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[54] **FLUFF PREPARATION SYSTEM AND APPARATUS**

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[52] **U.S. Cl.** .....**241/28**, 241/29, 241/34, 241/48, 241/152 R

[51] **Int. Cl.**.....**B02c 13/00**

[58] **Field of Search**.....241/18, 19, 25, 28, 29, 34, 241/48, 54, 58, 76, 78, 152 R, 153, 154

[56] **References Cited**

UNITED STATES PATENTS

2,072,157	3/1937	Day	241/48
2,446,551	8/1948	Pauley	241/28 X
3,519,211	7/1970	Sakulich et al.	241/18
3,596,840	8/1971	Blomquist	241/28

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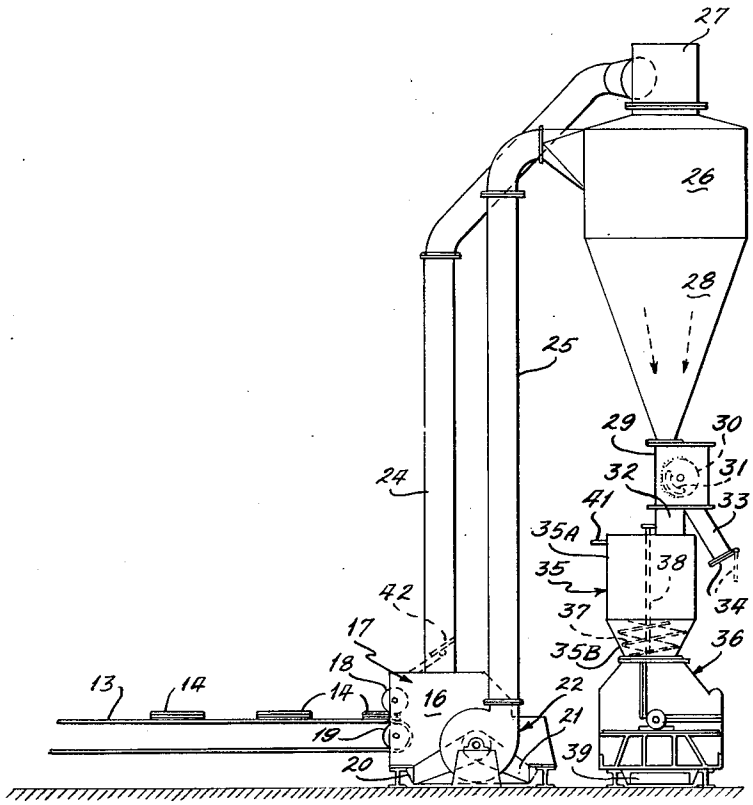
[57] **ABSTRACT**

A method or system of applying apparatus to the production of fluff which is used in the making of absorbent articles, like diapers, which after use can be thrown away. The method is directed to preparing fluff from cheap wood pulp sources in a way that yields a continuous stream of fluff for the final product producing machines suitable for direct delivery to overcome compacting which results from excessive handling or time delay between fluff preparation and incorporation into the final product.

