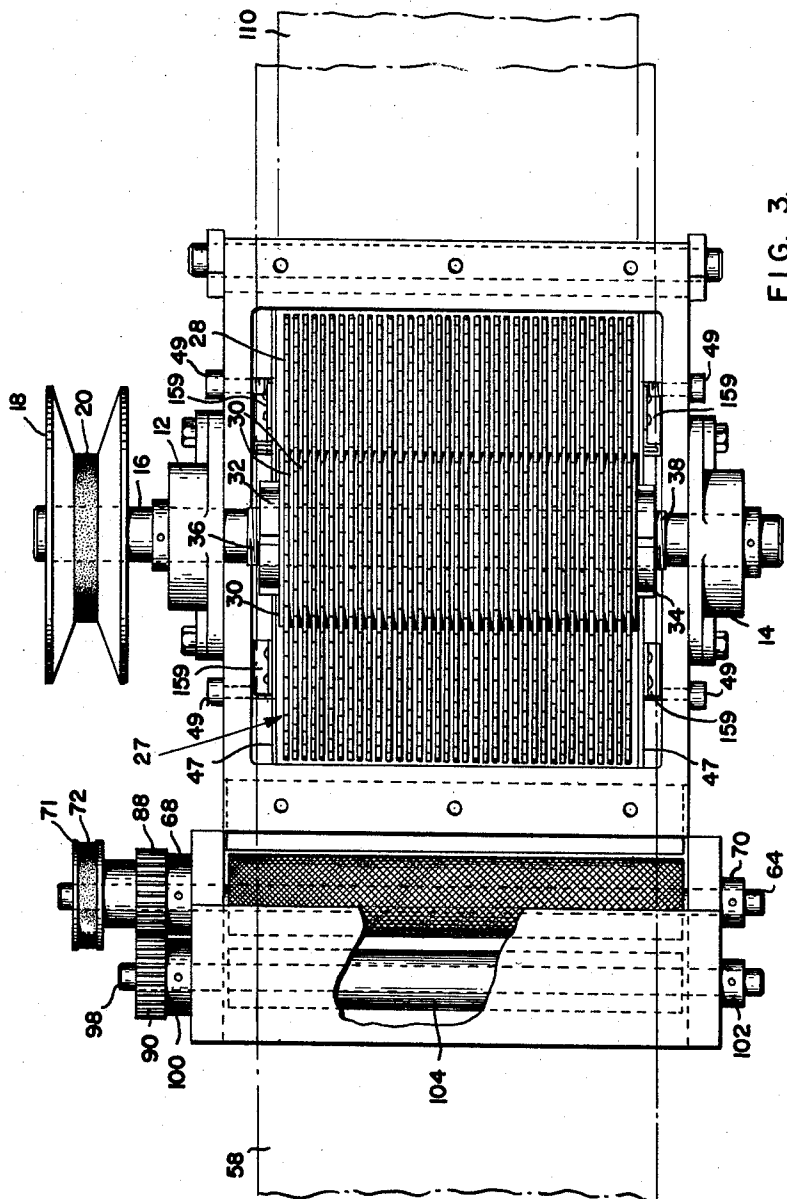


FIG. 3.

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5 Sheets-Sheet 4

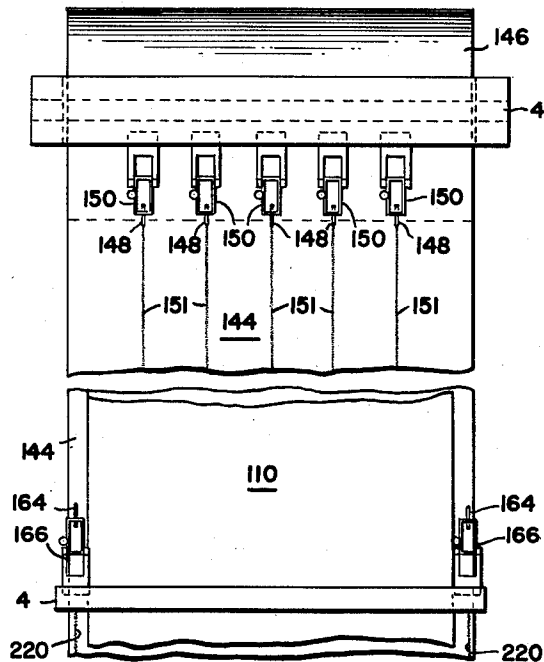


FIG. 4.

