April 2, 1963 J. A. REDDICK ETAL 3,083,828

FRACTIONATING APPARATUS

Filed Oct. 11, 1960 3 Sheets-Sheet 1

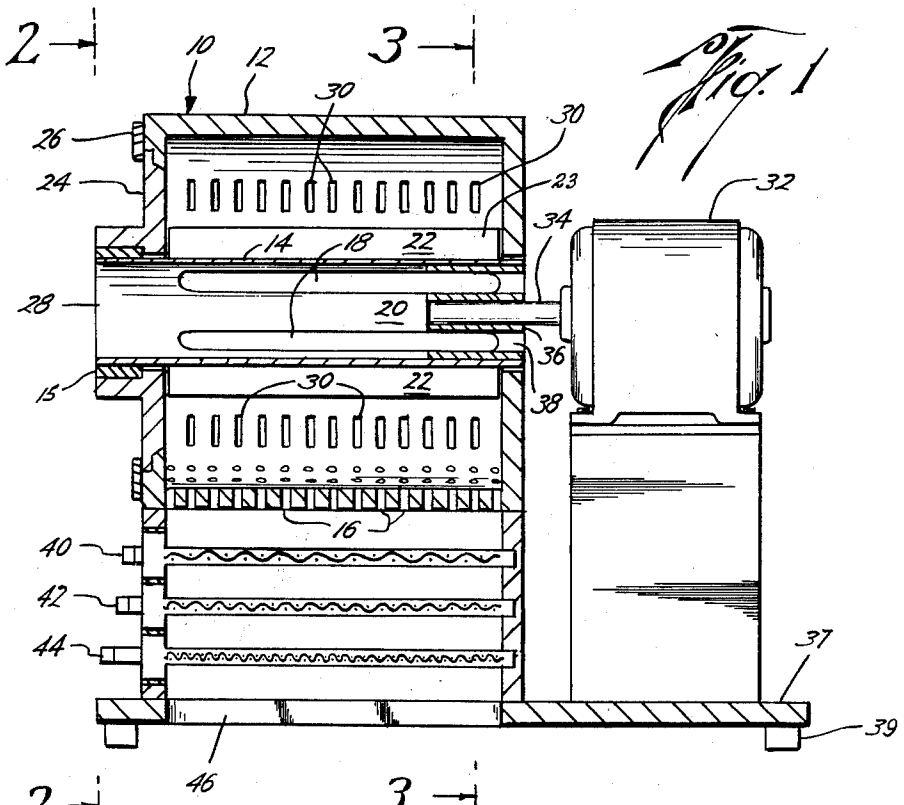



Fig. 1

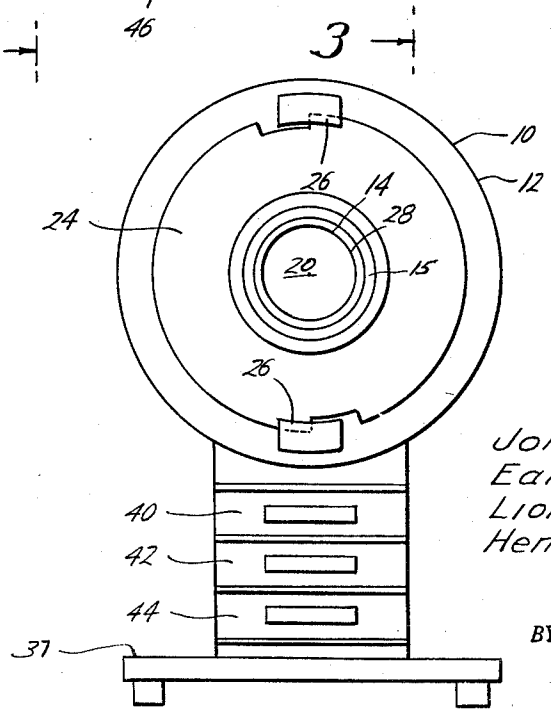



Fig. 2

John A. Reddick
Earl E. Berkley
Lionel L. Linthicum
Henry H. Buxton
INVENTORS

BY James F. Heiler
Jefferson D. Gilliam
William A. Stuart
Paul L. DeVorter II
ATTORNEYS