9 Claims, 2 Drawing Figures



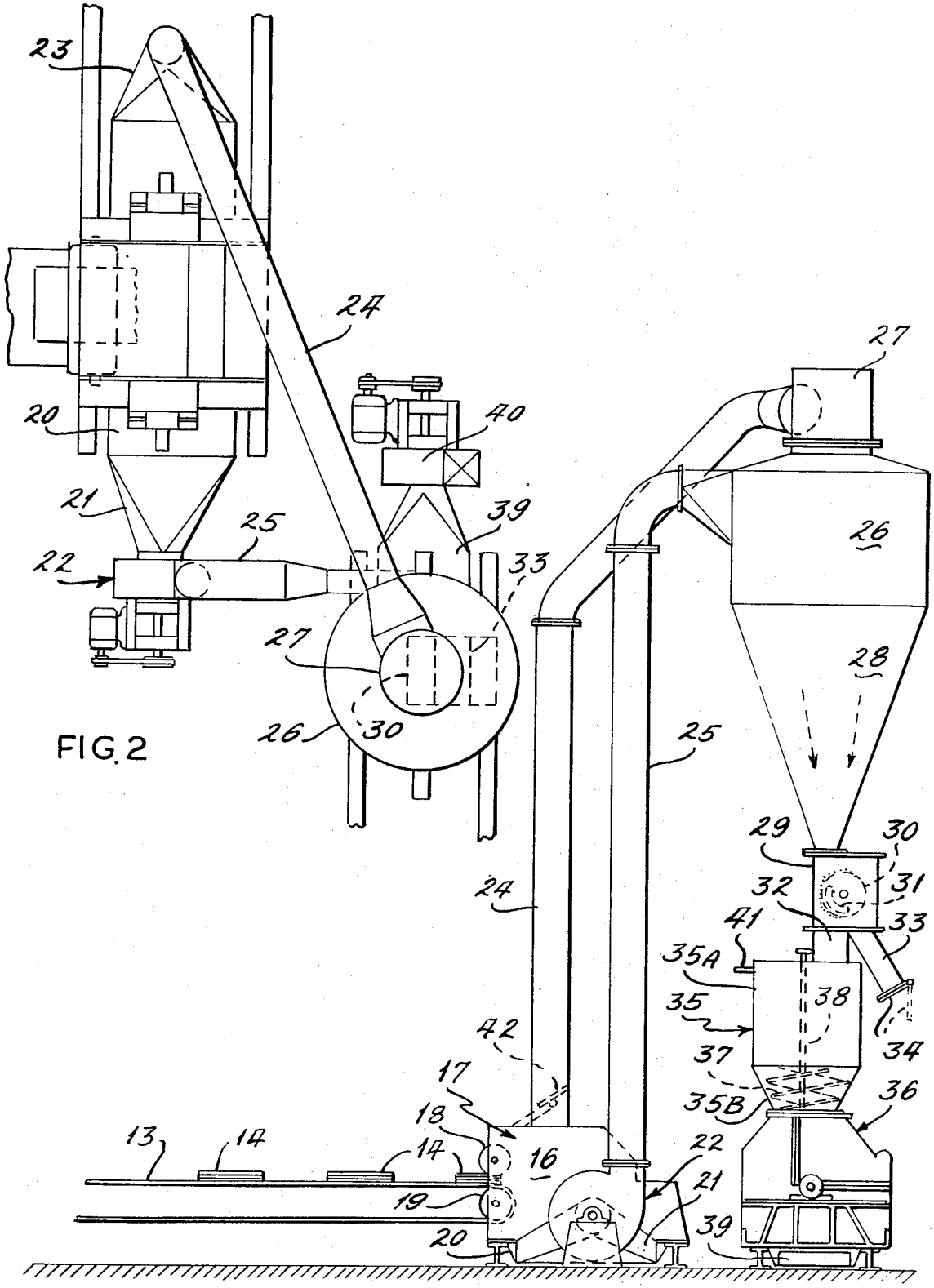

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FIG. 2

FIG. 1

FLUFF PREPARATION SYSTEM AND APPARATUS

BRIEF SUMMARY OF THE INVENTION

The present invention is directed to the system or method for preparing fluff which is utilized in the manufacture of absorbent articles like baby diapers.

In the present production of absorbent type finished products for the retail market there are a number of sources of fluffy type material which is the absorbent medium. Some of the types use high grade wood pulp material and others use low grade wood pulp. It is also known that the wood pulp must be treated so that it can be transported to the places where it is ultimately worked into absorbent products. One of the difficulties encountered in the latter transition is the expense involved in converting the wood pulp to sheets which are then rolled up on spools or cores for transportation. Frequently the large rolls become damaged at the ends and this results in a fairly high loss because the present type of machinery is not set up to handle misshapen and edge-damaged material.

In the present system a low grade wood pulp is utilized and the pulp is treated in the usual manner and formed into sheets which are then put up in bales while in the flat condition. The baled sheets are then very easy to transport and there is no difficulty in utilizing all of the sheets whether or not there may be edge damage caused in transportation. The bales of sheet material are put through a conveyor feeding system and fed into a primary shredder at a controlled rate. The shredded material is transported to a cyclone separator where some of the conveying air is returned to the primary feeder and the remainder is utilized in the cyclone separator to force conveyance of the separated shredded material through a tramp metal separator and into a feed hopper of a secondary shredder. The secondary shredder delivers the shredded material at a controlled rate and the output from the secondary shredder is conditioned so that it may be conveyed directly to a process line where the manufacture of finished products begins.

