United States Patent

[11] 3,599,293

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[21] Appl. No. **842,146**
[22] Filed **July 16, 1969**
[45] Patented **Aug. 17, 1971**

[73] Assignee **Paper Converting Machine Company Inc. Green Bay, Wis.**

[54] APPARATUS FOR FORMING FLUFF

8 Claims, 7 Drawing Figs.

[52] U.S. Cl. 19/155, 241/146, 241/255
[51] Int. Cl. D01g 25/00
[50] Field of Search 19/155–156.4, 83, 144, 145, 144.5; 241/146, 255, 297

[56] References Cited

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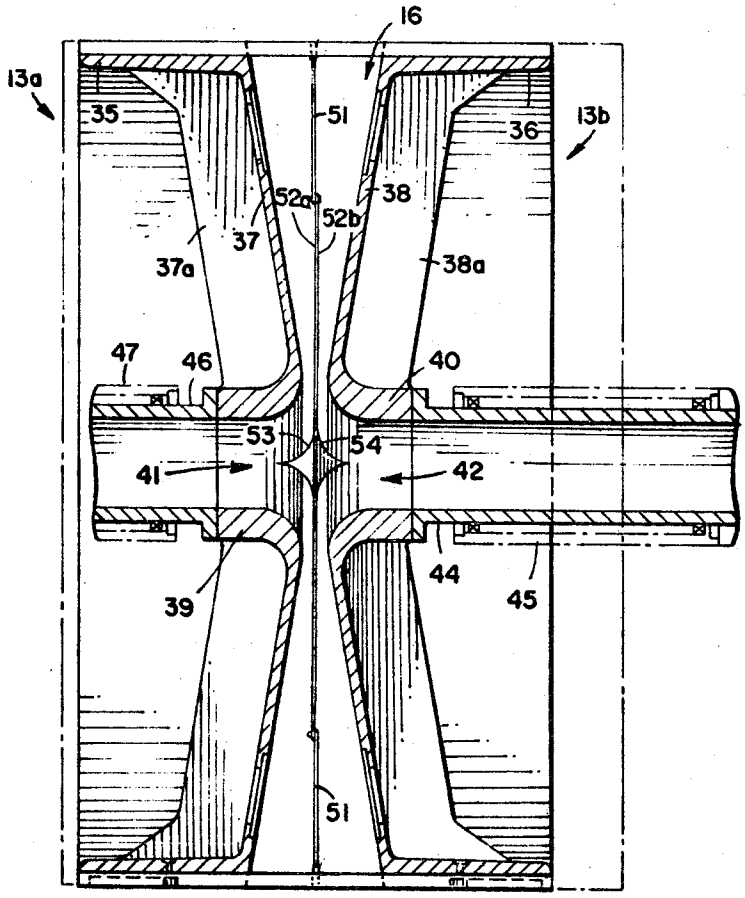
ABSTRACT: A machine for forming articles of fluffed cellulosic material includes a drum having first and second sections mounted coaxially for rotation and spaced apart to provide a chamber through which the fluff moves radially. An air-pervious web travels with the drum sections and covers the periphery of the chamber for receiving shredded cellulosic material which enters each of the drum sections axially and is forced against opposite sides of a baffle plate mounted between and rotating with the drum sections. The baffle plate is in the general shape of oppositely extending cones, the apexes of which divert the inflow of shredded material radially outward. A plurality of sets of tabs spaced about the baffle plate with each set at a different radial distance cause an even distribution of the fluff material against the travelling web. The drum sections are adapted for adjustable spacing; and the machine thus has the capacity of making articles of substantially larger width than heretofore has been feasible.



