May 31, 1955 E. G. SOFIO 2,709,281

FIBER AERATING, BLOOMING AND CLEANING MACHINE

Filed Jan. 15, 1951 4 Sheets-Sheet 1

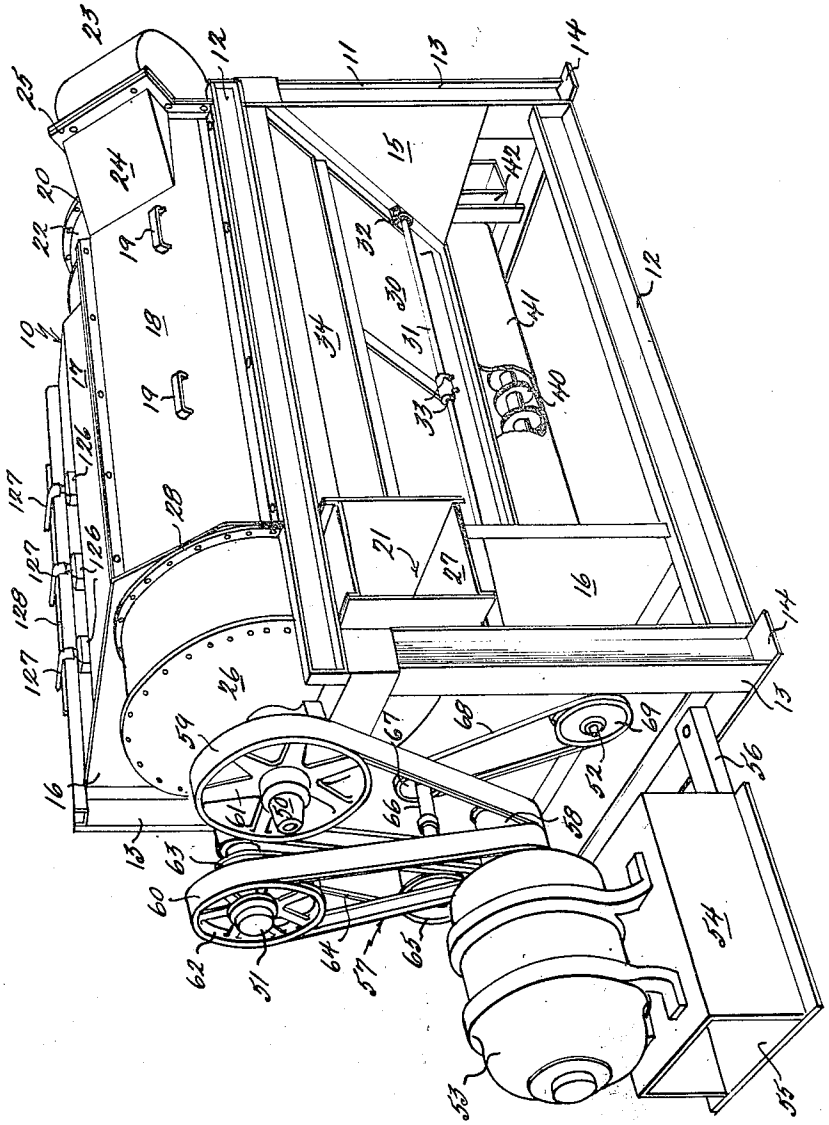


FIG. 1.

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FIBER AERATING, BLOOMING AND CLEANING MACHINE

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FIG. 2.