April 2, 1963 J. A. REDDICK ETAL 3,083,828

FRACTIONATING APPARATUS

Filed Oct. 11, 1960 3 Sheets-Sheet 2

Fig. 3

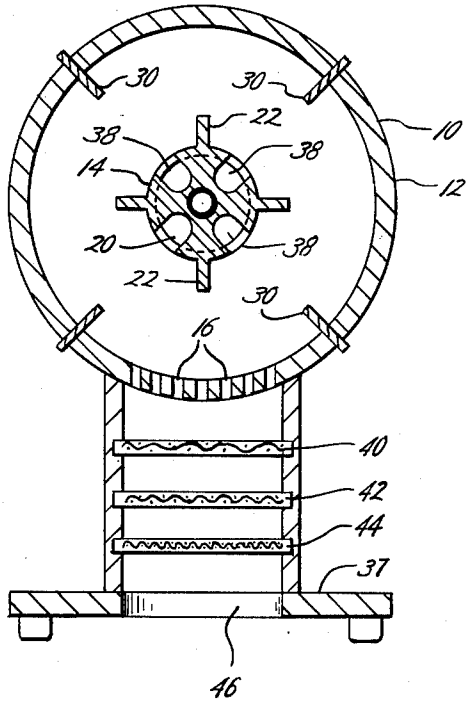
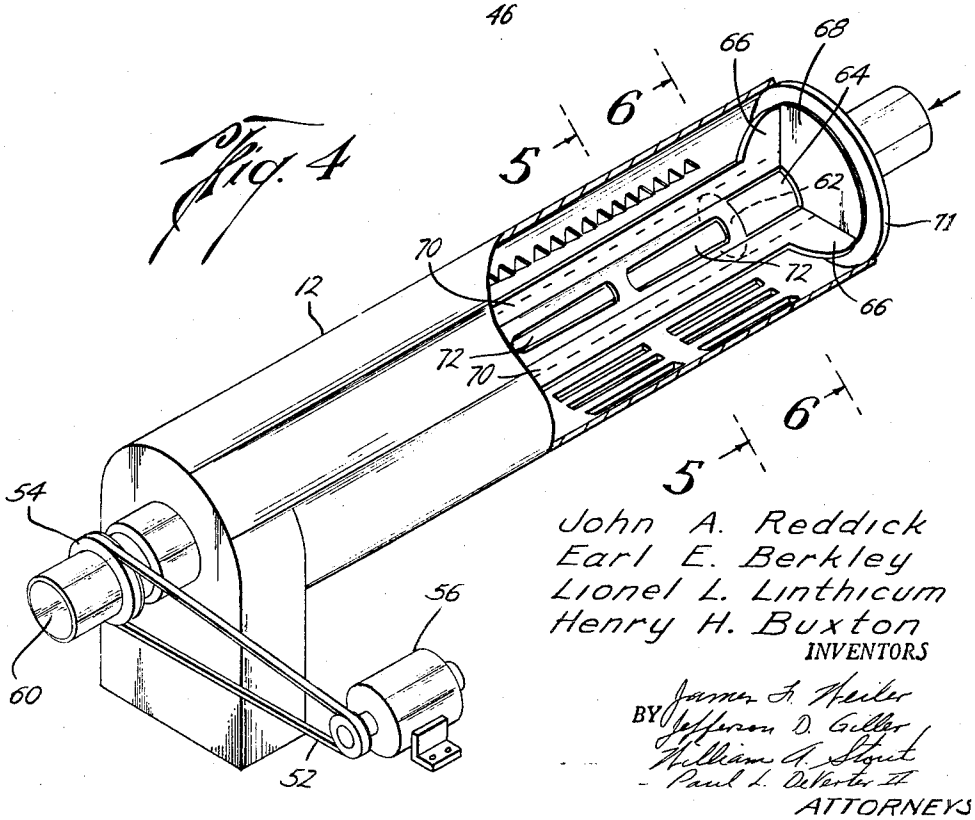



Fig. 4




John A. Reddick
Earl E. Berkley
Lionel L. Linthicum
Henry H. Buxton
INVENTORS

BY James F. Heisler
Jefferson D. Gilliam
William A. Shortt
Paul L. DeVerter II
ATTORNEYS