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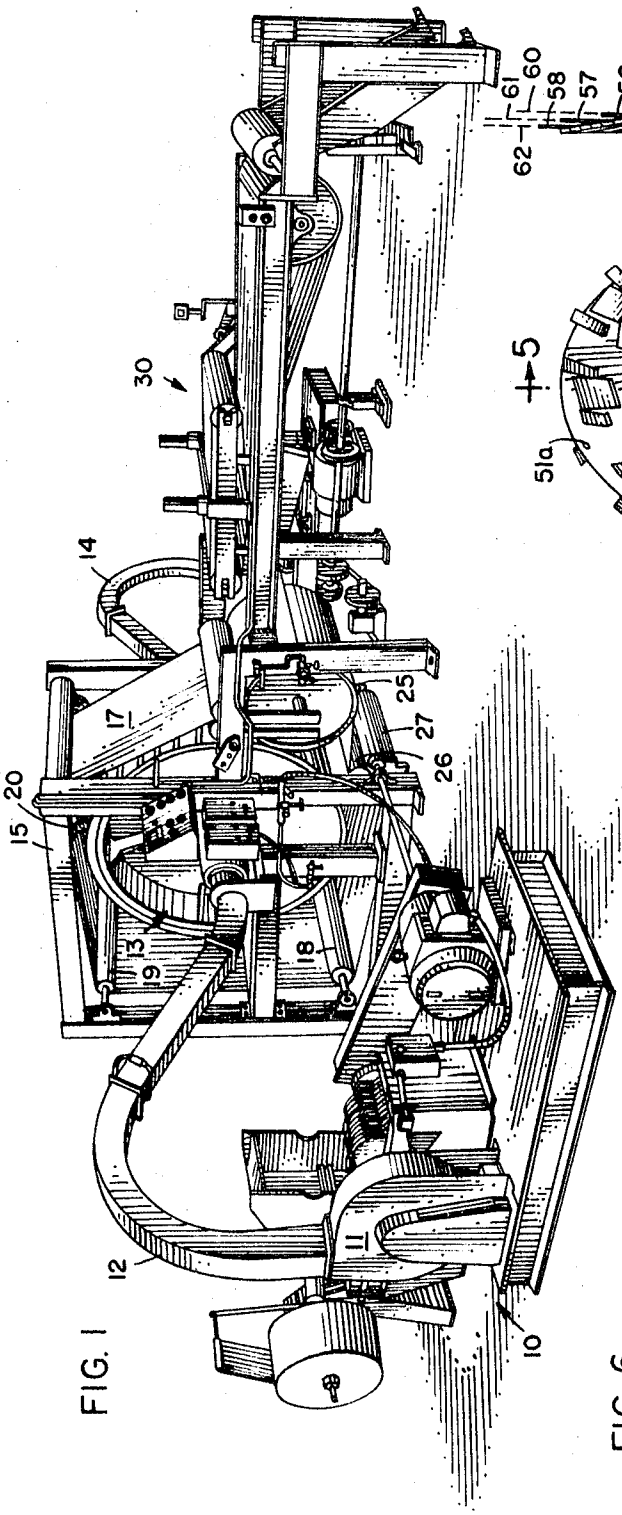