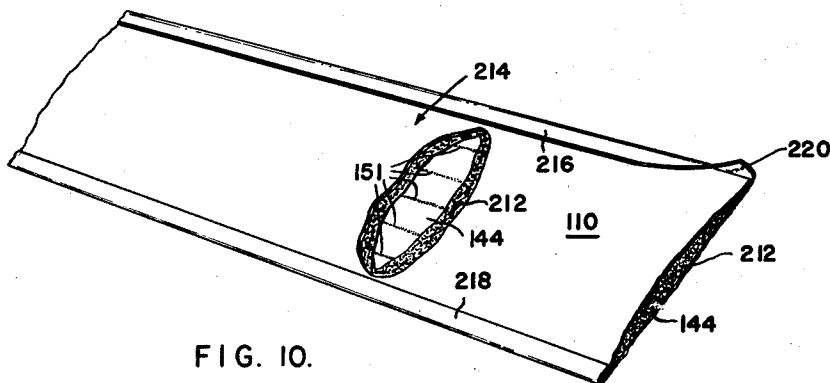


FIG. 10.

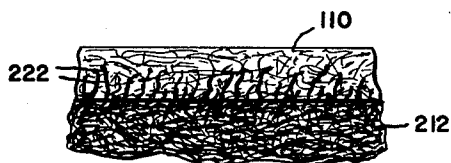


FIG. 11.

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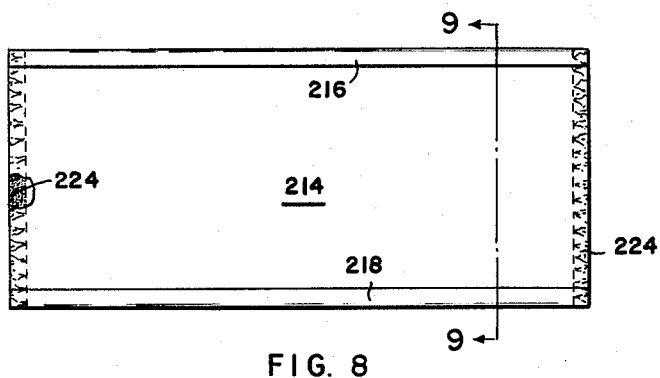


FIG. 8

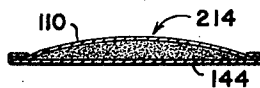


FIG. 9.

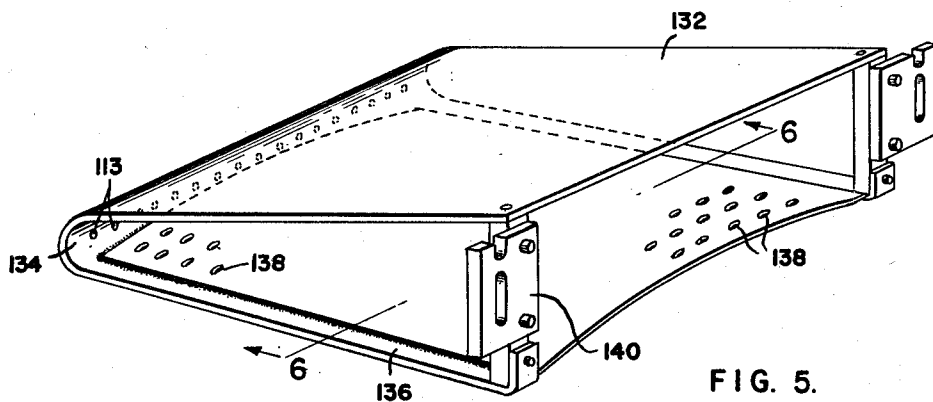


FIG. 5.

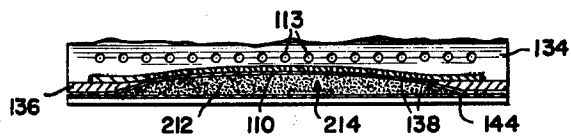


FIG. 6.