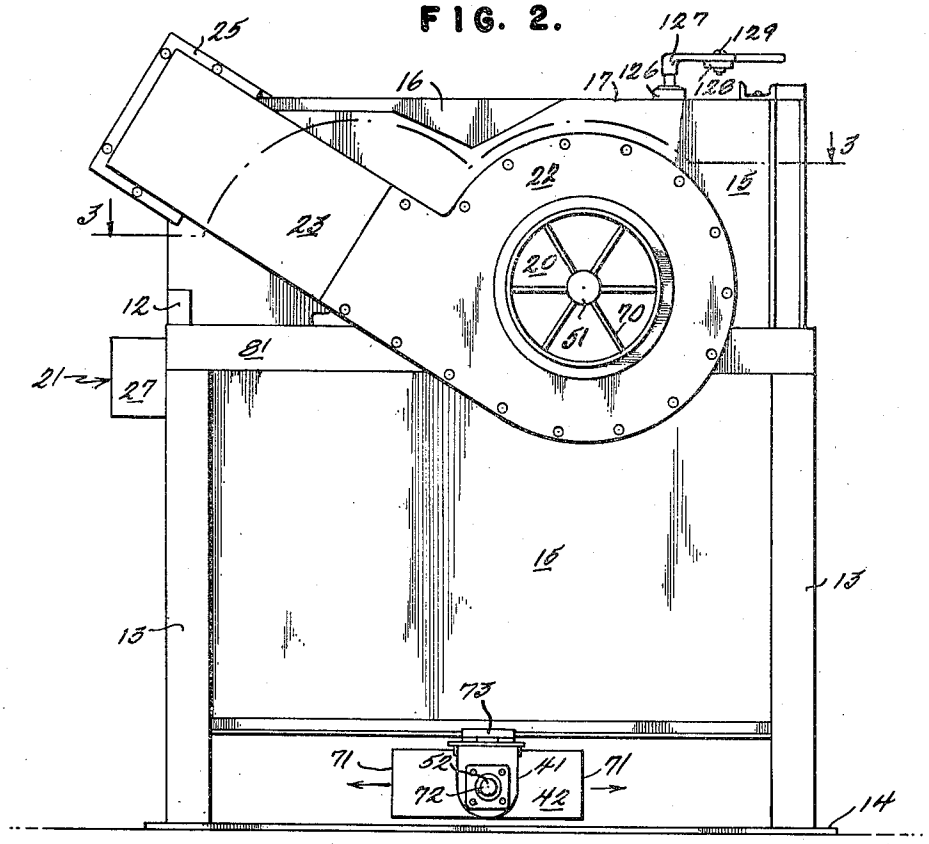
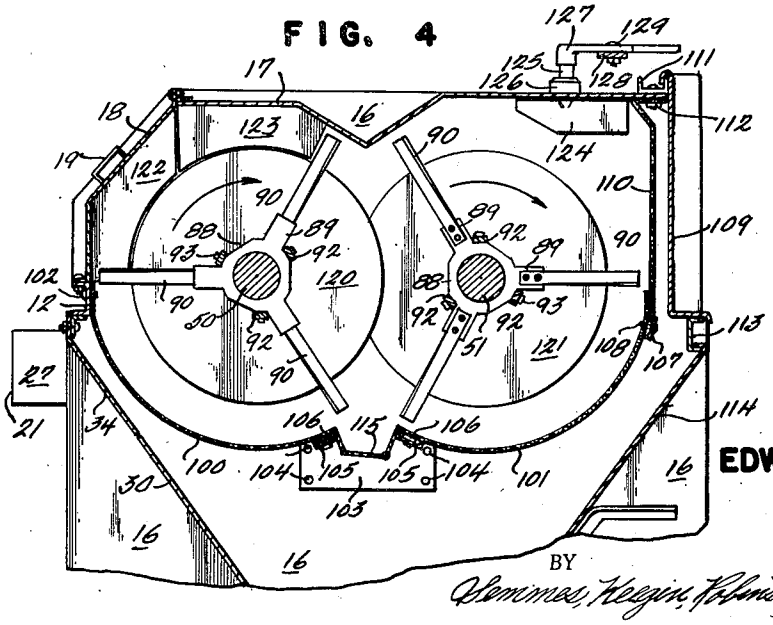


FIG. 4



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FIBER AERATING, BLOOMING AND CLEANING MACHINE

Filed Jan. 15, 1951 4 Sheets-Sheet 3

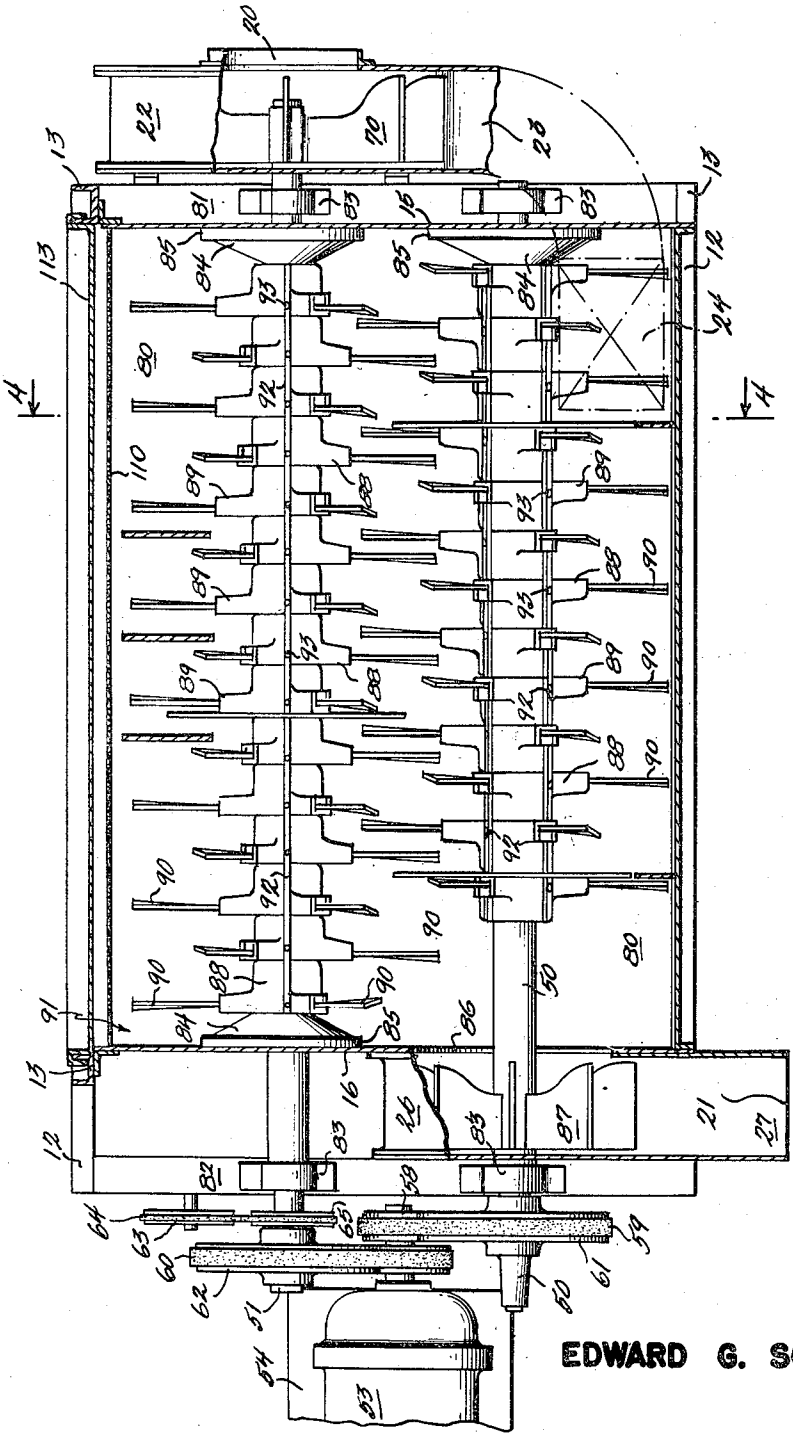


FIG. 3.