FIG. 1

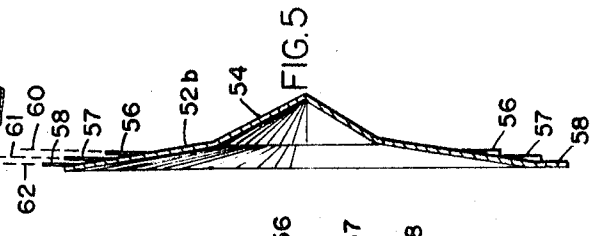

FIG. 5

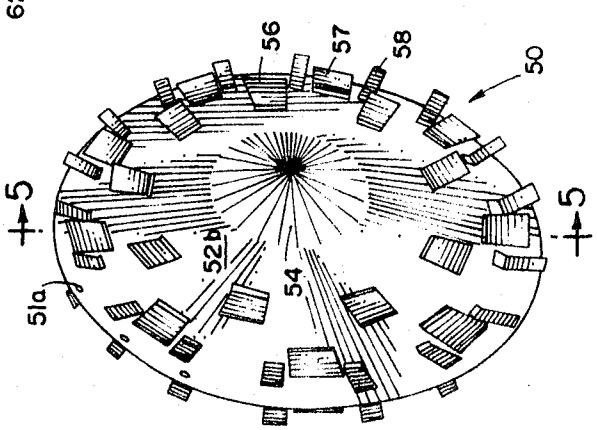

FIG. 4

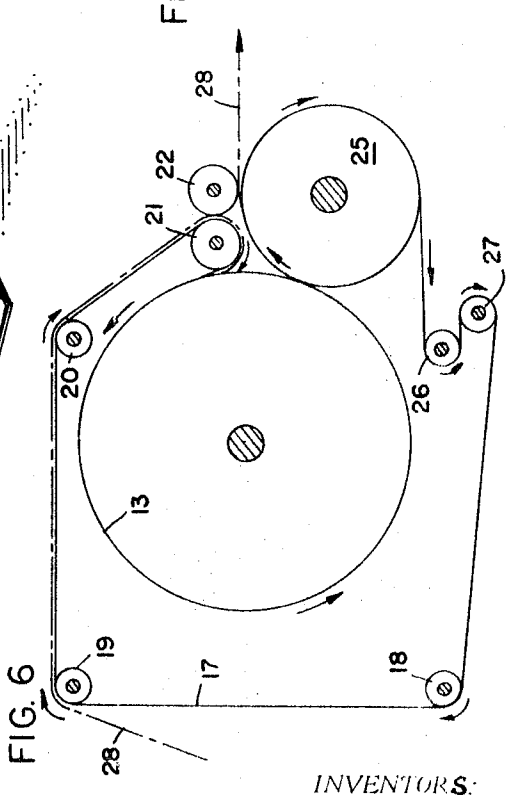

FIG. 6

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FIG. 2

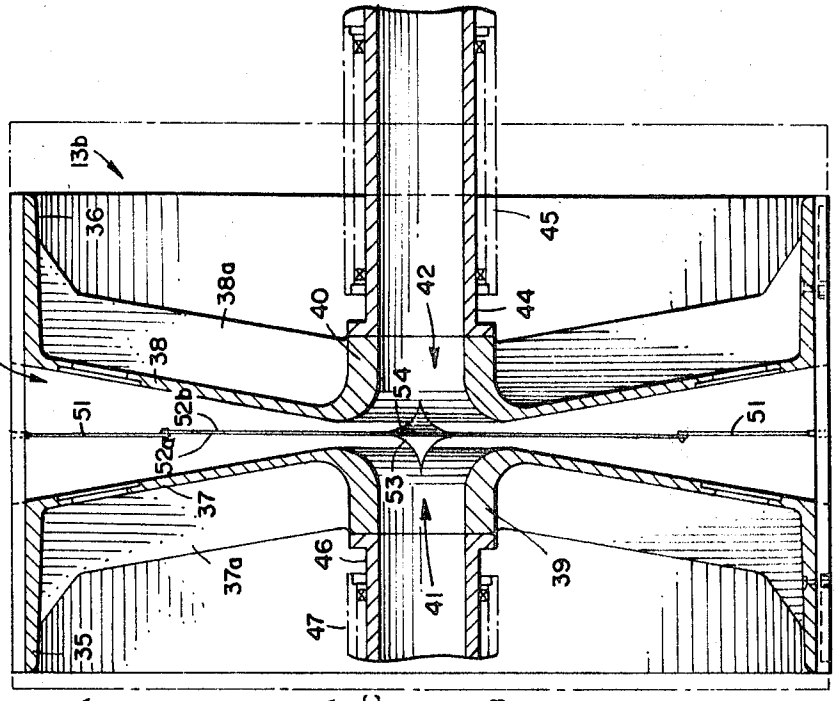


FIG. 2A

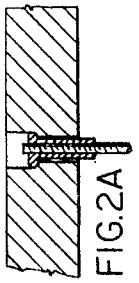
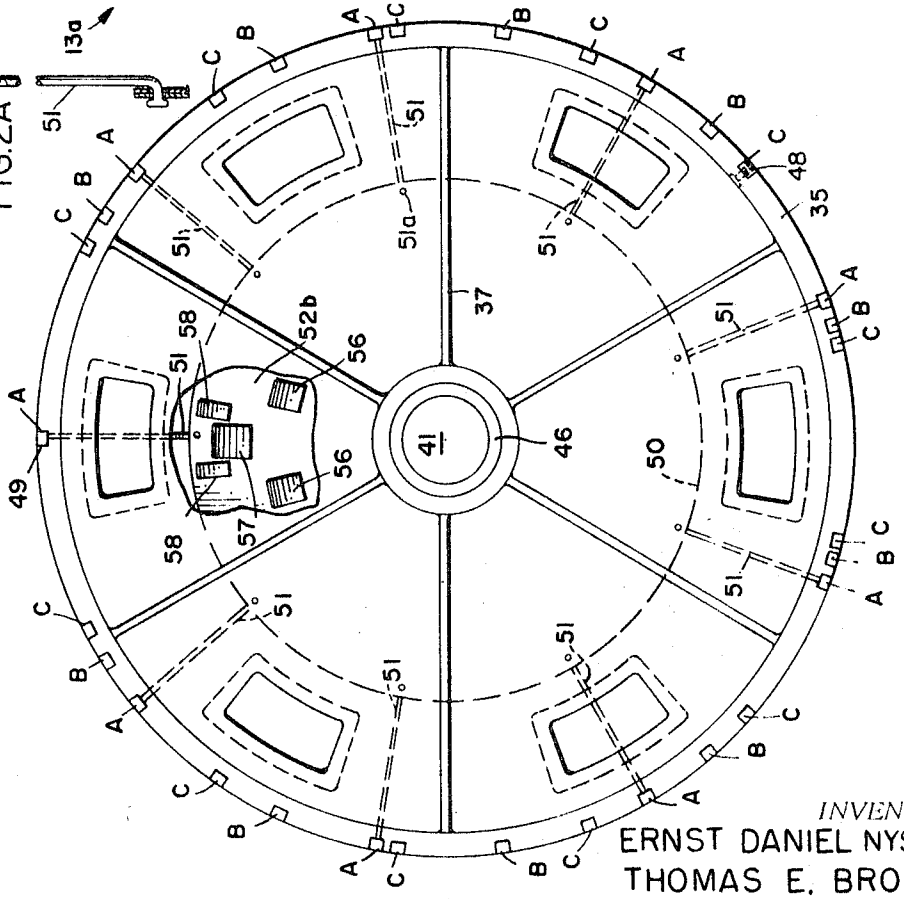


FIG. 3



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APPARATUS FOR FORMING FLUFF

BACKGROUND AND SUMMARY

The present invention relates to apparatus for forming articles of fluff (disposable diapers, for example) wherein shredded cellulosic material or pulp is received axially in a forming drum having first and second separated side sections. The separation between the two side sections of the fluff-forming drum provides a chamber, the periphery of which defines an annular opening. An air-pervious web travels with the rotating drum sections and covers the annular opening for receiving the fluff which is diverted from its axial input to a radial direction by a baffle plate mounted in the chamber of the forming drum.

Heretofore, the shredded cellulosic material has been forced axially of one of the side sections of the fluff-forming drum, and a generally conical baffle plate has been secured to the other side of the fluff-forming drum for diverting the shredded cellulosic material from its axial direction to a radial direction against the air-pervious web traveling along the periphery of the two drum sections of the two drum sections. This arrangement has caused limitations in the width of the article being formed from the fluff; and one of the principal advantages of the present invention is that it permits the formation of articles of a width of up to twice as great as that which was possible with the the above-described system. Further, the greater width is effected while permitting the axial adjustment of the two side drum sections for controlling the width of the article being formed the article being formed within the greater range.

