The present invention relates to improvements in a straining separator in which the solid matter strained from the material to be separated is removed continuously from the separator.

Such a straining separator is described in the Fleischer Patent No. 2,578,468. By means of this known straining separator, it is possible to dry e.g. textile material such as wool or cotton and similar fibrous material, when the separator drum is provided with guiding members by means of which the said material may be conveyed in a uniform flow through the compartments to the ejection apertures, without risk of clotting, or of the material being retained in the compartment.

In the straining separator described in said patent the guiding members comprise either upright inwardly projecting stationary guiding ribs or continuously rotating cylinders or rollers at the inner edges of the ribs. It has, however, been noted that when straining material containing long fibres there is a tendency of the material to clot in the separator chamber because such long-fibered material tends to wrap around the continuously rotating rollers.

The object of the invention is to provide a straining separator of the type described in which the clotting of the material containing long fibers may be eliminated by oscillating the upright rollers.

A further object of the invention is to provide a straining separator of the type described, in which the guiding members or rollers are actuated in such a manner that materials of all kinds will be assisted in their movement toward the apertured area of the drum so as to obtain a uniform flow without clotting.

A still further object of the invention is to provide a straining separator of relatively simple construction for imparting to the guiding rollers an oscillating motion.

These and other objects and advantages of the invention will be apparent from the following description of a straining separator, taken in conjunction with the accompanying drawing, in which:

Fig. 1 is a sectional view of the straining separator on the axis of rotation;
Fig. 2 is a plan view of the separator chamber at the base of the drum where there are provided ejection apertures through which the separated solid matter is removed. These ejection apertures are indicated in Fig. 3 by means of dot-and-dash lines. The separated solid matter is collected in a container 9 arranged around the separator drum. Opposite such ejection aperture 8 is arranged a rotary roller 10 which, as in said patent, both retards the discharge of solid material and conveys some of it away from the drum. Rollers 10 are arranged for displacement to and from the ejection apertures, or they may be adjusted to a suitable speed of rotation, so that they are able to receive and remove a predetermined quantity of material per time unit. The rollers may be driven from the separator spindle 3, e.g. by means of a screw gear wheel 11 attached to spindle 3. Meshing with gear 11 are supplementary screw wheels 12 on shafts 13 carrying worm gears 14 meshing with worm wheels 15 on certain of the rollers 10. Any number of shafts 13 and associated gears may be employed, and preferably there is employed such a number that they may be arranged symmetrically around the spindle 3 in order to well balance the separator drum 1. When a greater number of ejection apertures 8 with rollers 10 is used than the number of the shafts 13 and associated gears, it is necessary to couple the rollers 10 together by means of bevel gears 16 or other suitable coupling members, e.g. friction couplings.

Within the separator chamber 4 is arranged an annular series of upright guide members in the form of oscillating cylinders or rollers 17, each provided with a shaft 18 projecting through the base of the separator drum and journaled in depending bearings 19. As in Figs. 3 and 4 of Patent 2,578,468 the upright rollers are disposed at the inner ends of ribs or webs which extend inwardly from theinclined wall of the drum 1 and form a plurality of compartments 20 which together with the central space beneath the drum inlet 5 and surrounded by the rollers 17 constitute the separator chamber 4. Any number of these radially extending compartments 20 may be provided but as shown in Fig. 2 there are six. One of the apertures 8 is located at the outer portion of the bottom of each compartment and the outer wall of each of the compartments has the perforations 2. The shafts 18 carry radial arms 20 by means of which the rollers 17 may be rotated or turned first in one direction and then in the other, through driving members attached to power transmitting members on the drum spindle 3. The rollers may be actuated singly, or in groups as seen in Fig. 3, in which each group is operated from one of the shafts 13. Worm wheels 21 attached to the shafts 13 mesh with worm wheels 22 rotatable on pivots 23 which depend from the base of the drum. Worm wheels 22 are oscillated by eccentric mechanisms or crank devices. As shown, each crank device comprises a crank arm or pin 24 movable with the gear 25 and pivot 26 of the eccentric or crank rod 25, the other end of which latter is pivotally attached to a radial arm 20 on the shaft of one of the rollers 17. Links 26 are pivotally connected to adjacent arms 29 of each group, and since the arms 26 are longer than the length of stroke of the crank pins or arms 24, all of the rollers 17 will be oscillated during the operation of the separator.

In the operation of separators of this character, the material moves in a uniform flow through the separating chamber to the ejection apertures 8, and in doing so it must pass along the inner edges of the ribs or webs which form the compartments between them. If the material contains fibrous matter, there is a tendency for the fibers to adhere to said edges because of centrifugal force. To overcome this drawback, it was proposed in said patent to mount on said edges cylinders or rollers...
which are continuously rotated in the same direction. However, it was found in the operation of such a structure that the material contained long fibers, the latter would wrap around the cylinders because of their continuous rotation in the same direction. After much experimenting with that Fleischer separator, I discovered that by giving the cylinders or rollers an oscillating motion, the long fibers in the material will not wrap around the cylinders, and on account of the force of gravity, the material will be conveyed or forced to flow without clogging or other difficulty from the top of the separating aperture. The oscillation of the rollers or cylinders 17 not only prevents long fibers from wrapping around them and forming clots, but they agitate the material that comes in contact with them and tend to guide or feed such material into one or the other of the adjoining compartments and toward the apertured portions of the drum. It is to be noted that all of the material entering the inlet 5 must pass between adjacent rollers 17 and that their oscillatory movement tends to break it up as it moves downwardly and outwardly by gravity and centrifugal force.