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FIBER AERATING, BLOOMING AND CLEANING MACHINE

Filed Jan. 15, 1951 4 Sheets-Sheet 4

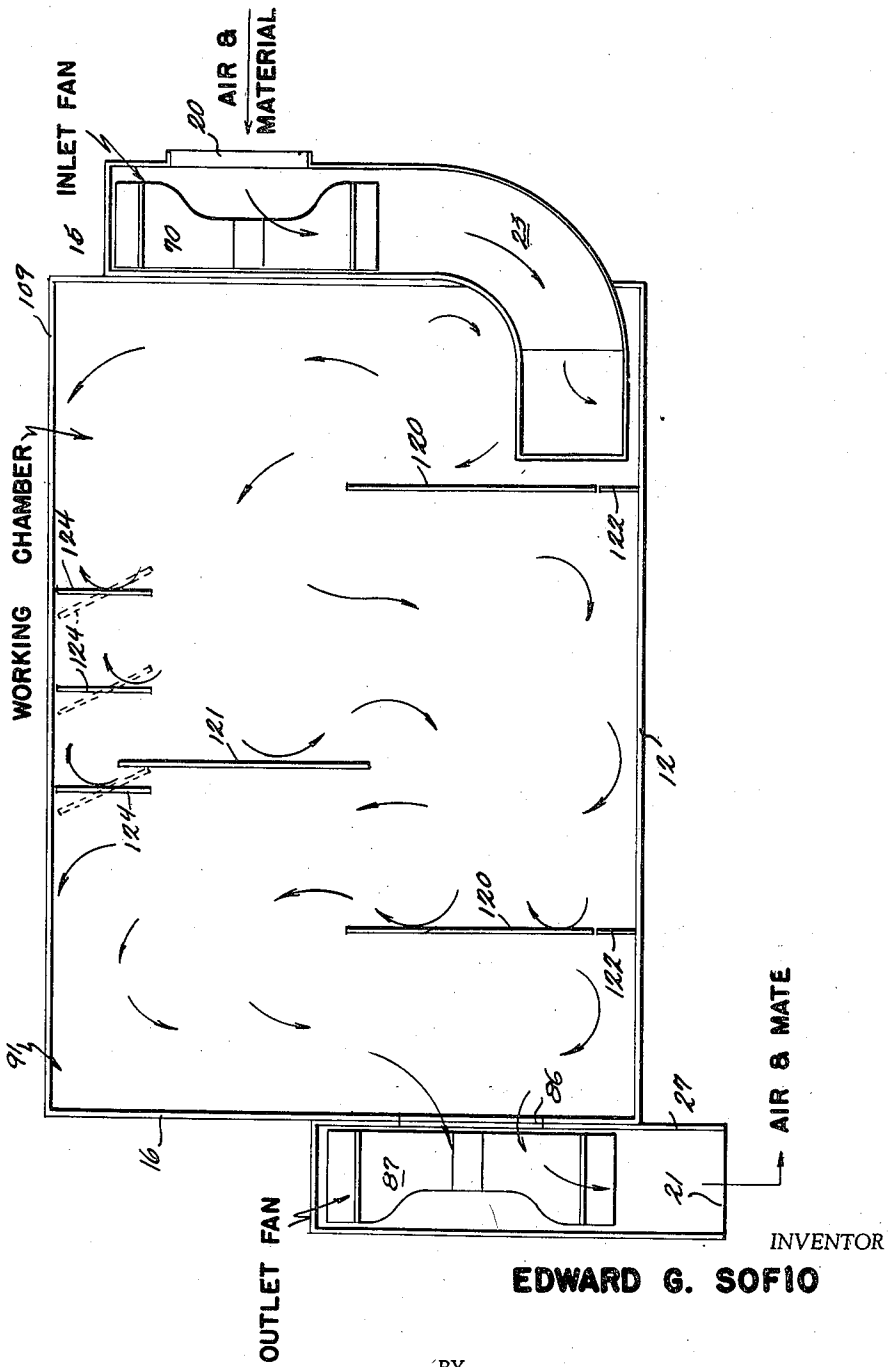


FIG. 5.

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United States Patent Office 2,709,281 Patented May 31, 1955

2,709,281

FIBER AERATING, BLOOMING AND CLEANING MACHINE

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Application January 15, 1951, Serial No. 205,980

12 Claims. (Cl. 19—91)

This invention relates generally to apparatus for placing cotton or other textile fibers in proper condition for subsequent ginning or other milling operations and has specific reference to apparatus for the aerating, blooming, and cleaning of the fibers to remove certain foreign materials such as sand, pebbles, leaves, dust, and the like.