In the inventive apparatus, the side drum sections are secured together by a plurality of spacer bars, adapted for adjusting the axial spacing between the two side sections. The spacer bars are placed at equal angular increments about the periphery of the drum sections. A baffle plate, generally conical on each of its sides, is supported by means of the spacer bars at the center of the separation between the drum sections. Each of the sides of the baffle plate has a central conical shape which has a relatively greater taper and an outer or peripheral frustoconical shape extending over the major portion of a radius; and the outer frustoconical surface has a relatively smaller taper than the center cone thereby to define a cymbal shape. Toward the periphery of the baffle plate, on each side, there are affixed a number of sets of tabs each extending in a direction generally perpendicular to the axis of rotation of the baffle plate. Further, each set of tabs is spaced radially further from the axis of rotation of the baffle plate, and adjacent sets are spaced at alternate angular locations so as not to interfere with tabs from another set in receiving fluff material and spreading the same against the air-pervious web. Each set of tabs therefore defines a plane for diverting the shredded pulp material; and these planes are spaced axially along the drum in the fluff-forming chamber. Thus, the present invention deposits a more even layer of fluff across a wider web while permitting adjustment of the width of the articles being formed.

Further advantages of the present invention will be apparent to persons skilled in the art from the following detailed description of a preferred embodiment accompanied by the attached drawing wherein identical reference numerals will refer to like parts in the various views.

THE DRAWING

FIG. 1 is an overall view in perspective of fluff-forming apparatus incorporating the present invention;

FIG. 2 is a transverse cross-sectional view of the fluff-forming drum and baffle plate;

FIG. 2A is an enlarged fragmentary sectional view of the top central portion of FIG. 2;

FIG. 3 is a side elevational view, partially cut away, of the fluff-forming drum;

FIG. 4 is a perspective view of the baffle plate of FIG. 2;

FIG. 5 is a transverse cross-sectional view of one side of the baffle plate of FIG. 4; and

FIG. 6 is a diagrammatic illustration of the loop formed by the supporting web, together with the arrangement of rollers for the apparatus of FIG. 1.

DETAILED DESCRIPTION

Referring first to FIG. 1, reference numeral 10 generally refers to a shredding station wherein cellulosic material or pulp is shredded and fed into a blower 11. The blower 11 mixes the shredded pulp with air and forces the mixture under pressure through an output conduit 12 into a fluff-forming drum 13. Located on the opposite side of the drum 13, a similar conduit 14 receives a forced mixture of shredded pulp and air from a blower similar to the blower 11 and couples it to the drum 13.

As is disclosed in a copending, co-owned application of E. W. Wittkopf for Machine for Forming Cellulosic Product, filed June 11, 1969, Ser. No. 832,299, the fluff-forming drum includes first and second side sections 13*a* and 13*b* in FIG. 2, which are separated to provide a central chamber which, in turn, defines a peripheral annular opening, generally designated 16.

In forming articles of fluff, such as disposable diapers or sanitary napkins, a continuous, closed air-pervious support web 17 (preferably of wire) is wrapped about the drum 13 for receiving the fluff material forced radially of the chamber between the drum sections 13*a* and 13*b*.

The wire support web 17 travels around idler rollers 18, 19, and 20 (see FIG. 6 for diagrammatic side view of roller arrangement) respectively, between pinch rollers 21 and 22, thence around the lower periphery of roller 21 and counterclockwise (as viewed in FIG. 1) about the periphery of the fluff-forming drum 13. The wire web 17 is then brought up about the upper periphery of a larger leaving roller 25 and thence about another roller 26 and a takeup roller 27 from which it is fed about the idler roller 18 to close the loop.

Although not illustrated in FIG. 1, a carrier web (diagrammatically shown as chain line 28 in FIG. 6) is also fed from behind the frame 15 over the idler rollers 19 and 20 on the outside of the wire support web 17. The carrier web is also fed about the roller 21 and along the periphery of the fluff-forming drum 13; however, it will be realized that the carrier web 28 is interposed between the surface of the drum 13 and the wire web 17 for receiving the fluff material. The two traveling webs are separated at the leaving roll 25; and the carrier web with the deposited fluff material may be fed to a conveyor and forming station generally designated by reference numeral 30 where additional operations may be formed on the articles for finished processing. In the case of the making of sanitary napkins, reference is made to the above-described application both for disclosure as to subsequent processing and for additional structural details of that portion of the machine which has just been described.