April 2, 1963 J. A. REDDICK ETAL 3,083,828

FRACTIONATING APPARATUS

Filed Oct. 11, 1960 3 Sheets-Sheet 3

Fig. 5

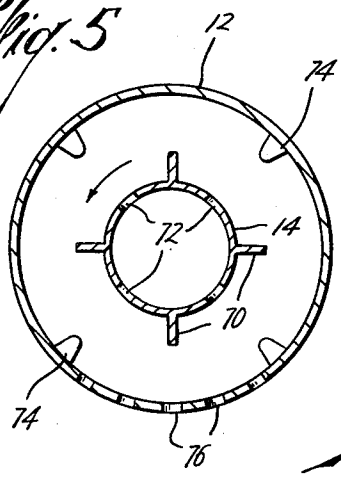



Fig. 6

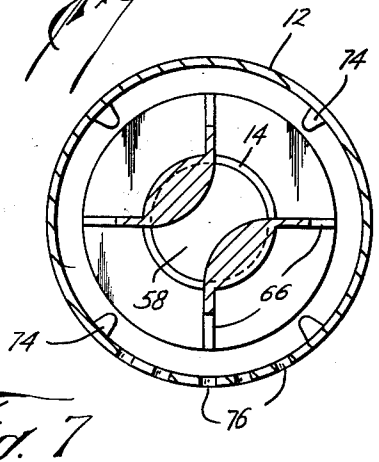



Fig. 7

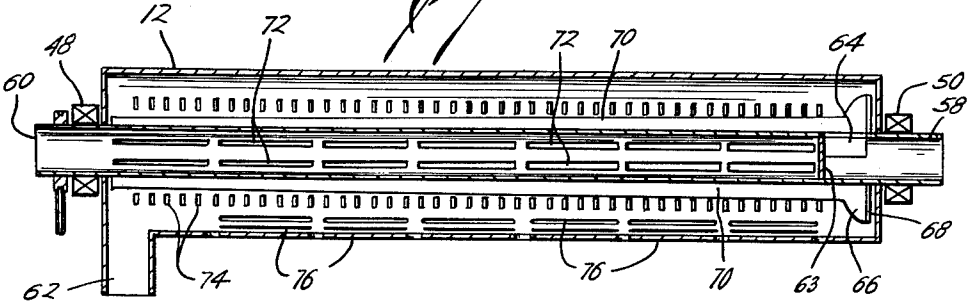



Fig. 8

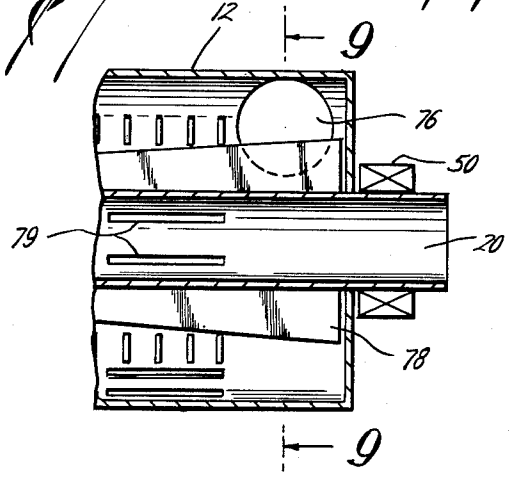
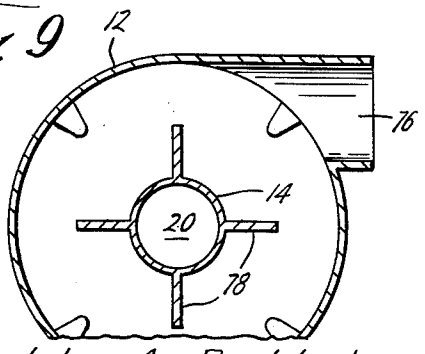



Fig. 9




John A. Reddick
Earl E. Berkley
Lionel L. Linthicum
Henry H. Buxton
INVENTORS

BY James F. Heiler
Jefferson D. Gilly
William A. Stout
Paul L. DeVerter II
ATTORNEYS

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3,083,828

# FRACTIONATING APPARATUS

John A. Reddick, Earl E. Berkley, Lionel L. Linthicum, and Henry H. Buxton, all of Houston, Tex., assignors to Anderson, Clayton & Co., Houston, Tex., a corporation of Delaware

Filed Oct. 11, 1960, Ser. No. 61,977
14 Claims. (Cl. 209—3)

The present invention relates to an apparatus for fractionating materials, and more particularly, relates to an apparatus for fractionating fibrous materials, particularly for the purpose of separating trash and other components whereby the materials are cleaned.

Trash, short fibers and foreign particles in fibrous materials affect the usefulness and consequently the monetary value of these materials. For instance, the monetary value of lint cotton is affected by the presence of an excess of short fibers, and it is necessary to separate them from the sample in order to determine the percentage and, therefore, the quality or monetary value of a bale of cotton. And, of cource, trash and other foreign objects must be removed from seed cotton. Therefore, it is desirable to fractionate, or separate the various components of a fibrous mass in order to clean or to procure a certain grade of fibrous product and determine its monetary value.

The present invention is directed towards an apparatus which causes a high velocity air current to be directed against fibrous materials, such as seed or lint cotton, to be fractionated for the purpose of separating trash, and in the case of lint cotton to remove the excess short fibers. The conventional methods and apparatus for cleaning fibrous materials use centrifugal force, saw cylinders, and external air jets to act on the fibrous material to remove the trash. And while these various methods do fractionate and clean, they have the disadvantages of being too slow for commercial application, or actually break the fibrous materials creating short fibers which are undesirable, or they require high pneumatic power requirements which is uneconomical. The present invention is directed to improvements in providing a fractionating apparatus which creates its own high velocity air currents for imparting motion to a fibrous material for fractionating and cleaning that material.

It is therefore an object of this invention to provide a pneumatic fibrous material fractionator which includes a rotatable rotor in a material container which by a combination of suction and pressure creates high velocity air currents which impart a rotating movement to the fibrous material in the container and cause separation of the various components of a material.

A further object of the present invention is the provision of a pneumatic fibrous sample fractionator which creates high velocity air currents which travel in a radial direction through the sample causing the fibrous material to contact a plurality of deflector fingers or bars to impart a change of direction to the material and separate the trash, and other undesired components from the material.

Yet a further object of the present invention is the provision of a pneumatic fibrous material fractionator which includes a rotatable rotor in a material container, the rotor having an internal passageway communicating with the atmosphere, a plurality of circumferentially spaced and generally axially extending fan blades on the rotor and a plurality of rows of axially extending slots in the rotor communicating with the passageway whereby as the rotor is rotated the fan blades create a flow of air through the passageway and slots and into the container for imparting a rotating action to the fibrous material in the container thereby fractionating the material by a combination of centrifugal force, change of velocity and contact with deflector bars.



