A machine for producing pulp bats has a rotary shredder, a vacuum drum with small openings in its periphery and duct means to convey shredded pulp from the shredder to the vacuum drum. An inner drum cuts off the openings from the vacuum to release material from the drum. Advantageously air jet means assist in releasing material from the drum. In one embodiment, guide means are adapted to guide a porous sheet to pass over a portion of the drum for the accumulation of shredded pulp on the porous sheet and then from a terminal position away from the drum. Means guide a second sheet adjacent the said terminal position to retain the accumulated shredded pulp between the porous sheet and the said second sheet. In a second embodiment, the shredded pulp accumulates directly on the drum and means guide a pair of opposed sheets adjacent the point of release of the shredded pulp from the drum to entrain the accumulated shredded pulp and carry it away from the drum.

12 Claims, 15 Drawing Figures
MACHINE FOR PRODUCING PULP BATS

BRIEF SUMMARY OF THE INVENTION

It is well known in the prior art to take shredded pulp and form a bat by forming a sandwich of the shredded pulp between a pair of opposed webs or sheets. U.S. Pat. No. 3,183,141 dated May 11, 1965 (Holden et al.), which is incorporated herein by reference, is typical and discloses entraining shredded pulp in a stream of air and depositing it between a pair of opposed webs. While the machine of this patent is satisfactory for many purposes, it fails to provide for the degree of uniformity of the shredded pulp between the webs throughout as is desired for some applications. In addition, for high speed operation it is necessary that both webs in the said patent be of porous material for satisfactory results. In accordance with the present invention, a highly uniform layer of shredded pulp of improved quality is achieved and high speed operation is possible even when one of the webs is not porous. The latter aspect is important since the pulp bats are in wide usage as underpads for patients' beds and normally require that one side of the bat be nonporous.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic view of apparatus for forming pulp bats;
FIG. 2 is a side elevation partially broken away of apparatus in accordance with the invention, partially broken away;
FIG. 2A is a view taken on the plane indicated by the line 2A—2A in FIG. 2;
FIG. 3 is a rear elevation, partially broken away, of the vacuum drum system of FIG. 2;
FIG. 4 is a rear elevation, partially broken away, of the drum of FIG. 3 with a screen added;
FIG. 5 is a front elevation (taken on the plane indicated by the line 5–5 in FIG. 6) of the drum of FIG. 3, partially broken away;
FIG. 6 is a vertical section taken on the plane indicated by the line 6–6 in FIG. 5;
FIG. 7 is a vertical section through a portion of the air conduit in the drum system;
FIG. 8 is a view taken on the plane indicated at 8–8 in FIG. 7;
FIG. 9 is a bottom plan view of the inner drums of the apparatus of FIG. 2;
FIG. 10 is a plan view of a bat made using the apparatus of FIG. 1;
FIG. 11 is a view taken on the plane indicated by the line 11–11 in FIG. 10;
FIG. 12 is a view taken on the plane indicated by the line 12–12 in FIG. 10;
FIG. 13 is a view illustrating the operation of the apparatus of FIG. 2, and
FIG. 14 is a view illustrating the operation of an alternative embodiment of the invention.

DETAILED DESCRIPTION

Referring first to FIG. 1, a machine 2 for producing pulp bats has a pulp sheet feeding device 4 which as best seen in FIG. 2 has opposed gears 6 and 8 and opposed gears 10 and 12 which engage a sheet 14 of pulp and advance it into a shredder 16 which is conventional and fully disclosed in detail in U.S. Pat. No. 3,183,141 and hence need not be described in detail here. As best seen in FIG. 2 the pulp 14 is shredded by a plurality of circular saw blades, one of which is shown at 18 and the shredded pulp 20 is discharged into a conduit 21. Conduit 21 has a hinged baffle 21A which extends the full width of conduit 21 and is sealed to the desired position by a bolt 21B secured to the baffle, passing through an arcuate opening 21C in the side wall 21D of shredder 16 and secured by wing nut 21E. Static bars 22 are positioned adjacent opening 23 where air enters the conduit 21 and static bars 24 are positioned in housing 25 which has an air intake opening 26 and which is on the top of opening 27 in conduit 21 (FIG. 2A). Opening 27 is controlled by five slidable adjustable air baffles 29 (FIG. 2A). Each baffle 29a has a slot 29b engaged by a headed screw 30A threaded into conduit 21 to provide for its adjustment. The static bars function in a well known manner to neutralize any changes on the shredded pulp by ionizing the air to cause positively charged material to be neutralized by attracting free negative ions and negatively charged material to be neutralized by attracting free positive ions. In the instant case the pulp tends to be randomly charged with either polarity.

