

[54] APPARATUS FOR DIVIDING UP A MASS OF SMALL PARTICLES INTO PART STREAMS

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[58] Field of Search..... 137/566, 561 A, 608,
137/262; 73/424; 222/264, 316

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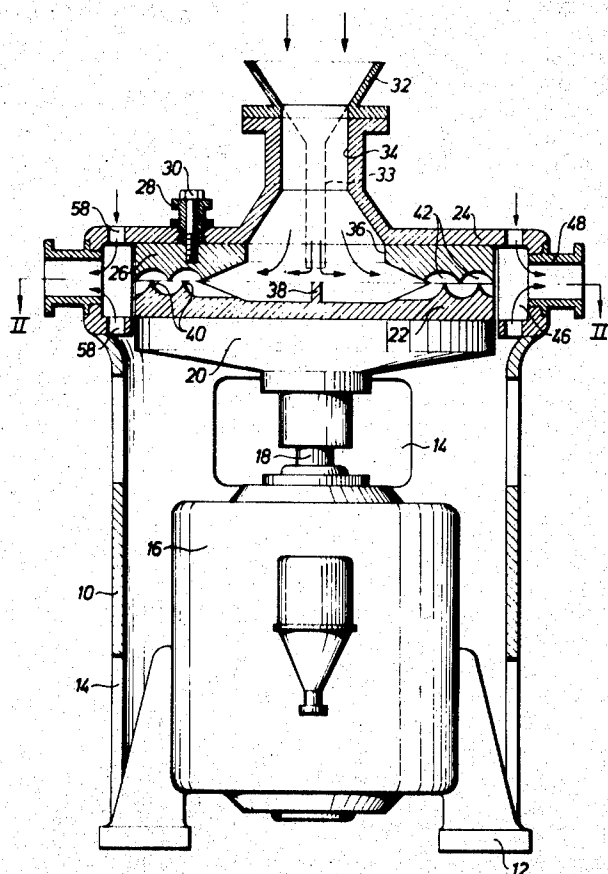
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[57] ABSTRACT

An apparatus for subdividing a mass of small particles into a plurality of sub streams of relatively variable size comprising two disc-shaped members which between them define an interspace, and at least one of which rotates at high speed. The mass of particles is introduced at the centrum of the interspace and slung outwardly by centrifugal force into the interspace with substantially uniform peripheral distribution about the circumference of the disc-shaped members and into a circumferential annular chamber which is subdivided into sections by means of peripherally displaceable collecting shields; the length of the arc shaped sections being adjustable relative to one another determine the relative magnitude of the sub stream caught in each section by its associated shield which stream is discharged through an opening formed in the circular outer wall of the respective section.