A still further object of the present invention is the provision of a series of removable trash trays beneath the trash outlets of a pneumatic fibrous material fractionator which are positioned with the coarser trash screens adjacent the trash outlets whereby separated trash, short fibers and other particles of different sizes are separated from the fibrous material being fractionated and are separated and deposited on the various trays in accordance with their size whereby various characteristics can be determined for the fibrous materials.

Yet a still further object of the present invention is the provision of a fibrous material fractionator which has but one moving part, the rotor, which creates its own air current for rotating and agitating the material in the apparatus and is capable of creating a suction to provide a continuous flow of the material being fractionated through the fractionator.

Still a further object of the present invention is the provision of a continuous flow fibrous material fractionator which creates a high velocity air current for separating the components of a fibrous sample and provides a high velocity suction for causing a continuous flow of the fibrous material through the container on a continuous flow basis.

Yet a still further object of the present invention is the provision of a continuous material flow pneumatic fabricator for fibrous materials having a rotatable rotor in a material container, said rotor having an internal passageway one end of which is connected to the atmosphere and the other end of which is connected to a material supply, and the rotor is provided with a plurality of circumferentially spaced rows of openings and blades, the openings and blades being tapered downwardly from the material end of the passageway to the air inlet end of the passageway whereby when the rotor is rotated fibrous material is continuously being drawn into one end of the rotor while air is being drawn into the second end of the rotor and out into the container whereby the sample is continuously flowing through the container and being fractionated and cleaned.

A still further object of the present invention is the provision of a fibrous material fractionator which is efficient, simple in construction, and requires a minimum of power.

Other and further objects, features and advantages will be apparent from the following description of presently preferred embodiments of the invention, given for the purpose of disclosure, and taken in conjunction with the accompanying drawings, wherein like character references designate like parts throughout the several views and where,

FIGURE 1 is an elevational view, partly in section, illustrating a batch type fractionating apparatus according to the present invention,

FIGURE 2 is an elevational view, taken along the line 2—2 of FIGURE 1,

FIGURE 3 is a cross-sectional view taken along the line 3—3 of FIGURE 1,

FIGURE 4 is a perspective view, partly in section, illustrating a continuous flow type apparatus according to the present invention having an inlet and outlet,

FIGURE 5 is a cross-sectional view taken along the line 5—5 of FIGURE 4,

FIGURE 6 is a cross-sectional view taken along the line 6—6 of FIGURE 4,

FIGURE 7 is an elevational view, in cross-section showing the device of FIGURE 4,

FIGURE 8 is an enlarged partial cross-sectional view

of the present invention illustrating an additional manner of providing a material inlet to the continuous type apparatus, and

FIGURE 9 is a cross-sectional view taken along the line 9—9 of FIGURE 8.

For purposes of illustration and by way of example only, the present invention is useful in cleaning seed cotton or fractionating lint cotton although, of course, the present invention is useful in cleaning or fractionating many and various types of fibrous materials.

Referring now to the drawings, the reference numeral 10 generally designates the apparatus of the present invention for fractionating fibrous materials. The apparatus 10 generally includes a material container 12 in which trash or outlet openings 16 are provided in the wall and deflector fingers 30 are provided on the interior of the container 12. The rotor 14 is rotatably mounted in the container or chamber 12 and inlcudes a plurality of axially extending slots 18 which are in fluid communication with an internal passageway 20 in the rotor which is in turn in communication with the atmosphere, and a plurality of circumferentially spaced and outwardly extending fan blades 22 on the outer periphery of the rotor 14 for creating a high velocity air current in the chamber 12 to agitate and rotate the fibrous material placed in the container 12.

Referring now to FIGURES 1–3, inclusive, a cotton fractionator and/or cleaner is shown which is used for a batch cleaning process or for determining the presence and amount of trash and short fibers in a given quantity of lint cotton. The container or material chamber 12 is preferably cylindrical in shape being closed at the first end 23 and provided with a removable end plate 24 at the second end. Locking lugs 26 (FIGURES 1 and 2) may be provided to provide a means of releasably securing the end plate 24 to the container 12. It is noted that the removable end plate 24 includes an opening 28 in communication with the rotor internal passageway 20 whereby air may enter inlet 28, the passageway 20 and proceed into the container 12 through slots 18 when a suction is created by the rotary action of the fan blades 22. A plurality of rows of deflector fingers or bars 30 may be provided secured to the interior of the chamber or container 12 so that when the fibrous material is being rotated about the container 12 it will contact and be deflected by the bars 30 thereby jarring and disassociating the trash and/or short fibers and separating them from the fibrous mass. Preferably, the deflector fingers or bars 30 are made of rubber or other similar flexible material and is formed in blunt shapes and rounded ends so as not to cut or damage the fibrous materials. Furthermore, the deflector fingers or bars 30 are conveniently spaced from each other so as to permit trash to pass between them against the interior wall of the chamber 12 while the rotating fibrous material is deflected away from the chamber wall by the deflector bars 30.

A series of trash outlet slots 16 of varying sizes and shapes are provided in the container wall to allow the exit of the trash and/or short fibers as they are rotated around the container wall and out the trash openings 16 by the air pressure in the container 12.