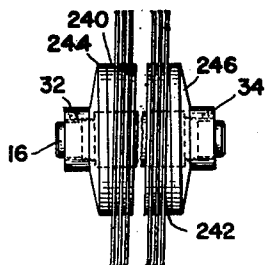


FIG. 12.

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SHREDDED PULP AND METHOD FOR MAKING SHREDDED PULP BATS

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5 Claims. (Cl. 161-43)

This invention relates to a novel shredded pulp bat and novel method for making shredded pulp bats. Shredded pulp bats have been made heretofore and generally include shredded or macerated pulp between a pair of opposed webs. Such bats have a wide range of utilities, for example, for heat insulating, bed pads, filter units, cushion pads and a wide range of other articles.

In the heretofore known bats the shredded pulp is employed in a uniform depth throughout the bat. In accordance with this invention, a bat is formed with a shredded pulp having a varying depth dependent upon the conditions for which it is to be used. Thus, for example, it is crowned transverse to the length of the bat when it is to be used for bed pads, diapers and other applications where it is desired to have a maximum of absorbency in the central area of the bat and where normal usage results in a tendency to displace the pulp from the center of the bat.

Also in accordance with this invention there is provided a method for making shredded pulp bats which is highly advantageous in that it forms bats of an exceptional degree of stability and also can form bats having a varying degree of thickness of the shredded pulp. Further, the method of this invention eliminates a substantial amount of the complexity and, hence, expense of heretofore known apparatus for making shredded pulp bats.

According to the method of this invention pulp is fed to a shredder and the shredded pulp is forced directly between a pair of opposed webs, the webs being guided by novel guides in accordance with this invention which in association with the shredder can provide increased stability of the bat and which due to their novel design can provide for a varying depth of shredded pulp in the bat.

The invention will be further clarified by reading the following description in conjunction with the drawings, in which

FIGURE 1 is a schematic elevation of apparatus in accordance with this invention;

FIGURE 2 is a side elevation of a shredder suitable for use in accordance with this invention;

FIGURE 3 is a plan view partially broken away of the apparatus of FIGURE 2;

FIGURE 4 is a plan schematic view showing the gluing mechanism for the lower web of FIGURE 1;

FIGURE 5 is a side perspective view of a guide for the upper web of FIGURE 1;

FIGURE 6 is a vertical section taken on the plane indicated by the line 6-6 of FIGURE 5;

FIGURE 7 is a vertical section taken on the plane indicated by the line 7-7 of FIGURE 2;

FIGURE 8 is a plan view of a bat made in accordance with this invention;

FIGURE 9 is a vertical section taken on the plane indicated by the line 9-9 of FIGURE 8;

FIGURE 10 is a top perspective view of the bat of FIGURE 8;

FIGURE 11 is an enlarged view showing the interlocking of pulp fibers with a web; and

FIGURE 12 is an elevation of an alternative mounting for the saw blades of the apparatus of FIGURE 1.

As shown in FIGURE 1, apparatus 2 in accordance with this invention is provided with a framework 4 on

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which is mounted shredding unit 6 having a lower casing section 8 and an upper casing section 10. The details of construction of shredder 6 are shown in FIGURES 2 and 3. Referring particularly to FIGURE 3, bearings 12 and 14 secured to casing section 8 support a shaft 16 which is driven by a pulley 18 (in a counterclockwise direction as viewed in FIGURE 2). Pulley 18 is driven by a belt 20 which as shown in FIGURE 1 is in turn driven by a motor indicated at 24. A shredder 27 has a plurality of circular saw blades 28 (FIGURE 3) mounted on shaft 16. The teeth 29 of blades 28 may be at an angle slightly less than 90° to the axis of the shaft 16. The saw blades 28 are spaced apart slightly by washers 30, the thickness of the washers being equal to or slightly greater than the set of the teeth 29 if they are at an angle to the axis of shaft 16. The blades 28 are positioned so as to stagger the teeth 29 of adjacent rows which is a desirable but not essential arrangement. Adjacent the outer face of the two outermost blades 28 are washers 30 which are compressed by nuts 32 and 34 respectively which in turn engage threaded portions 36 and 38, respectively of shaft 16. With some pulps it is desirable for best results to have the saw blades tilted at an angle to a plane perpendicular to the axis of rotation and such an arrangement is shown in FIGURE 12 wherein the blades 28 mounted on shaft 16 are cocked at an angle by taper washers 240 and 242 which are held against blades 28 by washers 244 and 246 and nuts 32 and 34, respectively. This arrangement due to the loose fit of blades 28 on shaft 16 sits blades 28 at an angle to a plane perpendicular to the axis of rotation.