5 Claims, 2 Drawing Figures



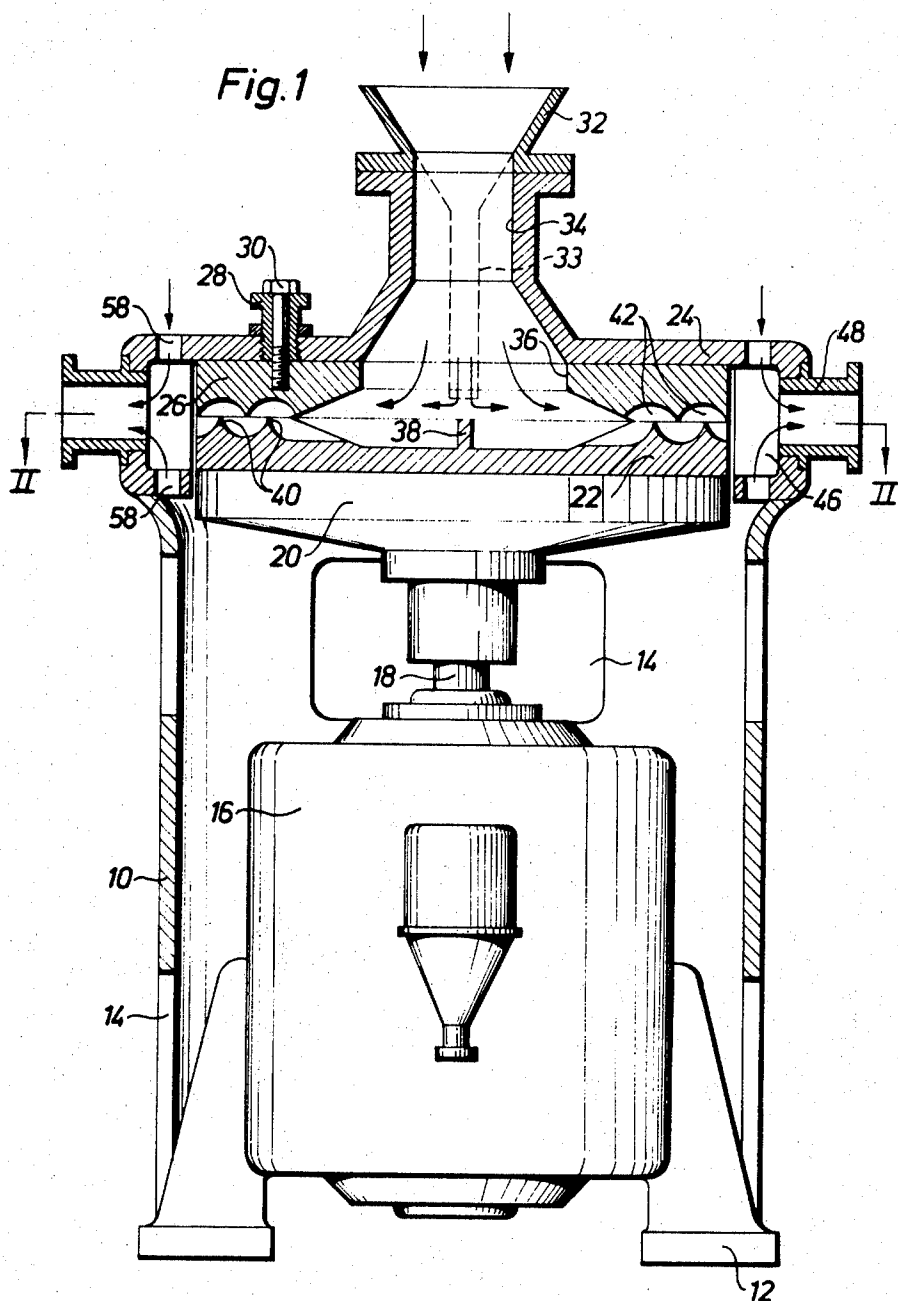
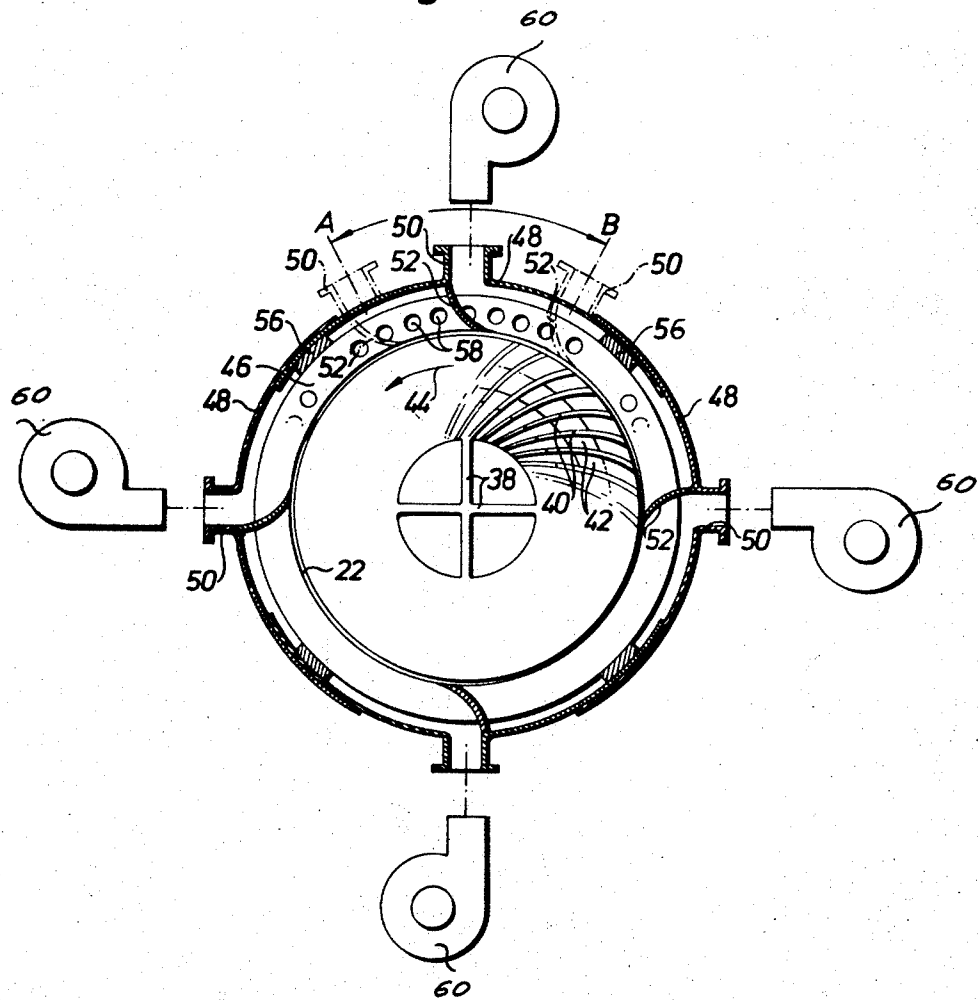