Conduit 21 extends downwardly to terminate immediately adjacent a vacuum drum system 32. As seen in FIGS. 2 and 3 drum system 32 has a rotating drum 34 which is mounted for rotation on a plurality of rollers 36 which are rotatably mounted on brackets 38. As best seen in FIG. 3, drum 34 has a central portion 44 with uniformly spaced small openings (perforations) 46. Outboard of central portion 44 are mounted rings 48 and 50 respectively, each of which is respectively adjacent a set of rollers 36 to keep the drum centered. An additional ring 52 is secured to the left hand end of drum 34 as viewed in FIG. 3 and has in turn secured thereto a sprocket 54.

A fixed inner suction drum 62 is mounted within drum 34. As best seen in FIG. 5, drum 62 has an opening 64 which is surrounded by sealing strips 66, 68, 70 and 72 which may be of, for example, felt, plastic, or wood. These sealing strips together with an additional longitudinal strip 74 secured to drum 62 (FIG. 3), which may be of the same material, act to center drum 62 within drum 34. Drum 62 has an end wall 78 to which is secured as by welding a shaft 80 which is mounted in an opening 82 in a standard 84. A set screw 86 engages shaft 80 to prevent its rotation and to permit adjustment of the angular position of drum 62 with respect to drum 34 (FIG. 3).

As seen in FIGS. 5–9, an angle member 90 is secured to the interior of drum 62 by machine screws 92 over openings 94 in drum 62. Angle member 90 has one end closed off by end wall 78 of drum 62 and the other end closed off by a plate 96 (FIG. 9). An air supply pipe 98 passes through wall 78 to supply air to the space encompassed by the angle member 90 and drum 62.

The open end 102 of vacuum drum 62 is connected to a conduit 104 (FIG. 5) which as shown schematically in FIG. 2, is connected to an exhaust blower 106.

As best seen in FIG. 2, drum 34 is rotated by means of a chain 108 connected to sprocket 54 and to sprocket 110 which is driven by a gear reducer 112.

A porous fabric web 120 passes through a small opening 122 into the interior of conduit 21 and about the central portion 44 of drum 34 and overlying openings 46, and thence away from drum 34 to drive rollers 124 and 126 (FIG. 1). As best seen in FIGS. 2 and 3, a guide roller 130 is provided to guide a nonporous web 132 (FIG. 1) adjacent drum 34.
Since the auxiliary apparatus necessary to make the hat is well known to the art, it will be described in connection with the operation of the foregoing described apparatus which follows. Shredded pulp 20 formed by applying pulp sheets 14 to shredder 16 is entrained in conduit 21 and conveyed in the direction of drum 34 by the action of blower 106 pulling air through openings 46 in rotating drum 34, opening 64 in suction drum 62 and through conduit 104. Since sheet 120 overlaps drum 34, the air is pulled through this sheet and causes the shredded pulp 20 to form a bed 136 of shredded pulp (FIG. 13). The flow of air through conduit 21 tends to be non-uniform in nature. Thus at the outset it is necessary in order to get pulp bed uniform to adjust air baffles 29 until the flow of air through conduit 21 is substantially uniform. Sheet 120 and the uniform bed of shredded pulp 136 are rotated together with drum 34 out of the confines of conduit 21 to a position adjacent roller 130 and non porous sheet 132 at which point they are beyond opening 64 in drum 62 and are being pulled off drum 34 by rollers 124 and 126 (FIG. 1). Advantageously jets of air are introduced from the space enclosed by angle members 90 through openings 94 in drum 62 to aid the sheet 120 and the associated bed 136 of shredded pulp to freely disengage from drum 34 and come into contact with sheet 32.

Prior to arriving at guide roller 130, web 132 has passed around a guide roller 140 (FIG. 1) and had an adhesive applied to its surface by a roller 142 which received the adhesive from a roller 144 which in turn received it from a roller 146 mounted in an adhesive container 148.

As shown schematically in FIG. 1, after leaving guide roller 130 the assembly of webs 120 and 132 with uniform bed 136 of shredded pulp passes through drive rollers 124 and 126 and thence to a transverse gluing station 152 where at spaced intervals the combination is engaged by gluing head 154, which has been supplied with an adhesive by adhesive supply roller 156, while the combination is backed up by backing roller 158 to provide adherence between webs 120 and 132 in the area where the webs are later severed to form separate bals. The assembly then passes to an embossing station indicated at 162 where it is just has been transversely glued and then to a folding station 164 where the outer edges of web 132, which is somewhat wider than web 120, are folded over web 120 and adhered thereto by the previously supplied adhesive. The assembly then proceeds to cutting station 166 where the webs are severed in the embossed area to form separate bals to complete the operation. All of the operations following rollers 124 and 126 are well known to the art.