Referring to FIGURE 2 an arcuate sheet 42 about the periphery of blades 28 extends downwardly from lower casing section 8 to arcuate terminal end 44. Spaced from the terminal end 44 of sheet 42 is an arcuate sheet 46 having a lower arcuate terminal end 48 and extending upwardly about the periphery of blades 28 to lower casing section 8.

Adjacent the side edges of sheets 42 and 46 a pair of upstanding enclosing plates 47, 47 are mounted by machine screws 49. Sheets 42 and 46, plates 47, 47 together with upper closing section 10 form an enclosing housing for shredder 27.

Adjacent the upper terminal end of sheet 42 is an opening 52 in lower casing section 8. In the lower portion of this opening there is positioned an anvil member 54 secured as by welding to a bracket 56 which is bolted to lower casing section 8. A pulp sheet 58 is adapted to be fed through opening 52 while resting on anvil 54.

Pulp sheet 58 is advanced by feeding apparatus indicated at 59 and shown in detail in FIGURES 2 and 3. Referring to FIGURE 2, an upper knurled feed roller 60 and a lower feed roller 62 are mounted respectively on shafts 64 and 66. Shaft 64 is carried by bearings 68 and 70 and is driven by pulley 71 which in turn is driven by belt 72. As shown in FIGURE 1, belt 72 is driven by a reduction gear driven pulley arrangement indicated at 74 which in turn is driven by a shaft 76 connected to motor 24.

Shaft 66 is carried in a pair of opposed bearing blocks 76, 76 (only one being shown), each bearing block being slidably carried in a slot 78 in plate 80 which is mounted on a bracket 82 secured to lower casing section 8. Bearing block 76 is adjustably secured in position by means of a bolt 84 secured to bearing block 76 and passing through a nut 86 welded to bracket 82.

A gear 88 secured to shaft 64 drives the gear 90 which in turn drives the gear 92 which drives gear 94 fixedly secured to shaft 66 to cause the clockwise rotation of roller 62 as viewed in FIGURE 2. Gear 90 is fixedly secured to a shaft 98, journaled in bearings 100 and 102. A guide roller 104 adapted to guide pulp sheet 58 is

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mounted on shaft 98 so that it can rotate independently of shaft 98. Pulp sheet 58 is supplied from a supply roll indicated at 106.

Referring again to FIGURE 1, a web 110 is supplied from a supply roll indicated at 112 and passes a glue station indicated at 114 and comprising a glue reservoir 116 and transfer rollers 118, 120 and 122. Roller 122 is adapted to be contacted by a protuberance 124 on roller 126, the protuberance 124 placing a glue line across the web 110 to facilitate the securing of the end of the bats preparatory to their being cut as will be described subsequently. Web 110 then passes into lower casing section 8.

As shown in greater detail in FIGURE 2, web 110 passes under guide bar 128 and through opening 130 in lower casing section 8. It then engages guide 132 which is formed to provide an arcuate portion 134 to guide web 110 in the reverse direction. After the direction of web 110 is reversed it passes over portion 136 of guide 132. Portions 134 and 136 are foraminous containing openings 113 and as shown in FIGURE 5 are arched upwardly in cross-section. Guide portion 136 terminates at 160 and the guide 132 secured to lower casing portion 8 on either side of opening 130 by means of brackets 140.