A variety of mechanisms have heretofore been employed with varying degrees of success to remove foreign matter from textile fibers before they are sent to the milling machines. In these mechanisms, beaters, spiked drums, and toothed cylinders have been employed to pass the fibers over screens through which the heavy foreign matter therein is intended to fall and collect in a hopper from which it is removed in any suitable manner. It is found that in the practical operation of fiber cleaning machines of this character, it is necessary to break up the cotton as it is sent to the machine and so separate the fibers and make the cotton light and fluffy in order to permit a thorough cleaning of the foreign matter therefrom.

A careful study of the operation of these various fiber cleaning devices has lead to the conclusion that they fail to fulfill the purposes for which they were intended principally because the fiber is not sufficiently opened up and the fiber locks separated before being placed over the screens.

Another major disadvantage of the devices heretofore constructed is that they are inefficient in the amount of fiber they can handle in relation to the amount of horsepower expended. Also, they are subject to great fire hazards. In addition, no means have been provided for varying the rate of flow of material through the machine in accordance with the type of fiber being operated upon, once the material has entered the machine, without actually changing the speed of the moving parts of the machine which, of course, affects the quality of treatment which the fiber receives.

It is, therefore, a primary object of the present invention to provide a fiber opening and cleaning machine which overcomes the difficulties now present in the art.

Another object of this invention is to provide a machine of the character described which is more efficient and safe in its operation.

Another object of this invention is to provide a machine of the character described which has a plurality of parallel beaters arranged so that their arcs of rotation intersect to beat the fibrous material apart and open it up to reduce its density while assisting in transmitting the material through the machine.

Another object of this invention is to provide a machine of the character described which has baffles therein for passing the fibrous material being operated upon transversely from one beater shaft to another as the material is forced along the length of the beaters, and also to control the rate of flow of the material through the machine without altering the speed of the beaters.

Another object of this invention is to provide a machine of the character described which has a housing which is shaped to facilitate the most efficient operation of the machine and to assist in controlling the flow of material through the machine and to avoid rolling and spinning of the fibers.

Another object of the invention is to provide a machine of the character described which provides a trap below the point of intersection of the beaters in a quiescent area outside the moving stream of air for collection of heavy foreign matter.

Another object of this invention is to provide a machine of the character described with the interior of the housing and the beaters made of non-sparking materials in order to cut down the fire hazard in the machine.

Yet another object of the present invention is to provide a machine of the character described which has beater blades turned at an angle to fan and propel material forward through the machine while baffles therein retard the forward flow of the material and impart transverse movement thereto.

With these and other objects and advantages in view, which will become more apparent during the course of the following description, the invention consists in the features and combinations hereinafter set forth.

In order to make the invention more fully understood, preferred embodiments thereof have been made the subject of illustration in the accompanying drawings in which:

Figure 1 is a perspective view of the machine of this invention;

Figure 2 is an end elevation of the machine of Figure 1;

Figure 3 is a fragmentary plan view of the machine taken substantially along the line 3—3 of Figure 2;

Figure 4 is a sectional elevation taken on line 4—4 of Figure 3; and

Figure 5 is a diagrammatic plan view of the machine showing the novel direction of flow of material achieved by the machine of this invention.

In its broadest concept, the present invention embodies a machine for opening and cleaning fibrous material comprising a housing having an inlet port at one end and an outlet port at the other end opening into a working chamber. A plurality of parallel beater shafts are mounted for rotation within the housing, and blades set at an angle on the shafts propel and fan the material through the housing. Means are provided for rotating said shafts in the same direction at different speeds. Screens below the shafts and to one side thereof transmit foreign material from within the chamber. A trap is constructed about a quiescent zone defined below the area of intersection of the blades on said parallel shafts in order to retain foreign matter too heavy to pass through the screens. The interior of the housing and the blades are constructed of and mounted on non-sparking metal to cut down the fire hazard within the chamber. Disposed strategically within the chamber are various sets of baffles for controlling the flow of material through the chamber. Revolving baffles are spaced along each shaft and coact with stationary baffles depending from the interior walls of the housing to prevent the direct longitudinal flow of material through the housing, and a series of adjustable baffles depend from the roof of the housing in order that the rate of flow of material through the chamber may be altered as desired without changing the speed of rotation of the beater shafts. It is contemplated that the blades on the shafts be set at an angle to fan and propel the material through the chamber.

Referring to the drawings, Figure 1 shows an aerating blooming and cleaning machine of this invention, generally designated as 10. This machine comprises a framework 11 having longitudinal angle members 12 and vertical angle members 13. Base plates 14 support the machine on the floor. At the right hand end of the machine is an end panel 15 and at the left end is an end panel 16, both preferably made of sheet metal. A top panel 17 forms the roof of the housing, and a one piece inspection panel 18 has handles 19 thereon so that it may be easily removed for inspecting the interior of the housing. At the right end of the machine is an inlet port 20 and at the left end is an outlet port 21. The inlet port is defined by a housing 22 and a chute 23 which leads into the interior of the housing through the inspection panel at 24. Bolted brackets 25 secure the chute 23 to the machine. The outlet end of the machine is defined by a housing 26 and a chute 27, the housing 26 being secured to the end panel 16 by screws passing through a flange 28. The lower front of the housing has a panel 30 which is pivoted about a rod 31 secured in either end of the housing by a bracket 32. The rod 31 is positioned about three-quarters of the way down from the top of the panel so that said top will swing down and out as the bottom comes up. Bolts 33 prevent the panel 30 from pivoting about the rod 31 when it is desired to keep the panel in closed position. Above panel 30 is a fixed side panel 34.