The apparatus by which the foregoing system may be practiced includes means for controlling the throughput of the material to be converted into fluff so that the rate of feed of the sheet material into the primary shredder will be gauged by a predetermined desired quantity of shredded fluff in the feed hopper for the secondary shredder. The apparatus also desirably operates at a minimum horse power output by limiting the rate of feed of the raw material into the primary shredder.

BRIEF DESCRIPTION OF THE DRAWINGS

The fluff preparation system and apparatus of this invention is seen in the accompanying drawings wherein:

FIG. 1 is a schematic elevational view of one form of apparatus for practicing the system or method; and

FIG. 2 is a top plan view of the schematic illustration shown in FIG. 1.

DESCRIPTION OF A PREFERRED EMBODIMENT

Turning now to the drawings, the present invention is practiced by apparatus which includes a feed conveyor assembly 13 for receiving bundles several sheets thick of raw sheet stock material 14. Conveyor 13 is operated by motor means of conventional character, and therefore, this portion of the apparatus has not been deemed necessary to show. The discharge end of conveyor 13 is operatively connected into the housing 16 of a primary shredder assembly 17. The conveyor is provided with a pinch roller 18 to cooperate with the end pulley 19 of the conveyor 13 to grip each bundle 14 and control the rate at which it projects into the shredder off the end of the conveyor 13. The action of the pinch roller 18 avoids having a complete bundle 14 of sheet material pulled or thrust directly into the shredder rotor where it would load up the rotor and thereby call for a substantial increase in horse power output.

The primary shredder assembly 17 delivers its output into a suitable pan-type enclosure 20 at the bottom, and the pan 20 is connected by a convergent chute portion 21 (FIG. 2) to the suction eye of a blower 22. The opposite end of the discharge pan 20 of the primary shredder 17, as may be more clearly seen in FIG. 2, is provided with a shroud 23 to which is connected an airflow conduit 24 for a purpose that will presently appear. The discharge from the blower 22 is conducted by a conduit 25 to the upper end of a conventional cyclone separator 26. Cleaned air is collected in the cyclone cupola 27. The previously mentioned airflow conduit 24 is connected directly to the cupola 27 (FIG. 1) so that the delivery of the blower 22 feeding air and fluff, in a first stage of preparation, to the cyclone separator 26 will be divided and part of the cleaned air will be returned to the shroud 23 through conduit 24 to the pan of the primary assembly shredder 17. The supply of air into the opposite end of the pan from the suction eye of blower 22 clearly assists in making the output of the primary shredder continuous and it also eliminates tendencies to clog up the outlet screen which may have perforations varying in size through a range from substantially ½ to 1 inch.

As may be seen more in detail in FIG. 1, the cyclone separator 26 has a bottom outlet 28 connected into the top of a tramp metal separator 29, which metal is usually of a magnetic character. There is shown in the separator 29, in broken line, a rotary screen 30 revolvable about an arcuately shaped magnet 31. The screen is formed of nonmagnetic material so that any magnetic material which is caused to cling to the surface of the screen will be carried past the drop-out chute 32 for the fluff material and over into a drop-off zone directly above a tramp metal collector 33. The collector 33 is provided with a hinged clean-out door 34 which may be opened periodically for the purpose of discharging tramp metals and other materials collected therein. The fluff material passes through the chute 32 into hopper 35 which forms the feeder device for a secondary or finished product shredder 36.

The hopper 35 is divided into a reservoir section 35A and a controlled feeder section 35B. The feeder section 35B is tapered so as to match up with the housing inlet of the shredder 36 and within this tapered section there is disposed a feed screw 37 operatively carried by a vertically directed drive shaft 38 which extends through the reservoir section 35A to the exterior thereof where it is driven by a suitable prime mover (not shown). The feed screw 37 is operated at a speed to assure a continuous supply of fluff material from the reservoir sec-

tion 35A to the finishing mill or shredder 36 so that the output of the finished product will not only be uninterrupted by will be at a pre-determined rate of delivery.

The finished product delivered form the shredder 36 is collected in a bottom pan 39 which pan (FIG. 2) is connected to the suction eye of a second blower 40, and from the blower 40 the finished product is delivered directly to a suitable process line where the fluff is incorporated into absorbent articles for sale in various commercial markets.