Fig. 2



APPARATUS FOR DIVIDING UP A MASS OF SMALL PARTICLES INTO PART STREAMS

FIELD OF THE INVENTION

This invention relates to an apparatus for subdividing a mass comprising small particles which by way of example may have the shape of fibres or grains, into two or more sub streams of controllable magnitude relative one another. The general aim is to attain a desired distribution by percentage of the total quantity of small particles coming from a step in the manufacturing process, a supply storage or a similar source to various receiving stations. One such example comprises fibrous particles of vegetable material which have been finely disintegrated in grinding apparatus or refiners and which are subsequently to be divided into portions of different size for continued production of the final products.

THE PRIOR ART

It is known to subdivide or distribute fibre pulp, for example, by means of belt scales or volume fill, but these methods have the disadvantage that the accuracy of distribution is not exact but depends for example on occasional variations in the weight by volume and/or moisture content of the fibre pulp. In attempting at least partially to eliminate sources of errors of this kind, relatively complicated measuring apparatus and control instruments have been resorted to however, without attaining the desired accuracy.

THE OBJECTS OF THE INVENTION

Therefore, one main object of the present invention is to provide an apparatus which substantially eliminates the disadvantages indicated hereinbefore and which effects a division or distribution of a mass of small particles introduced into the apparatus in desired proportions regardless of unavoidable variations in the consistency of the particle mass with respect to such factors as volume by weight and moisture content, particularly in connection with fibre pulps of vegetable or lignocellulose containing materials.

SUMMARY OF THE INVENTION

The invention is based on the fact that when particles are introduced into the centrum of an annular interspace which at least at one side is defined by a rapidly rotating disc member, the portion of particles thrown outwards will within narrow limits acquire equally great volume at the outer circumference of the disc for each degree unit thereof. The sub division or distribution becomes independent of occasional variations in the composition of the mass of particles as far as the above mentioned exemplified factors of weight by volume and moisture content are concerned. A condition is that the number of particles is so great, calculated per degree unit of the circumference of the disc, that the percentage influence of possible fluctuations in the distribution becomes negligible. Thus, according to a main feature of the invention, two disc-shaped members are provided which under the action of the centrifugal force throw particles in a radially outward direction into a space formed between them with substantially uniform peripheral distribution about the circumference of the disc members and into an annular chamber located outside said circumference which by means of rotationally stationary particle catching shields is subdivided

into sections each of which is connected with an associated outlet. The shields are peripherally displaceable for varying the length of the circular curve of the sections between the shields relative to another.

BRIEF DESCRIPTION OF THE DRAWINGS

Further objects and advantages characterizing features of the invention will become apparent from the following description, considered in connection with the accompanying drawings, which form part of this specification, and of which:

FIG. 1 is a vertical longitudinal section through a distribution apparatus for fibre pulp constructed according to the invention.

FIG. 2 is a partial sectional view following the line II—II of FIG. 1.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring now to the drawings, reference numeral 10 denotes by way of example a sleeve shaped frame supported on feet 12 and which may be provided with openings 14 arranged about the circumference. The frame supports at its lower end an electric motor 16 having a vertical shaft 18 which supports a disc member 20. Suitably united with the upper side of this disc member is another disc member 22, which, if desired, may be composed of segments and which together with the disc member 20 is rotated by the motor.

Secured to the top portion of the frame 10 is a casing 24 (FIG. 1) which supports a stationary disc member 26 secured by means of set screws 28 and attachment bolts 30. An interspace is formed between the two disc members 22 and 26 and the spacing is adjustable by means of said screws and bolts. In the illustrated embodiment, the interspace extends at right angle to the shaft of the rotatable disc member 20, but it extends in a conical direction or some other direction from an inner radius to an outer radius.

The mass of small particles which may be fibre pulp from an Asplund Defibrator or a refiner, working under atmospheric or superatmospheric pressure, is fed into the apparatus through a hopper 32 to a central passage 34 formed in the casing 24. The pulp then passes through a central opening 36 in the stationary disc member 26 and thereafter falls down onto the central portion of the rotatable disc member 22. This central portion may be provided with means which by way of example may have the shape of radially extending arms 38 which throw the pulp in radially outward direction towards the interspace between the two disc members 22 and 26. The disc members 22 and 26 may have their opposed surfaces in the zone of the interspace formed with elongated projections or ridges 40 separated from one another by grooves 42 which follow a curvature similar to the curvature of the grooves between the impeller blades in a centrifugal pump to ensure proper intermixture of the supplied particle material and also to prevent particles from passing too rapidly from the centrum to the periphery of the interspace. Simultaneously, these throw means contribute to a uniform distribution of the particles about the circumference. The direction of rotation of the disc member 22 is indicated by the arrow 44.