Disposed beneath the housing of the machine 10 is a screw conveyor 40 enclosed within a casing 41. At the right end of the machine is a screw conveyor outlet 42.

Passing transversely through the housing are two parallel beater shafts, a front shaft 50 and a rear shaft 51. Also emerging from the left end of the housing is a shaft 52 at the end of the screw conveyor 40. In order to drive these shafts an electric motor 53 is provided which is mounted upon a stand 54 having a base plate 55 and rigidly attached to the machine 10 by bars 56. Connecting the electric motor 53 to the aforementioned shafts 50, 51 and 52 are a series of reduction pulleys generally designated as 57. A main drive pulley 58 at the inner end of the electric motor drives belts 59 and 60 for turning pulley wheels 61 and 62 of the front and rear beater shafts 50 and 51 respectively. Inwardly of the shaft 51 is a small driving wheel 63 from which a belt 64 runs to an idler pulley wheel 65 on a shaft 66. The inner end of shaft 66 is journalled in the housing and on the immediate outer side of panel 16 is a pulley 67, which through belt 68 drives the pulley wheel 69 secured to the end of the shaft 52.

Figure 2 shows a view of the right end of the machine of this invention. Shown within the inlet of the machine is an inlet impeller fan 70 for driving fibrous material introduced into the machine up through the chute 23 over the upper corner of the machine and down through the front inspection panel. The impeller fan 70 is driven from the end of the beater shaft 51. This view also shows the outlet end 42 of the screw conveyor mechanism. The outlet 42 is T-shaped with ports 71 opening to the right and left. A bracket 72 is bolted to the end of the conveyor casing 41 for bearing the end of the conveyor shaft 52. At the top of the casing 41 where it extends beyond the panel 15 of the machine is a hinged inspection cover 73.

As shown in Figure 3, interiorly of the machine 10 is a chamber 80 through which drive shafts 50 and 51 extend in parallel relationship. Mounted on transverse cross members 81 and 82 are bearings 83 at either end of the housing to which are journalled for rotation the beater shafts. Within the chamber where the beater shafts pass through the side panels are cone shaped shields 84 which are designed to keep the material being operated upon within the machine from raveling where the shaft goes through the end panels and from creating heavy friction which might cause fire. As shown, these cones 84 rotate within stationary discs 85. Toward the left end of the shaft 50 where it passes through the panel 16 there is no shield 84 because of the opening 86 leading to the outlet 21 of the machine.

Within the housing 26 secured to the panel 16 about the opening 86 is an outlet impeller fan 87 which serves to drive material accumulating at this end of the machine through the outlet 21 by way of a chute 27. It will be noticed that this impeller fan 87 is driven directly from the beater shaft 50 in the same manner that the impeller fan 70 was driven from the right hand end of the shaft 51. Secured to the beater shafts 50 and 51 are castings 88 preferably made of a cast alloy bronze, aluminum, or other non-sparking metal. Mounted on radial arms 89 of the castings 88 are beating, fanning and propelling blades 90 which are preferably made of alloy bronze or other non-sparking metal. These blades 90 are pitched to mechanically propel and to fan the material together with the air introduced into the chamber longitudinally of the chamber and toward the outlet end thereof. The blades 90 on the far left hand end of the shaft 51 are preferably pitched in the opposite direction to keep material from crowding into the far corner 91. It should also be appreciated here that if a batch of material introduced into the machine is unusually light that the pitch of the blades could be changed on every other casting so as to further retard the flow of material through the machine. Reinforcing rods 92 run the length of the beater shafts and are bolted to the castings at 93 to make all of the castings rigid with respect to each other and prevent play between the castings on the shafts.

Figure 4 shows the details of some of the most important structural features of the machine of this invention. Within the housing and defining the lower extremities of the working chamber are concave longitudinal screens, a front screen 100 and a rear screen 101. These screens may be made of stainless steel or other non-sparking metal to cut down fire hazards within the chamber. The front screen has its forward edge bolted to the panel member 12 by a bolt 102. On the inside of panel 16 at the left end of the machine is a bracket 103 which is riveted to the panel at points 104. Extending longitudinally of the housing from the bracket 103 are two parallel spaced longitudinal channel members 105. These channels run the full length of the machine and the inner edges of each of the concave screens 100 and 101 are bolted to these panels by bolts 106. The rear edge of screen 101 is secured to the housing frame by being bolted to channel member 107 by bolts 108. This channel, it will be noticed, is disposed away from a rear panel 109 of the housing and runs longitudinally thereof. A depending side screen 110 at the rear of the machine is secured at the rear of the machine and spaced from the panel 109. This screen is secured to panel 107 along its lower edge and is turned back at its top edge and bolted to the top frame at channel member 111 by bolt 112. This side screen gives about one third more screened area through which foreign matter may be transmitted from inside the working chamber. This screen may also be constructed of stainless steel or other non-sparking metal to diminish fire hazards.

The panel 109 is actually a slidable door positioned at the back of the machine so that one may get at the interior of the machine from that point if desired. This panel has a curved flange along the top edge thereof which is hooked over the outer edge of channel member 111 and has a lower outward flange resting on a cross channel member 113 at the rear of the machine. Also attached to this cross panel member is a rear inwardly extending side panel 114.