As will be understood on reference to Fig. 4, instead of using the arms 20, the extensions of shafts 18, of rollers 17 may be provided with gear wheels 27 which mesh with a toothed segment 28 arranged for oscillatory motion on a pivot 29 depending from the base of the separator drum. The segment is at one end of a swinging arm 30, the other end of which is mounted on pivot 29. The connecting rod 25 is pivotally attached to the part 30 between the toothed portion and the pivot 29. Instead of link members 26 the rollers may be coupled together by means of gear wheels.

What is claimed is:

1. In a continuously operating separating separator for handling material containing long fibers, the combination of a perforated separator drum having an upper inlet and a base with a plurality of ejection apertures for removal of separated solids from the drum, means mounting the drum for rotation including a drum shaft, rotary retarding and conveying members associated with said ejection apertures, means for rotating said members, an annular series of upright guiding rollers within the drum and between which the material entering said inlet must pass to reach the perforated areas, each of said rollers being rotatably mounted vertically shaft, and means for oscillating the shafts of said rollers.

2. A structure as claimed in claim 1 in which said last mentioned means includes an eccentric mechanism driven from said drum shaft.

3. A structure as claimed in claim 2, in which the eccentric mechanism comprises at least one screw gear device interposed between worm wheels attached to the separator drum shaft and the retarding and conveying members, respectively, an eccentric meshing each of said worm wheels, and link members interconnecting said eccentrics with at least one guiding roller shaft.

4. A structure as claimed in claim 1, in which the means for oscillating the shafts of the guiding rollers comprise for each roller a shaft extension projecting below the drum base, at least one arm projecting from said shaft extension, connection rods interconnecting said arms, a gear wheel rigidly attached to at least one of the said shaft extensions, a toothed segment rotatably mounted on a pivot attached to the drum base and in mesh with said gear wheel, a disc connected to the driving means of the retarding and conveying members for rotation thereby, and a connecting rod eccentrically attached to the said disc and to the toothed segment between its teeth and its pivot.

5. In a continuously operating separating separator for handling material containing long fibers, the combination of a perforated separator drum having an upper inlet and a base with a plurality of ejection apertures for removal of separated solids from the drum, means mounting the drum for rotation including a drum shaft, rotary retarding and conveying members associated with said ejection apertures, means for rotating said members, said drum having an annular series of upright guiding rollers between which the material entering said inlet must pass to reach the perforated areas, said rollers extending from the top to the base of the drum and one of them being disposed along the inner edge of each of said webs, a vertical shaft for each roller rotatably mounted and having an extension projecting below the drum base, said means for rotating said members including at least one rotatory shaft driven from the drum shaft, a pair of meshing screw gears, one being mounted on said last mentioned rotatory shaft and the other mounted on a vertical pivot extending inwardly from its perforated straining wall to form between them an annular series of radially extending compartments which together with the central space beneath said inlet constitute the separating chamber of the drum, an annular series of upright guiding rollers between which the material entering said inlet must pass to reach the perforated areas, said rollers extending from the top to the base of the drum, a crank arm movable with the gear wheel on said vertical pivot and rotatable with that gear, means actuated by said crank arm to oscillate at least one of said shaft extensions, and means for imparting the oscillating movement of the last mentioned shaft extension to certain other of the shaft extensions.

6. In a continuously operating separating separator for handling material containing long fibers, the combination of a perforated separator drum having an upper inlet and a base with a plurality of ejection apertures for removal of separated solids from the drum, means mounting the drum for rotation including a drum shaft, rotary retarding and conveying members associated with said ejection apertures, means for rotating said members, said drum having an annular series of upright webs extending inwardly from its perforated straining wall to form between them an annular series of radially extending compartments which together with the central space beneath said inlet constitute the separating chamber of the drum, an annular series of upright guiding rollers between which the material entering said inlet must pass to reach the perforated areas, said rollers extending from the top to the base of
the drum and one of them being disposed along the inner edge of each of said webs, a vertical shaft for each roller rotatably mounted and having an extension projecting below the drum base, said means for rotating said members including at least one rotary shaft driven from the drum shaft, a pair of meshing screw gears, one being mounted on said last mentioned rotary shaft and the other mounted on a vertical pivot depending from the drum base, a crank arm movable with the screw gear on said vertical pivot and rotatable with that gear, a toothed gear on at least one of said shaft extensions, at least one horizontally swinging arm having one end pivotally supported from the drum base and its other end provided with a gear segment in mesh with said toothed gear, a connecting rod pivoted at one end to said crank arm and at its other end to an intermediate portion of said swinging arm, whereby said one shaft extension will be oscillated when said crank arm is rotated, and means for imparting the oscillatory movement of said one shaft extension to certain other of the shaft extensions.

References Cited in the file of this patent

UNITED STATES PATENTS

2,578,468 Fleischer \(------------\) Dec. 11, 1951