A completed bals 170 is shown in FIGS. 10-12. The edges 172 of web 132 are turned up over web 120 and adhered thereto by adhesive indicated at 174 (FIG. 11). Each end 176 is embossed as indicated at 178 and adhered together by an adhesive 180 which permeates the embossed portion of web 120 and bed 136 of shredded pulp and contacts web 132 (FIG. 13).

ALTERNATIVE EMBODIMENT

Alternatively the uniform shredded pulp bed may be formed directly on the drum. As shown in FIG. 4, a cylindrical screen 184 of sufficient fineness to prevent the passage therethrough of the shredded pulp (for example, from about 710 to about 105 mesh) overlies the central portion 44 of drum 34. The screen 184 is secured in place by virtue of its elasticity. In this alternative embodiment there is one additional minor modification of the originally described embodiment. Absorbent web 190 is guided about a guide roller 192 rather than passing around drum 34. Otherwise, this alternative embodiment is the same as the embodiment described above.

In operation of the alternative embodiment, the shredded pulp 20 accumulates evenly on screen 184 and is carried thereon beyond opening 64 in fixed drum 62 to a point opposite the space enclosed by angle member 90 where jets of air pass through openings 94 in drum 62 and thence through openings 46 in drum 34 to force the bed of shredded pulp off screen 184 and onto the non porous web 132 on which it is carried to the left as viewed in FIG. 14 to be joined by absorbent web 190 which passes around guide roller 192 and overlies the pulp bed.

Typically, web 120 may be a fabric web of, for example, woven or unwoven cotton, woolen, nylon, rayon or linen fabric or paper which will permit the passage of air. The non porous web 132 may be, for example, polyethylene. Absorbent web 190 may be, for example, cotton, wool or paper and need not permit the passage of air.

The above described embodiments are illustrative and are not intended to be limiting.

1. A machine for producing uniform pulp bals comprising:
   a. a rotary shredder,
   b. a drum having perforations in its periphery, means to guide a porous sheet to pass over a portion of the drum and then away from the drum at a terminal position,
   c. duct means to convey shredded pulp from the shredder to said porous sheet for a uniform accumulation on said porous sheet,
   d. vacuum means communicating with the inner periphery of the drum opposite the duct means and terminating adjacent the said terminal position, and
   e. means to guide a second sheet adjacent to and then away from said terminal position to retain the accumulated shredded pulp between the porous sheet and said second sheet.

2. A machine in accordance with claim 1 having means adjacent said duct means to neutralize any electrical charges on the shredded pulp.

3. A machine in accordance with claim 1 in which the vacuum means includes a fixed inner drum having an opening opposite the duct means.

4. A machine in accordance with claim 1 having means to deliver air under pressure to the inner periphery of the drum opposite the perforations to provide jets of air from said perforations adjacent the said terminal position.

5. A machine in accordance with claim 1 having means to control the flow of air through the duct means to provide a uniform flow of air through the duct means.

6. A machine for producing pulp bals comprising:
   a. a rotary shredder,
   b. a vacuum drum having perforations in its periphery,
   c. a screen covering the drum having a mesh opening that is smaller than the particles of shredded pulp,
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duct means to convey shredded pulp from the shredder to the screen covered vacuum drum for accumulation on the periphery of the screen.

vacuum means communicating with the inner periphery of the drum opposite the duct means, and means to guide a pair of opposed sheets adjacent to said screen covered vacuum drum to entrain the accumulated shredded pulp as it is released from the drum at a terminal position and carry it away from the drum.

said vacuum means terminating adjacent said terminal position to release the accumulated shredded pulp.

7. A machine in accordance with claim 6 having means adjacent said duct means to neutralize any electrical charges on the shredded pulp.

8. A machine in accordance with claim 6 in which the vacuum means includes a fixed inner drum having an opening opposite the duct means.

9. A machine in accordance with claim 6 having means to deliver air under pressure to the inner periphery of the drum opposite the perforations to provide jets of air from said perforations through the screen adjacent the said terminal position.

10. A machine in accordance with claim 6 having means to control the flow of air through the duct means to provide a uniform flow of air through the duct means.

11. A machine in accordance with claim 6 having means for rotatably adjusting the inner drum to vary the angular position of the opening.

12. A machine in accordance with claim 6 having means for rotatably adjusting the inner drum to vary the angular position of the opening.

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