Between the inner edges of screens 100 and 101 is a longitudinal trough 115 which is strategically positioned in a quiescent area of the working chamber directly below the area of intersection of the beater shafts so that foreign matter which is too large or too heavy to pass through any of the screens may accumulate in this trough without

being continually beat around in the machine where it may damage the various parts thereof or maybe even cause a fire. Of course the less heavy or smaller foreign matter passes through the screens and runs down the slanting panels **30** and **114** where it is piled on and above the screw conveyor. In order to remove the foreign matter from trough **115** the bolts **33** are loosened on rod **31** and panel **30** is swung down from the top so that the bottom edge thereof comes up to meet the forward edge of the trough **115** so that the foreign matter therein can be removed without it contaminating the less heavy foreign matter. In this connection, it should be noted that the back panel **114** is not hinged, but that it may be pulled upwardly and removed from the lower flange of the panel member **113**.

Spaced at predetermined intervals along each shaft are revolving baffles **120** and **121**. These baffles are secured to the face of a casting **88** so that they will revolve with the beater shafts. Coacting with the revolving baffles on the front beater shaft **50** are stationary baffles **122** and **123**. Stationary baffle **122** extends inwardly from the one piece inspection panel **18**, and baffle **123** depends from roof panel **17** of the machine directly over the top of the revolving baffle **120**. The baffles **120**, **122** and **123** are all three positioned with respect to each other to form a continuous obstacle to the forward flow of material longitudinally of the shaft **50**. Adjacent the roof in the rear of the machine are a series of adjustable baffles **124**. Each of these baffles are attached to a shaft **125** which passes through the roof of the housing and is retained in position thereabove by retaining nut **126**. A crank arm **127** connects the shaft **125** and its baffle **124** to a rod **128** through bolt **129**. The crank arm is pivotally connected to the rod **128** so that all the baffles **124** may be adjusted in unison. Means, not shown, also are provided for locking the baffles **124** in any desired position.

Having described the machine in considerable detail, its operation may be understood more readily by reference to the diagrammatic drawing of Figure 5. This drawing shows the flow of fibrous material through the machine and in particular points out the effect of the various baffles and beater blades on this flow. Fibrous material to be worked upon is introduced at the inlet **20**. The impeller fan **70** immediately draws the material together with a large amount of air into the center of the fan and expels it up through the chute **23** and drops the material onto the top of the beater shaft **50** at the right hand end of the machine from above the working chamber of the machine. The shaft itself, in addition to its mechanical propelling action, blows the material like a fan by dragging the material down toward the center of the shaft whereupon the centrifugal force of the blades and the force of the air throws the material radially and outwardly. Of course, since the limits of the working chamber do not extend far beyond the area of rotation of the beater shafts, the material cannot find any point of rest within the machine for any length of time, for it is quickly caught up again and the same action is repeated. Since both beater shafts are rotating in the same direction, material which finds itself in the space intermediate the two shafts is given an extra heavy working over.

Aside from this activity which takes place transversely of the machine at any given point, the material is forced longitudinally of the machine toward the outlet end by the combined action of the blowing of the inlet fan, the sucking of the outlet fan and the fanning and propelling action of the angularly disposed blades on the beater shafts. However, the material cannot move longitudinally of the machine for any substantial distance before it meets one of the revolving baffles **120** and its associated baffles **122** and **123**. On reaching these baffles the material, unable to move forward, but nevertheless being pushed in a forward direction, can only move transversely of the beater shaft and is therefore thrown over into the area of rotation of the beater shaft **51**. The arrows in Figure 5 show how the material flows in and around the working chamber. In general, the material moves forward and circulates about the front beater shaft and then is thown transversely of the chamber into the rear beater shaft. This transverse movement is very important to the cleaning and blending of fibrous materials within the machine. The material then moves longitudinally of the rear beater shaft while it is being agitated circularly until it comes upon a revolving baffle **121** on this shaft. From this point it is thrown transversely into the front beater shaft and continues generally down that shaft while being agitated circularly until it hits another revolving baffle **120**, etc.

While the material is moving down along the rear beater shaft, it is impeded by the positioning of the adjustable baffles **124**. This tends to retard the general rate of flow of material through the machine, as shown by the arrows, and throw the material in a direction back along the shaft from which it has just come. These adjustable baffles **124** add a sensitive control mechanism for the machine. By turning these baffles to the rear as shown by the dotted lines they will further retard the flow of material forward through the machine. These baffles, in the position designated, act especially upon the material which is heaviest by comparison, by the centrifugal action of the beaters forcing it again forward to be further acted upon by the beaters or until the size of the fibre groups and the density of the material is such that it can be conveyed by the air currents in the housing. The flow of the material may be speeded up by turning the baffles angularly in the reverse direction. Of course, it is desired to slow up the rate of flow of material through the machine when the material being operated upon is particularly dense or unusually dirty, or both. When the material comes to the left hand end of the chamber, the reversing of the blades on the last casting of the beater shaft **51** slows the material down at that point, keeping it out of the far corner **91** and enabling it to run into the flow of material going through the outlet **86**.

The invention having been described in its preferred form, it will be understood that various changes may be made such as in the size, shape and arrangement of parts or by the substitution of equivalents without departing from the spirit thereof. Therefore, the invention is not limited to the formal uses shown except to the extent indicated in the appended claims which are to be interpreted as broadly as the state of the art will permit.