One of the important advantages for the system is that uniformity of final product density and continuity may be obtained by monitoring the quantity of fluff material at all times present in the reservoir section 35A and utilizing the results of the monitoring to control the operation of the input of the respective bundles 14 of raw sheet material to the primary shredder 17. A suitable level control device 41, such as an electric eye and time control may be incorporated in the chute 32 or (as shown) in the top portion of the reservoir 35A, and when the level of material in the hopper 35 breaks the light beam after a predetermined time limit, a signal will be transmitted to the motor drives (not shown) for the conveyor 13. Conveyor 13 will be shut down, but the primary shredder 17 will not be stopped nor will blower 22. The reason for incorporating a time delay in the level control 41 is to make certain that the stream of fluff issuing from the separator 29 will not cause a false signal to be delivered for shutting down the drive motor.

An additional important factor of the system shown by the preferred embodiment of apparatus in FIGS. 1 and 2 is that part of the air output from blower 22 is applied to the transportation of the fluff through the bottom outlet 28 of the cyclone separator. This places the system and blower, including the separator 29 and the hopper 35, under a positive pressure. Concurrently, the blower 40, shown in FIG. 2, places the outlet of the finished product shredder 36 under a suction or reduced pressure condition so that the finished product produced by the shredder 36 will be forcefully removed through the pan 39 both by positive pressure from above and by the suction effect of blower 40. This is a particular advantage as it permits the outlet screen for the shredder 36 to have outlet perforations of a very small order, such as a diameter in the range of 3/32 of an inch. Very fine final product fluff can be produced by the apparatus herein described which is a preferred embodiment for the practice of the present invention. The fineness of the fluff materially enhances its absorbent quality, but it also contributes to a somewhat higher compaction rate if too frequently handled, or if stored for any length of time where the storage containers might be subject to vibratory disturbances. On the other hand, the present embodiment of apparatus is particularly useful for direct connection to the process line where the finished fluff delivered by blower 40 will be substantially immediately embodied in finished products.

What is claimed is:

1. A method for producing fluff material as a finished product comprising the steps of collecting shredded material in a predetermined quantity, moving said material into a product finishing fluffer at a controlled rate, monitoring the collection of shredded material, and applying the monitored results to selectively add to the shredded material collection.

2. A method for producing fluffy absorbent material from sheet stock, said method including the steps of feeding the stock to a first shredder, transporting by blowing the shredded material from the first shredder toward a second shredder, cleaning the shredded material from a portion of the transporting air and returning the cleaned air to augment the transportation of the shredded material from the first shredder, collecting the shredded material and delivering it to a second shredder and maintaining said second shredder under an operating condition of suction at its outlet and pressure at its delivery side.

3. Fluff material producing apparatus including at least a pair of material shredding means operatively connected in series, means supplying material to be shredded to the first shredding means of said series, reservoir means supplying shredded material to the last of said series of shredding means, control means responsive to the contents of said reservoir means to vary the supply of sheet material to said first shredding means, and means connected to said last shredding means to move the thus produced fluff to a point of use.

4. Material reducing apparatus comprising a pair of material shredding units each having an outlet to size the material shredded therein, air transportation means operatively interconnecting said units to move shredded material therebetween, means connected to one of said units to feed raw material thereto for shredding, collector means inserted in said air transportation means adjacent the other of said units, and means responsive to the contents of said collector means to start and stop said raw material feed means whereby the contents of said collector means is maintained, said other unit having its outlet connected to a fluff material moving device.

5. The apparatus of claim 4 wherein said air transportation means includes a cyclone separator, and conduit means is connected from said separator to said one shredding unit to supply air free of shredded material to said one unit, said cyclone separator and collector means being related in series.

6. The apparatus of claim 4 wherein said raw material feed means includes roll means to regulate the delivery of the raw material into said one unit, whereby said one unit is operated free of being overloaded by raw material.

7. The apparatus of claim 5 wherein conduit means for said air free of shredded material is connected to the said one unit at one side of said outlet therefrom and said air transportation means is connected to the opposite side of said outlet.

8. The apparatus of claim 4 wherein said collector means includes a positive material feeding element to regulate the rate of delivery of the shredded material.

9. The apparatus of claim 4 wherein raw material feed means to said one unit includes pinch roll elements to restrict the feed of raw material and prevent overloading said one unit, and said collector means includes a feed screw to regulate the rate of delivery of the shredded material to said other unit.

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