The rotor 14 preferably includes a tubular body suitably supported in the material container 12 for rotatable movement such as by bearings 15 at one end; the other end being supported by the motor shaft 34. Of course, other desired means for providing a rotatable support may be used. The fan blades 22 are connected to the rotor 14 and are circumferentially spaced about the rotor. Preferably, the fan blades 22 are axially extending although, of course, they could be at an angle or even be spirally shaped about the rotor 14. Furthermore, any desired number could be provided. The air outlet slots or openings 18 are preferably axially extending and spaced between adjacent fan blades 22 in order to provide air for agitating and rotating the fibrous material when the fan blades are rotated and cause a suction from the atmosphere through internal passageway 20 and the slots 18. The desired amount of air for effective fractionation of the fibrous material may be controlled by varying one or more of the variables: the size of the slots 18, the rotor speed, the inlet opening 28 or the area of rotor blades. The volume and velocity of air created by the rotor determines the area of the trash outlet slots. If the air velocity at the point of the trash outlets 16 is too high, good fibers are carried out with the trash and if the air velocity is insufficient, effective cleaning and fractionation of the material is not accomplished.

A desirable means for rotating the rotor 14 may be provided such as motor 32 which may be directly connected to the rotor 14 by means of a shaft 34. A rotor sleeve 36 may be provided with air intake openings 38 which are in communication with rotor passageway 20. Thus, when the motor 32 rotates the rotor 14, the fan blades 22 create a fan action in the container 12 thereby rotating and agitating the fibrous material which has been placed in the container 12. The openings 28 and 38 allow air to flow through the rotating rotor passageway 20 and pass out through the slots or openings 18 and into the material chamber or container 12. The air flow through the rotor is due to the fan action created by the blades 22. And if desired a suitable base 37 may be provided to suitably support the apparatus 10 and the motor 32.

As previously stated it may be desirable to collect and weigh trash, short fibers and other foreign particles from the material being fractionated thereby weighing and comparing these various components in relation to the original sample. The monetary value of the fibrous material can then be determined because of the presence of these components. Thus, a series of removable trash trays 40, 42 and 44 are provided supported by the base 37 beneath the trash outlets 16 and spaced vertically from each other. The trash trays are sized with a coarse screen tray 40 on top, a medium mesh screen tray 42 below and a fine mesh screen trash tray 44 on the bottom. The trash trays are slidably removable from the support 37 and an air escape 46 and feet 39 are provided in the base 37 for the exit of the air from the trash outlet 16 through the trash trays 40, 42 and 44 and out the opening 46.

Referring now to FIGURES 4–9, the fractionating apparatus of the present invention is also adapted to provide a continuous flow process of cleaning fibrous samples by the addition of suitable flow inlets and outlets and means for propelling the material through the container 12. As shown in FIGURES 4–9, the rotor 14 is suitably supported by bearings 48 and 50 (FIGURE 7) on either end and extends outwardly from each end of the container 12. A belt and pulley arrangement 52 and 54 is suitably connected to a motor 56 for rotating the rotor 14. Of course, a similar support and rotating means could be provided for the batch type fractionator of FIGURES 1–3.

Thus, with the rotor 14 journaled for rotary movement in the container 12 the interior passageway 20 of the rotor 14 is provided with a material inlet or opening 58 at one end and an air opening or inlet 60 at its second end. The opening 60 is in communication to the atmosphere and as previously described thereby permits air to flow through the rotating rotor 14 upon rotation of the fan blades and rotor 14. A material outlet 62 (FIGURE 7) is provided in the second end of the enclosed chamber or container 12 to allow the exit of the fibrous material after it has been cleaned.

As best seen in FIGURES 4–7 a supply of material (not shown) is suitably connected to the rotor material inlet 58 and the action of the rotor itself causes the movement of the fibrous material through the container 12. In order to provide this self-feeding operation a partition 63 is provided in the passageway 20 of the rotor 14 to separate the material inlet 58 from the air inlet 60. Material openings 64, of enlarged area are provided in the rotor 14 on the side of the partition 63 towards the material inlet 58. Fan blade extensions 66 are provided

adjacent the material openings 64 and are of greater width than the fan blades thereby creating a greater suction as the rotor 14 is rotated in order to provide sufficient suction to draw the fibrous material through the opening 58, the material openings 64 and into the container 12 and to provide greater pressure for driving the material to outlet 62. End plate 68 is provided to insure deflection of the material into the chamber 12 as it enters the openings 64 and to prevent material from being caught and wedged, and thus binding between the end 71 and the rotating blade extensions 66. Thus, as the rotor 14 is rotated the fan blade extensions 66 induce a higher suction than the fan blades causing the fibrous material to enter the feed inlet 58 from a material source (not shown) and flow continuously into the container 12 and by virtue of the higher air velocity created by the blade extensions 66 at the first end of the container 12. The fibrous material moves in a spiral path along the container 12 where it is cleaned and the cleaned fibrous material passes out the material outlet 62.

Preferably, the rotor 14 of the continuous flow fractionator apparatus of FIGURES 4–7 is provided with tapered fan blades 70 which are wider at the material inlet end than at the air inlet end of the container and is provided with rows of slots 72 which also taper downwardly so that the slots 72 are wider toward the material inlet end of the container than at the air inlet end. This feature insures that the air as it enters inlet 60 and goes through the passageway 20 of the rotor will tend to have a higher velocity and volume adjacent the material inlet end of the chamber 12 than at the air inlet end thereby aiding in the passing of the material along the container 12 from the inlet to the outlet 62. Furthermore, there will be an even velocity of pressure the full length of the rotor 14.