As shown in FIGURE 1, a second paper web 144 is supplied from a supply roll indicated at 146. Web 144 after leaving supply roll 146 passes under transversely spaced horizontal glue needles (FIGURES 1 and 4) which are each supplied by a reservoir 150. The glue supplied by these needles contributes to the stabilization of the formed bat by adhering the shredded pulp to web 144 along the glue lines 151. Thereafter web 144 passes inside of lower casing section 8. Referring for greater detail to FIGURE 2, web 144 passes through opening 152 in lower casing section 8 and engages web guide plate 154 which is developed at 156 to a portion 158 which lies opposite portion 136 of guide 132. The arcuately developed portion 134 and 156 of guides 132 and 154 respectively form a throat for the entrance of the shredded pulp into the area between webs 110 and 144. The lateral guiding of web 144 is accomplished by guide members 159 which are screwed to plates 47, 47 (FIGURES 1, 2 and 7).

Externally of opening 130 in lower casing section 8 a guide bar 160 is provided for guiding the formed bat assembly of the opposed paper webs and the contained shredded pulp.

The additional structure is conventional and well known to the art and hence will be described only with reference to the schematic showing of FIGURE 1. After passing from guide bar 160 the bat assembly passes below a pair of spaced glue needles 164, 164 (FIGURES 1 and 4) each supplied by a reservoir 166 which are adapted to supply glue to the outer edges of the lower web 144 which is wider than the upper web 110 so that it can be folded around the upper web and secured thereto. In order to thus fold the edges of the lower web around the upper web there is provided a conventional folding plough arrangement indicated at 170 and a folding roll indicated at 168.

The roller 172 having a projecting portion 173 is adapted to cooperate with roller 174 to contact the glue line placed by the glue station 114 in order to laterally glue the assembly together at this glue line. As shown schematically, rollers 172 and 174 may be driven by a belt drive indicated at 176 which in turn is driven by a reduction gear driven pulley assembly indicated at 178 which in turn is driven by a shaft 180 from motor 24.

The bat assemblies are cut into the desired length by means of cutter roller 182 having a knife 183 adapted to cooperate with roller 184. Rollers 182 and 184 may be driven by a belt drive indicated at 186 which in turn is driven by a reduction gear driven pulley assembly indicated at 188 which is driven by a shaft 190 from reduction gear pulley assembly 178.

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The thus severed assembly is advanced to the right as viewed in FIGURE 1 by opposed pull rolls 192 and 194 which as indicated are driven by a pulley 196 which in turn is driven by a reduction gear pulley assembly 198 driven by shaft 200 from reduction gear pulley assembly 188. The end product bat 202 is stacked as indicated at 204.

Webs 110 and 144 will be fabric webs of, for example woven or unwoven cotton, woolen, nylon, glass, felt, rayon or linen fabric. The term fabric is also intended to include paper. Web 110 will be a porous fabric to permit interlocking with the pulp fibers as hereinafter explained, while web 144 can be a porous or non-porous fabric.

Operation

It is believed that the operation of the apparatus 2 is entirely clear from the above description with the exception of some additional detail relating to the operation of the structure shown in detail in FIGURES 2 and 3 which is the heart of the claimed invention.

As pulp 58 is fed into blade 28 of shredder 6, the pulp is shredded or macerated to produce fibers of pulp which are indicated at 210 in FIGURE 2. Pieces of pulp 210 are confined by sheet 42 and upstanding plates 47, 47 and hence are carried downwardly by blade 28 until they reach the opening between sheet 42 and sheet 46 where they are urged by centrifugal force into the space between upper web 110 and lower web 144 where they are supported by guides 132 and 154. Arcuate portion 134 and guide 132 are positioned so that a portion of the pulp fibers 210 will impinge directly against web 110 adjacent these portions causing these pulp fibers to penetrate in part web 110. The intimate engagement of the pulp fibers 210 with web 110 is further enhanced by virtue of the fact that blades 28 act as a fan to produce a jet stream of air travelling with the pulp fibers 210. This stream of air tends to escape through opening 113 in guide 132 which causes the fibers 210 which are adjacent web 110 to be forced into interlocking engagement with web 110. This interlocking engagement of fibers 210 with web 110 acts to provide a high degree of stabilization of the pulp fibers 210 with respect to webs 110 and 144. Further stabilization is provided by the adherence of fibers 210 to glue lines 151 on the lower web 144.

Guide 132 in association with blades 28 acts to cause the formed bed or bat of fibers 210 which is indicated at 212, FIGURE 6, to form with a varying thickness, the thickness increasing from the edges towards the middle, to form a crowned top indicated at 214.