Formed adjacent the outer periphery of the disc members is a chamber 46 which extends annularly about the entire or at least the major part of the circumference of the discs. This chamber is in outward di-

rection defined by a number of sector walls 48, the number of which in the present case is four and each of which has such an extension in peripheral direction that, when they assume their intermediate positions they overlap one another for example by 30° or more. Each sector wall or metal plate cover 48 is suitably provided with an outlet opening 50 from the rear end of which, viewed in the direction of rotation 44, a collection shield or screen 52 extends through the chamber and terminates at the periphery of the disc members 22 and 26. This shield or screen is thus united with the associated sector wall 48 and is displaceable in peripheral direction together with said sector wall. In this manner the chamber 46 will be subdivided peripherally into sections between the shields or screens 52 of the sector walls. The quantity of particle pulp thrown out between two such shields will be caught by the rear shield, viewed in the direction of rotation, to be subsequently discharged through the adjacent opening 50. Due to the fact that the sector walls 48 are adjustable, e.g. within the angular area indicated by the radii A and B at the top of FIG. 2, the length of the circular arc of the associated section of the annular chamber can be varied as to its magnitude. Since the discharge of particles from the disc interspace is constant or substantially constant within each degree unit about the entire circumference, the quantity of particles which is discharged through an outlet 50 will thus be directly dependent on the angular position of the walls 48 relative one another.

The overlapping ends of the sector walls 48 may bear against peripherally placed brackets 56 which bridge over the spacing between the upper and lower portions of the casing 24 in correspondence to the number of sector walls 48.

To facilitate the continued conveyance of fibre material discharged from the distributing disc member 22 to the various sectors, the case 34 may be formed with lateral channels 58 adjacent the upper and/or lower portions of the annular chamber 46. These channels are evenly distributed about the circumference. By connecting the outlets 50 to exhaust fans 60 the discharge of fibre particles from the sections will be facilitated. The aggregate area of the openings 50 must be so large in relation to the capacity of the fans that no appreciable reduced pressure will be produced in the individual sections of the annular chamber 46. In this connection it is of importance that the same air pressure is maintained in all sections.

The rotational speed of the disc member 22 may be adjusted in response to the kind and size of the grainy and/or fibrous products to be distributed.

By readjusting the sector walls 48 into various angular positions relatively one another the mass of particles such as the fibre pulp may within narrow limits be subdivided into sub streams of relatively different magnitude. In the illustrated embodiment, four sub streams of relatively differently magnitude can be obtained at

the utmost, but the number of streams may be reduced to two or three.

Both disc members 22 and 26 may be rotatable. The disc members 22 and 26 or their working surfaces may have a conical shape. If desired, the hopper 32 may be extended downwards and merge into a central conduit 33 as indicated by dashed lines in FIG. 1 with a relatively little diameter and opening immediately above the lower disc 22. The disc members may have a horizontal shaft.

While one more or less specific embodiment of the invention has been shown and described, it is to be understood that this is for purpose of illustration only, and that the invention is not to be limited thereby, but its scope is to be determined by the appended claims.

What I claim is:

1. Apparatus for subdividing a mass of particulate material into a plurality of streams of relatively variable magnitude, comprising:

- a. a pair of rotatable disc-shaped members defining an interspace therebetween;
- b. means for rotating at least one of said disc shaped members;
- c. means for admitting the particulate material into said interspace;
- d. means disposed in said interspace for radially dispersing said particulate material about the circumference of said disc shaped members by centrifugal force;
- e. an annular chamber defined between the periphery of said disc shaped members and an outer annular wall for receiving the dispersed material;
- f. said outer annular wall comprising a plurality of overlapping sections peripherally displaceable relative to one another and each having a discharge outlet; and
- g. a shield fixed to each of said wall sections adjacent each of said discharge outlets and extending across said annular chamber in relatively movable contact with said disc shaped members to define a plurality of relatively adjustable annular chamber sections.

2. The apparatus as claimed in claim 1, in which said disc shaped members comprise a lower disc element supported by a vertical, rotatable shaft and a superimposed disc member which together define the annular interspace.

3. The apparatus as claimed in claim 2, in which the upper disc member is stationary and has a central opening for introducing the mass of particles into the interspace.

4. The apparatus as claimed in claim 1, in which at least one of the disc shaped members is formed with ridges distributed about the circumference and intervening grooves of curved shape.

5. The apparatus as claimed in claim 1, in which the outlets of the sections of the annular chamber are adapted to be connected with suction fans.

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