Of course, the fan blades 70 and the slots 72 need not be tapered as the pressure created by the blade extensions 66 can be made to be sufficient to cause the fibrous material to pass longitudinally along the container 12. However, the tapering feature insures a more uniform gradient of pressure differential along the container. Furthermore, each row of slots 72 may be made a single elongated slot as in FIGURES 1–3.

As in the fractionating apparatus of FIGURES 1–3, a plurality of rows of suitable deflector bars 74, preferably flexible, is provided secured to the container 12 and suitable trash outlets, here shown in the form of slots 76, are provided in the wall of the container 12.

Referring now to FIGURES 8 and 9, a material inlet feed 76 is provided in place of the self-feeding arrangement of the material opening 64 and fan extension 66. The inlet feed 76 is shown positioned in the side wall of the container 12, however, it may if desired be placed in the end wall. Thus, in the continuous flow process of cleaning fibrous materials using the apparatus shown in FIGURES 8 and 9 a suitable supply of material is supplied under pneumatic pressure (not shown) to the material inlet 76 into the container 12 whereby the pressure of the material entering will push the fibrous material along the container 12 with a spiral motion to a material outlet after the material has been fractionated or cleaned. Of course, as in the device of FIGURES 4–7 tapered fan blades 78 along with tapered slot openings 79 may be provided to increase this longitudinal movement of the material through the apparatus. In this arrangement the air will enter both ends of the rotor 14 into the passageway 20.

The foregoing apparatus 10 for fractionating fibrous material, while shown as being used and operated in a horizontal position, can be operated in a vertical or any position and while useful in cleaning or fractionating cotton such as in laboratories or cotton gins, will work equally well in other environments, for instance, such as in cotton strippers and cotton pickers. Furthermore, the present invention is useful in fractionating other fibrous materials.

Referring now to FIGURES 1–3, the operation of the present invention is best seen in its use as a fractionating and cleaning apparatus wherein a sample of fibrous material such as lint cotton containing trash and short fibers is weighed and inserted in the container 12. The removable end plate 24 is locked into position and motor 32 is actuated to rotate the rotor 14. As the rotor rotates the fan blades 22 create a movable jet of air acting in a radial direction thus passing through the cotton sample causing it to move around the wall of the container 12. The fan blades 22 create the air flow action by drawing air through the rotor passageway 20 from inlet 28 at one end of the rotor and inlets 38 at the other end of the rotor where the air passes out through the air outlet slots 18 into the container 12. Thus, no external source of air power is required as the rotating rotor creates by its own suction a high velocity air current.

Thus as the mass of fibrous materials is rotated about the interior of the container 12 it strikes the deflector fingers or bars 30 which tend to retard temporarily the fibrous mass giving an impact which further frees the trash and exposes additional fiber surfaces to the cleaning and fractionating action of the high velocity air currents. The trash, short fibers, and other foreign particles since they are of a different weight than the normal clean fibers are acted upon by a combination of centrifugal force, change of velocity by the jetting air and the impact caused by hitting the deflector fingers 30 and are caused to separate from the fiber mass. Since the deflector fingers or bars 30 are spaced to permit trash to pass between them against the wall of the container 12 while the fibrous mass is deflected away from the container wall, the trash, short fibers, and other foreign particles pass around the wall and are blown out the trash outlets 16 where they are ejected onto the trays 40, 42 and 44, depending upon the size of the ejected material. The air passing out the outlet 16 and the trash trays passes out the opening 46 in the support 37.

Thus by rotating the rotor for a fixed period of time, a period found in the case of cotton samples to be approximately thirty seconds, the trash, short fibers, and other foreign particles are separated from the cotton sample and deposited upon the screens 40, 42 and 44. After stopping the motor 32, the original sample is removed from the sample chamber or container 12. And since the monetary value of a cotton sample is influenced by the presence of an excess of short fibers and trash the clean sample may be weighed and the loss in weight from the original weight is an indication of the amount of trash, short fibers and other foreign particles which have been removed. The trash on the individual trays 40, 42 and 44 may be weighed separately to give an indication as to the amount and type of trash on each tray. By refractionating the trash samples in a similar refractionating apparatus 10 (usually an apparatus with smaller trash outlet holes 16), the short fibers can be effectively separated from the trash and other foreign particles. By weighing and comparing these short fibers to the original sample weight loss, both weight and percentage of short fibers may be calculated. Similarly, trash and other foreign material may be weighed and calculated to show either weight or percent trash in the original sample.