Turning now to FIGS. 2 and 3, each of the spaced-apart side sections 13*a* and 13*b* includes a cylindrical flange, designated respectively 35 and 36. The cylindrical flanges 35 and 36 are integrally formed with sidewall members 37 and 38 (defining the central chamber) as well as radially extending bracing ribs 37*a* and 38*a*. It will be observed that sidewalls 37 and 38, which define the central chamber through which the cellulosic material is forced radially, are spaced increasingly further apart proceeding outwardly from the horizontal axis of rotation. Further, the positioning of the wire support web 17 and the carriage web relative to the periphery of the drum 13 will be observed from FIG. 2.

Hubs 39 and 40 are provided at the central location of the side sections 13*a* and 13*b* respectively. The hubs 39 and 40 define respectively apertures 41 and 42 for receiving the forced mixture of shredded pulp and air axially of the fluff-forming drum. A hollow shaft 44 is secured to the hub 40 of the drum section 13*b*; and a suitable means (not shown) cou-

pled to the hollow shaft **40** drives the drum **13** in rotation. The shaft **44** is journaled in a bearing shaft **45** which is shown in chain line and mounted on the frame **15** of the machine. The hub **39** is similarly connected to a hollow shaft **46** which is received in a bearing shaft **47**, only a portion of which is shown for brevity.

The cylindrical flanges **35** and **36** of the side drum sections **13***a* and **13***b* define a plurality of aligned, axially extending grooves for slidably receiving spacer bars (see the bar **48** in FIG. 2) for securing the drum side sections at a constant distance which defines the width of the article being formed. As illustrated in FIG. **3**, there are three separate sets of aligned grooves so that the circumferential length of the discrete articles being formed may be varied. For example, the set of grooves each identified by A comprise a set of none slots spaced at 40° increments. Similarly, the set of slots each identified B includes 11 equally angularly spaced slots (it being realized that the upper slot **49** is included). A third set of aligned slots, each designated C, includes 13 slots equally angularly spaced about the periphery of the flanges **35** and **36**.

A baffle plate **50** is suspended in the central chamber between the side sections **13***a* and **13***b* of the drum. As illustrated by dashed line in FIG. **3**, the outer periphery of the baffle plate **50** is circular, and it extends only about two thirds of the spacing from the axis of the fluff-forming drum to its web-supporting periphery. The baffle plate **50** is supported by means of a plurality of rods **51** interconnecting its periphery as at **51***a* with associated ones of the spacer bars **48** so that the transverse axis of the baffle plate is colinear with the axis of rotation of the fluff-forming drum. The baffle plate **50**, of course, rotates with the drum sections. The baffle plate **50** is symmetrical about a vertical plane; and, as seen in cross section in FIG. **5** for one surface, each side surface includes an outer frustoconical surface extending inwardly from the periphery. These surfaces are designated **52***a* and **52***b* in FIG. **2**.

Central conical surfaces **53** and **54** are provided respectively inwardly of the peripheral frustoconical surfaces **52***a* and **52***b*. As can be seen, the central conical surfaces **53** and **54** provide a greater taper than do the peripheral frustoconical surfaces. Thus, the conical surfaces **53** and **54** receive and divert the axial flow of the pulp outwardly toward the periphery of the baffle plate and onto the frustoconical surfaces **52***a* and **52***b*.

Three separate sets of tabs are secured respectively to each of the surfaces **52***a* and **52***b*. Referring to FIGS. **4** and **5**, each of the sets of tabs is spaced radially further away from the axis of rotation of the baffle plate **50**. The innermost set of tabs on the surface **52***b* comprises nine individual tabs designated **56**; the intermediate set of nine tabs is designated **57**; and the outermost set of 18 tabs is denoted **58**. Each of the tabs **56—58** includes a base portion which is secured to the surface **52***a* of baffle plate **50** and a diverter plate which extends generally perpendicularly to the axis of rotation of the baffle plate for diverting the pulp material directly radially outward. By thus spacing the sets of tabs at increasing radial locations along a conical surface, there are defined six planes of diversion for the pulp material spaced apart along the rotational axis — the three right-hand planes are designated respectively by the chain lines **60—62** in FIG. **5**. As seen from FIG. **4**, the intermediate set of tabs **57** are located at angular locations intermediate the angular locations of the tabs **56**. Likewise, the tabs **58**, although of smaller width, are double in number; and they are placed at angular locations intermediate each of the locations of the tabs **56** and **57**. Thus, the structure of the baffle plate **50** together with the location of the diverting tabs causes an even distribution of fluff material on the carrier web **17***a* for all adjustments in width of the annular aperture **16**.