The above described operation is novel not only in the product which is formed but also in that it eliminates much of the heretofore used apparatus in accomplishing this result by virtue of the fact that it provides for a direct transfer of the pulp particles produced by the maceration or shredding operation to the webs which are to encompass the pulp fibers. The thus formed assembly of pulp fibers and the upper and lower webs then finished off by gluing the outer edges of lower web 144, folding them over the top of the upper web 110 with the subsequent sealing of the bats transversely along the transverse glue lines and cutting them into the desired lengths. It will be appreciated, of course, that the bat can be finished in a wide variety of fashions. For example, where the bats are to be used in furniture or the like they may be simply rolled into large rolls without any transverse sealing being accomplished. The manner of finishing off the bats will vary widely according to the intended use.

Product

The pulp bat made in accordance with this invention is shown at 214 in FIGURES 8, 9 and 10. As shown in FIGURE 10, the bed 212 of pulp fibers is confined between upper porous fabric web 110 which acts as a facing ply and lower porous or non-porous fabric web 144 which acts as a backing ply, lower web 144 having its

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edges 216 and 218 folded upwardly around web 110 and glued thereto by an adhesive indicated at 220. As shown in FIGURE 11, individual fibers 222 of fibers 212 are actually embedded and interlocked with the fibers forming web 110. This provides a marked improvement in the stabilization of the bat. Further stabilization is achieved by the adherence of the pulp fibers 212 to the glue lines 151.

It will be noted that web 110 as well as the top of bed 212 is crowned due to the presence of a gradually increasing amount of pulp from the edges of the bat towards the center thereof.

While not at all essential the ends of the bat 214 illustrated in FIGURE 8 are sealed by the ends being compressed against an adhesive as indicated at 224.

The thus formed bat is markedly advantageous from the point of view of its stabilization. It is further novel and entirely advantageous in that it provides an increased amount of pulp in the center as against the outer edges which provides for greater absorption of fluids in this area which is highly desirable for numerous applications and which further acts to prevent the thinning out of the pulp in the central portions of the bat incident to the working of a weight in this area as, for example, a person's body lying on such a bat employed as a bed pad.

It is not desired to be limited except as set forth in the following claims.

What we claim is:

1. A bat comprising a facing ply, a backing ply and shredded pulp contained between said plies, fibers of said shredded pulp being embedded in at least one ply to stabilize the bat, one of said plies being wider than the other ply and having its edges folded over the edges of the other ply and adhered thereto.

2. A bat comprising a facing ply, a backing ply and shredded pulp contained between said plies, fibers of the shredded pulp being embedded in at least one ply to stabilize the bat, the thickness of the shredded pulp between the plies progressively increasing from the outer portions of the bat to substantially the center of the bat and one of said plies being wider than the other ply and having its edges folded over the edges of the other ply and adhered thereto.

3. The method of manufacturing a pulp bat comprising shredding a sheet of pulp and forcing the shredded pulp between a pair of moving webs in a stream of air, at least a portion of said shredded pulp being impinged

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against one of said webs to embed the fibers of the pulp in said one web.

4. The method of manufacturing a pulp bat comprising shredding a sheet of pulp with a rotary shredder, confining the shredded pulp to cause it to rotate with said rotary shredder during a portion of its rotary travel, releasing the shredded pulp and an accompanying stream of air from its travel with said shredder adjacent a pair of spaced moving webs disposed to form a receiving end opening between the webs to impinge by centrifugal force at least a portion of said shredded pulp against at least one of the webs, and exhausting at least a portion of said air stream through one of said webs.

5. The method of manufacturing a pulp bat comprising shredding a sheet of pulp with a rotary shredder, confining the shredded pulp to cause it to rotate with said rotary shredder during a portion of its rotary travel, releasing the shredded pulp and an accompanying stream of air from its travel with said shredder adjacent a pair of spaced moving webs of different widths disposed to form a receiving end opening between the webs to impinge by centrifugal force at least a portion of said shredded pulp against at least one of the webs to embed fibers of the pulp in at least one of said webs, exhausting at least a portion of said air stream through one of said webs and applying an adhesive to the edges of the wider of said webs and folding said edges over the other web to adhere said edges to said other web.

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