In order to provide a continuous process of fractionating or cleaning a fibrous material such as seed cotton, for example in a cotton gin or picker, the apparatus of FIGURES 4–7 may be used which is similar to the device of FIGURES 1–3 but includes a material feed inlet and outlet and means for continuously feeding the material through the container 12. The material inlet 58 is connected to a supply of material (not shown) to be fractionated or cleaned and the motor 56 (FIGURE 4) is energized rotating the rotor 14 through the belt and pulley arrangement 52 and 54. As the rotor 14 rotates

the blade extensions 66 also rotate creating a suction through material inlet openings 64 and through the material inlet 58 thereby drawing fibrous material through these opening into the container 12. At the same time the actions of the fan blades 70 create a radial jet action of air acting in a radial direction caused by the suction of air through the air inlet 60 and through the air outlet slots 72, thus acting on the fibrous samples entering into the chamber 12 to cause the fibrous materials to be acted upon similarly to the action of the batch fractionator of FIGURES 1–3 to clean the material. Since the blade extensions 66 are wider than the rest of the fan blades 70 the velocity and volume of air entering the openings 64 is greater per unit area of rotor than the velocity and amount of air entering the slots 72 into the container 12. Thus, the material entering the container 12 through the slots 64 will be forced by the pressure difference along the container 12 in a spiral action during which time the fibrous material will be cleaned. When the material reaches the outlet end of the container 12 the cleaned material will pass out the material outlet 62. Additionally, if the air outlet openings or slots 72 and the fan blades 70 are tapered in width from a maximum width at the inlet end of the container 12 to a minimum width at the outlet end of the container 12 the pressure of air near the material inlet end of the container 12 will be increased thereby aiding in causing the sample to move longitudinally along the container 12.

Thus the fractionating apparatus of FIGURES 1–7 has a single moving part, the rotor 14, which creates its own air currents and is capable of creating a sufficient suction to provide a continuous flow of material through the apparatus without requiring additional and external feeding equipment and thus provides an aparatus for continuous processing.

However, if desired, as shown in FIGURES 8 and 9, a feed inlet 76 can be provided into the container 12, here shown in a side wall although the opening could be placed in the end wall. The feed opening 76 will then be fed from a material supply (not shown) under air pressure and the rotor 14, the blades 78 and the slots 79 would as previously described cause the material to move along the container 12 and be cleaned in a similar manner to the action previously described.

Thus, the present invention provides a fractionating apparatus for fractionating a sample of fibrous materials, such as lint or seed cotton, for the purpose of separating trash, and in the case of lint cotton separating short fibers from the sample by the application of high velocity air currents. The fractionating apparatus 10 includes a single moving part, the rotor 14 which creates the high velocity air currents for cleaning and moving the material through the container and at the same time provides sufficient suction to provide a suction feed for the apparatus and thus considerably reduces the amount of power required to clean a given amount of fibrous material.

The present invention, therefore, is well adapted to carry out the objects and attain the ends and advantages mentioned as well as others inherent therein. While presently preferred embodiments of the invention have been given for the purpose of disclosure, numerous changes in the detail of construction and arrangement of parts may be made which will readily suggest themselves to those skilled in the art and which are encompassed within the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. An apparatus for fractionating fibrous materials comprising a container for receiving said material, a rotatable body positioned interiorly of said container and mounted for rotation in said container, said container having a closable material opening for feeding material into the container, said body having an interior passageway, said passageway being in fluid communication with the atmosphere, a plurality of outwardly extending blades



secured to the exterior of said body, said blades being substantially perpendicular to the surface of said body, said body having a plurality of openings in communication with said interior passageway whereby as the body is rotated air is sucked through said passageway and out of said openings by the rotating action of the blades thereby agitating and cleaning any material in said container, and trash disposal openings in said container permitting the passage of trash and debris separated from said fibrous material.

2. The invention of claim 1 wherein the container includes a material opening adjacent one end of said container and body, and an outlet adjacent the second end of said container and body, said blades tapering downwardly in width from said one end to the second end of said body, and said body openings tapering inwardly from said one end to the second end of said body.

3. The invention of claim 1 wherein the container includes a material exit adjacent one end of said container, a partition having first and second sides positioned in said body passageway, said body having a plurality of enlarged openings on the first side of said partition, said blades being of enlarged width on said first side of said partition adjacent said enlarged openings and a material inlet connected to said passageway on said first side of said partition.

4. An apparatus for fractionating fibrous materials comprising, a container for receiving said material, a rotatable body mounted inside of said container, means for rotating said body, said body having an axial extending passageway through said body, said passageway being in fluid communication with the atmosphere, a plurality of circumferentially-spaced and substantially axially extending fan blades disposed on said body, said body having a plurality of axially extending openings, said openings being in communication with said passageway whereby as the body is rotated a suction is created by the fan blades drawing air through the passageway and out the openings, and a plurality of rows of deflector bars disposed on the interior of the container for deflecting and loosening the debris from the material as it rotates about the container, and a plurality of trash outlets in the container.

5. The invention of claim 4 including a plurality of mesh screen trays in spaced vertical relationship positioned below said trash outlets.

6. An apparatus for fractionating fibrous materials comprising, a substantially cylindrical container for receiving said material, a tubular rotor mounted for rotation in said container, said rotor having an axial passageway in communication with the atmosphere, a plurality of circumferentially spaced and substantially axially extending fan blades attached to said rotor, said rotor having a plurality of substantially axially extending openings, one of said openings being disposed between adjacent fan blades and in communication with the passageway, a plurality of rows of deflector bars disposed on the interior of the container for deflecting and loosening the fibrous material as it is rotated about the container, and a plurality of trash outlets in the wall of the container.