Having thus described in detail a preferred embodiment of the invention, persons skilled in the art will be able to modify portions of the structure disclosed and to substitute equivalent elements for those shown; and it is, therefore, intended that all such modifications and equivalents be covered as they are embraced within the spirit and scope of the invention.

We claim:

1. In fluff-forming apparatus, the combination comprising a frame, a drum rotatably mounted on said frame and including first and second side sections spaced apart to define a chamber, first and second means for delivering shredded pulp under pressure and axially respectively through each of said drum sections, a baffle plate interposed between said drum sections and spaced therefrom, means mounting said baffle plate to said drum sections for rotation therewith to intercept said inflow of shredded pulp from each of said drum sections and divert the same radially outwardly toward the periphery thereof, and an air-pervious web traveling on the periphery of said drum for receiving said pulp.

2. The apparatus of claim **1** wherein said baffle plate has a circular cross section taken transverse of the axis of rotation and includes first and second surfaces tapering outwardly from its periphery toward said axis of rotation and a plurality of sets of diverting tabs, each set spaced at a different radial position from said axis of rotation, and each tab including a diverting surface extending generally perpendicularly of said axis of rotation to provide a plurality of diversion planes for said shredded pulp material to evenly distribute the same along said web.

3. The apparatus of claim **2** wherein said baffle plate further comprises inwardly of said first and second inclined surfaces third and fourth conical surfaces respectively interconnecting the center of said plate with said inclined surfaces and defining a greater taper than said inclined surface for receiving said shredded pulp material to divert the same onto said first and second inclined surfaces respectively.

4. The apparatus of claim **3** wherein said baffle plate includes on each of said inclined surfaces three sets of diverter tabs, each spaced at a further radial distance from said axis of rotation and wherein each tab is spaced angularly about said plate so as not to interfere with the flow of pulp material to other tabs.

5. The apparatus of claim **1** wherein said baffle plate has a circular cross section transverse of the direction of rotation thereof and wherein the diameter of said baffle plate is less than the diameter of said drum, and further comprising a plurality of spacer bars each interconnecting the peripheral surface of each of said drum sections, and a plurality of support rods, each interconnecting one of said spacer bars with the periphery of said baffle plate for supporting the same.

6. The apparatus of claim **1** wherein each of said drum sections includes a cylindrical peripheral flange for supporting said web, each of said flanges defining a plurality of axially aligned slots, a plurality of spacer bars slidably received in said slots and secured to said drum, and a plurality of support rods, one for each of said spacer bars interconnecting an associated spacer bar with the periphery of said baffle plate.

7. In combination, a fluff-forming drum comprising first and second side sections mounted for rotation about a horizontal axis and spaced apart to define a central chamber, each section including means for receiving shredded pulp material underpressure in an axial direction into said chamber, baffle means in said chamber and secured to said drum sections for rotation therewith and including pendant tab means for diverting said pulp material into a plurality of planes transverse of said axis of rotation and spaced therealong on either side of said baffle means to evenly distribute said pulp material; and air-pervious web means traveling with said drum for intercepting said evenly distributed pulp material.

8. Apparatus according to claim **7** wherein said side sections of said drum are adjustable to define varying widths of said chamber, and said sections define aligned axial slots spaced about the periphery thereof, and further comprising a spacer bar slidably received in each of said aligned slots, and a rod interconnecting a spacer bar with the periphery of said baffle means for supporting the same.