I claim:

1. A machine for opening and cleaning fibrous material comprising a housing having an inlet at one end and an outlet at the other end, an inlet fan for introducing the material into the housing, an outlet fan for forcing material out of the housing, a plurality of parallel beater shafts within said housing and running longitudinally thereof from the inlet to the outlet end of the housing, blades set at an angle on said shafts to propel and fan the material through the housing, the blades on one shaft intersecting the area of rotation of the blades on the other shaft, means for rotating said shafts in the same direction at different speeds, rotary baffles positioned on each shaft at intervals to divert the flow of material transversely of said shafts, said rotary baffles on one shaft being in a series longitudinally displaced from the rotary baffles on the other shaft in order to alternately force the material from the vicinity of one shaft to the vicinity of the other as the material progresses longitudinally of the housing, stationary baffles fixed inside the housing to complement the action of the rotary baffles, a series of adjustable baffles attached inside the housing to control the rate of flow of material longitudinally of the housing, screens below the shafts and to the side thereof for transmission of foreign material therethrough, a trap formed about a low pressure area defined below the area of intersection of the blades for retaining foreign matter too large to pass through the screens, the interior of the housing and said blades being constructed of non-sparking metal to prevent sparking therein.

2. A machine for opening and cleaning fibrous material comprising a housing having an inlet at one end and an outlet at the other end, an inlet fan for introducing the material into the housing, an outlet fan for forcing material out of the housing, a plurality of parallel beater shafts within said housing and running longitudinally thereof from the inlet to the outlet end of the housing, blades set at an angle on said shafts to propel and fan the material through the housing, the blades on one shaft intersecting the area of rotation of the blades on the other shaft, means for rotating said shafts in the same direction at different speeds, rotary baffles positioned on each shaft at intervals to divert the flow of material transversely of said shafts, said rotary baffles on one shaft being in a series longitudinally displaced from the rotary baffles on the other shaft in order to alternately force the material from the vicinity of one shaft to the vicinity of the other as the material progresses longitudinally of the housing, stationary baffles fixed inside the housing to complement the action of the rotary baffles, a series of adjustable baffles attached inside the housing to control the rate of flow of material longitudinally of the housing, screens below the shafts and to the side thereof for transmitting foreign material therethrough, a trap formed about a low pressure area defined below the area of intersection of the blades for retaining foreign matter too large to pass through the screens.

3. A machine for opening and cleaning fibrous material comprising a housing having an inlet at one end and an outlet at the other end, an inlet fan for introducing the material into the housing, an outlet fan for forcing material out of the housing, a plurality of parallel beater shafts within said housing and running longitudinally thereof from the inlet to the outlet end of the housing, blades set at an angle on said shafts to propel and fan the material through the housing, the blades on one shaft intersecting the area of rotation of the blades on the other shaft, means for rotating said shafts in the same direction at different speeds, rotary baffles positioned on each shaft at intervals to divert the flow of material transversely of said shafts, said rotary baffles on one shaft being in a series longitudinally displaced from the rotary baffles on the other shaft in order to alternately force the material from the vicinity of one shaft to the vicinity of the other as the material progresses longitudinally of the housing, stationary baffles fixed inside the housing to complement the action of the rotary baffles, a series of adjustable baffles attached inside the housing to control the rate of flow of material longitudinally of the housing, screens below the shafts and to the side thereof for transmitting foreign material therethrough.

4. A machine for opening and cleaning fibrous material comprising a housing having an inlet at one end and an outlet at the other end, an inlet fan for introducing the material into the housing, an outlet fan for forcing the material out of the housing, a plurality of parallel beater shafts within said housing extending longitudinally thereof from the inlet to the outlet end of the housing, blades on said shafts, the blades on one shaft intersecting the area of rotation of the blades on the other shaft, means for rotating said shafts in the same direction at different speeds, rotary baffles positioned on each shaft at intervals to divert the flow of material transversely of said shafts, said rotary baffles on one shaft being in a series longitudinally displaced from the rotary baffles on the other shaft, a series of adjustable baffles attached inside the housing to control the rate of flow of material longitudinally thereof, screens below the arc of rotation of each shaft.

5. A machine for opening and cleaning fibrous material comprising a housing having an inlet at one end and an outlet at the other end, an inlet fan for introducing the material into the housing, an outlet fan for forcing the material out of the housing, a plurality of parallel beater shafts within said housing extending longitudinally thereof from the inlet to the outlet end of the housing, blades on said shafts, the blades on one shaft intersecting the area of rotation of the blades on the other shaft, means for rotating said shafts in the same direction at different speeds, rotary baffles positioned on each shaft at intervals to divert the flow of material transversely of said shafts, said rotary baffles on one shaft being in a series longitudinally displaced from the rotary baffles on the other shaft, and screens below the arc of rotation of each shaft.

6. A machine for opening and cleaning fibrous material comprising a housing having an inlet at one end and outlet at the other end, an inlet fan for introducing the material into the housing, an outlet fan for forcing the material out of the housing, a plurality of parallel beater shafts within said housing extending longitudinally thereof from the inlet to the outlet end of the housing, blades on said shafts, the blades on one shaft intersecting the area of rotation of the blades on the other shaft, means for rotating said shafts in the same direction at different speeds, rotary baffles positioned on each shaft at intervals to divert the flow of material transversely of said shafts, stationary baffles carried by and extending inwardly from the housing adjacent one of said shafts and respectively positioned to coact with the rotary baffles on said last-named shaft, to form a substantially continuous obstacle to the flow of material longitudinally of that shaft, a series of angularly adjustable baffles attached inside the housing adjacent the other shaft, means for adjusting the pitch of said last-named baffles to control the rate of flow of material longitudinally thereof, and screens below the arc of rotation of each shaft.