7. An apparatus for fractionating fibrous materials comprising a substantially cylindrical container for receiving said material, a tubular rotor mounted for rotation in said container, said rotor having an axial passageway, said passageway being in fluid communication with the atmosphere, a plurality of circumferentially spaced and axially extending fan blades attached to said rotor and radially extending therefrom, said rotor having a plurality of axially extending and circumferentially spaced openings, said openings being in communication with the passageway, a plurality of rows of flexible deflector bars axially disposed on the interior of the container for deflecting and loosening the fibrous material as it rotates about the container, means for rotating said tubular rotor, and a plurality of trash outlets in the container.

8. The invention of claim 7 including an enclosure having an opening and an exit, said opening being adjacent said trash outlets, and a plurality of mesh screen trays in spaced vertical relationship positioned in said enclosure.

9. An apparatus for fractionating fibrous materials comprising, a substantially cylindrical container having first and second ends for receiving said material, a tubular rotor mounted for rotation in said container, said rotor having first and second ends and having an axial passageway communicating with the atmosphere, a plurality of radially extending fan blades axially attached to the exterior of the rotor, said rotor having axially extending slots in the exterior of the rotor, said slots being in communication with said axial passageway whereby when the rotor is rotated air is sucked through said passageway and slots by the fan action of the blades and into the container, a plurality of rows of deflecting bars disposed on the interior of the container for deflecting and cleaning the fibrous material as it rotates about the container, a plurality of trash outlets in the container, a material opening adjacent the first end of said container, and a material outlet adjacent the second end of said container, and means for rotating said rotor.

10. The invention of claim 8 wherein the fan blades are tapered downwardly in width from said first end of said rotor, and said slots are tapered inwardly from said first end of said rotor.

11. An apparatus for fractionating fibrous materials comprising, a substantially cylindrical container for receiving said material and having first and second ends, a tubular rotor coaxially mounted for rotation in said container and having first and second ends, said rotor having an axial passageway communicating with the atmosphere at the second end, a plurality of outwardly and axially extending first fan blades circumferentially spaced on said rotor, said rotor having a plurality of rows of axially extending slots, said slots being in fluid communication with the axial passageway whereby when the rotor is rotated air is sucked through said passageway and slots by the action of the fan blades into the container thereby agitating and cleaning said material in said container, a plurality of rows of deflecting bars disposed on the interior of the container for deflecting and cleaning the fibrous material as it rotates about the container, a plurality of trash outlets in the container, a material outlet in said container adjacent said second end, a partition in said rotor passageway between said first and second ends, at least one material opening in said rotor, said opening being on the side of the partition adjacent said first end of the rotor, and at least one enlarged fan blade adjacent said material opening, said enlarged fan blade being outwardly and axially extending and connected to said rotor.

12. The invention of claim 9 wherein the first fan blades are tapered downwardly in width from said first



end of said rotor, and said slots are tapered inwardly from said first end of said rotor.

13. An apparatus for fractionating fibrous materials comprising, a substantially cylindrical container for receiving said material and having first and second ends, a tubular rotor coaxially mounted for rotation in said container and having first and second ends, said rotor having an axial passageway, said passageway communicating with the atmosphere at said second end and said first end arranged for connection to a material supply, a partition in said passageway between said ends having first and second sides, a plurality of outwardly and axially extending first fan blades circumferentially spaced on said rotor on the second side of said partition, said rotor having a plurality of rows of axially extending first slots on the second side of said partition, said slots being in communication with the axial passageway whereby when the rotor is rotated air is sucked through said passageway and slots by the action of the fan blades into the container thereby agitating and cleaning said material in said container, a plurality of rows of deflecting bars disposed on the interior of the container for deflecting and cleaning the fibrous material as it rotates about the container, a plurality of trash outlets in the container, a material outlet in said container adjacent said second end, a plurality of material inlet openings in said rotor on said first side of the partition, a plurality of second fan blades axially extending and circumferentially spaced about the rotor adjacent said material openings.

14. An apparatus for fractionating fibrous materials comprising, a container for receiving said material, a rotatable body mounted inside of said container, said body having an axially extending passageway through said body, said passageway being in fluid communication with the atmosphere, means removed from said passageway for feeding fibrous material into said container, a plurality of circumferentially spaced fan blades disposed on said body, said blades being substantially perpendicular to the surface of said body, said body having a plurality of circumferentially spaced openings, said openings being in communication with said passageway, each of said openings being positioned behind one of said blades when said body is rotated whereby a suction is created by the fan blades as the body is rotated thereby drawing air through the passageway and out of the openings, and trash disposable openings in said container sized to permit the passage of trash and debris separated from the fibrous material but preventing the passage of said material.

**References Cited** in the file of this patent

UNITED STATES PATENTS

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|---|---|---|
| 373,075 | Kitson | Nov. 15, 1887 |
| 2,002,974 | Bennett et al. | May 28, 1935 |
| 2,489,079 | Clark | Nov. 22, 1949 |
| 2,910,731 | Moore et al. | Nov. 3, 1959 |