7. A machine for opening and cleaning fibrous material comprising a housing having an inlet at one end and an outlet at the other end, a plurality of parallel beater shafts within said housing and running longitudinally thereof from the inlet to the outlet end of the housing, blades set at an angle on said shafts to propel and fan the material through the housing, the blades on one shaft intersecting the area of rotation of the blades on the other shaft, means for rotating said shafts in the same direction at different speeds, rotary baffles positioned on each shaft at intervals to divert the flow of material transversely of said shafts, said rotary baffles on one shaft being in a series longitudinally displaced from the rotary baffles on the other shaft in order to alternately force the material from the vicinity of one shaft to the vicinity of the other as the material progresses longitudinally of the housing, stationary baffles fixed inside the housing to complement the action of the rotary baffles, a series of adjustable baffles attached inside the housing to control the rate of flow of material longitudinally of the housing, and screens below the shafts and to the side thereof for transmitting foreign material therethrough.

8. A machine for opening and cleaning fibrous material comprising a housing having an inlet at one end and an outlet at the other end, a plurality of parallel beater shafts, blades on said shafts, the blades on one shaft intersecting the area of rotation of the blades on the other shaft, means for rotating said shafts, and rotary baffles placed at intervals on each shaft to turn and divert the flow of material transversely of said shafts, said rotary baffles on one shaft being in a serious longitudinally displaced from the rotary baffles on the other shaft in order to alternately force the material from the arc of rotation of one shaft to the arc of rotation of the other as the material progresses longitudinally of the housing from the inlet to the outlet.

9. A machine for opening and cleaning fibrous material comprising a housing having an inlet at one end and an outlet at the other end, a plurality of parallel beater shafts within said housing and running longitudinally thereof from the inlet to the outlet end of the housing, blades set at an angle on said shafts to propel and fan the material through the housing, the blades on one shaft intersecting the area of rotation of the blades on the other shaft, means for rotating said shafts in the same direction at different speeds, rotary baffles posi-

tioned on each shaft at intervals to divert the flow of material transversely of said shafts, said rotary baffles on one shaft being in a series longitudinally displaced from the rotary baffles on the other shaft in order to alternately force the material from the vicinity of one shaft to the vicinity of the other as the material progresses longitudinally of the housing, stationary baffles fixed inside the housing to complement the action of the rotary baffles, a series of angularly adjustable baffles attached inside the housing, means to adjust the pitch of said last-named baffles to control the rate of flow of material longitudinally of the housing, and screens to one side of the shafts for transmitting foreign material therethrough.

10. A machine for opening and cleaning fibrous material comprising a housing having an inlet at one end and an outlet at the other end, a plurality of parallel beater shafts within said housing and running longitudinally thereof from the inlet to the outlet end of the housing, blades set at an angle on said shafts to propel and fan the material through the housing, the blades on one shaft intersecting the area of rotation of the blades on the other shaft, means for rotating said shafts in the same direction at different speeds, rotary baffles positioned on each shaft at intervals to divert the flow of material transversely of said shafts, said rotary baffles on one shaft being in a series longitudinally displaced from the rotary baffles on the other shaft in order to alternately force the material from the vicinity of one shaft to the vicinity of the other as the material progresses longitudinally of the housing, stationary baffles fixed inside the housing to complement the action of the rotary baffles, a series of angularly adjustable baffles attached inside the housing, means to adjust the pitch of said last-named baffles to control the rate of flow of material longitudinally of the housing, and screens below the shafts for transmitting foreign material therethrough.

11. A machine for opening and cleaning fibrous material comprising a housing having an inlet at one end and an outlet at the other end, a plurality of parallel beater shafts within said housing and running longitudinally thereof from the inlet to the outlet end of the housing, blades set at an angle on said shafts to propel and fan the material through the housing, the blades on one shaft intersecting the area of rotation of the blades on the other shaft, means for rotating said shafts in the same direction at different speeds, rotary baffles positioned on each shaft at intervals to divert the flow of material transversely of said shafts, said rotary baffles on one shaft being in a series longitudinally displaced from the rotary baffles on the other shaft in order to alternately force the material from the vicinity of one shaft to the vicinity of the other as the material progresses longitudinally of the housing, stationary baffles fixed inside the housing to complement the action of the rotary baffles, a series of angularly adjustable baffles attached inside the housing, means to adjust the pitch of said last-named baffles to control the rate of flow of material longitudinally of the housing.

12. A machine for opening and cleaning fibrous material comprising a housing having an inlet at one end and an outlet at the other end, a plurality of parallel beater shafts within said housing and running longitudinally thereof from the inlet to the outlet end of the housing, blades set at an angle on said shafts to propel and fan the material through the housing, the blades on one shaft intersecting the area of rotation of the blades on the other shaft, means for rotating said shafts in the same direction at different speeds, rotary baffles positioned on each shaft at intervals to divert the flow of material transversely of said shafts, said rotary baffles on one shaft being in a series longitudinally displaced from the rotary baffles on the other shaft in order to alternately force the material from the vicinity of one shaft to the vicinity of the other as the material progresses longitudinally of the housing, stationary baffles fixed inside the housing to complement the action of the rotary baffles, a series of adjustable baffles attached inside the housing to control the rate of flow of material longitudinally of the housing, screens below the shafts and to one side thereof for transmitting foreign material therethrough, and a trap formed below the area of intersection of the blades and out of the normal line of movement of material, for retaining foreign material too large to pass through the screens.

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