April 21, 1931. M. GOLDBERG 1,802,249

MACHINE FOR PROCESSING FIBROUS FILLING MATERIALS

Filed May 8, 1929 5 Sheets-Sheet 1

Fig. 1.

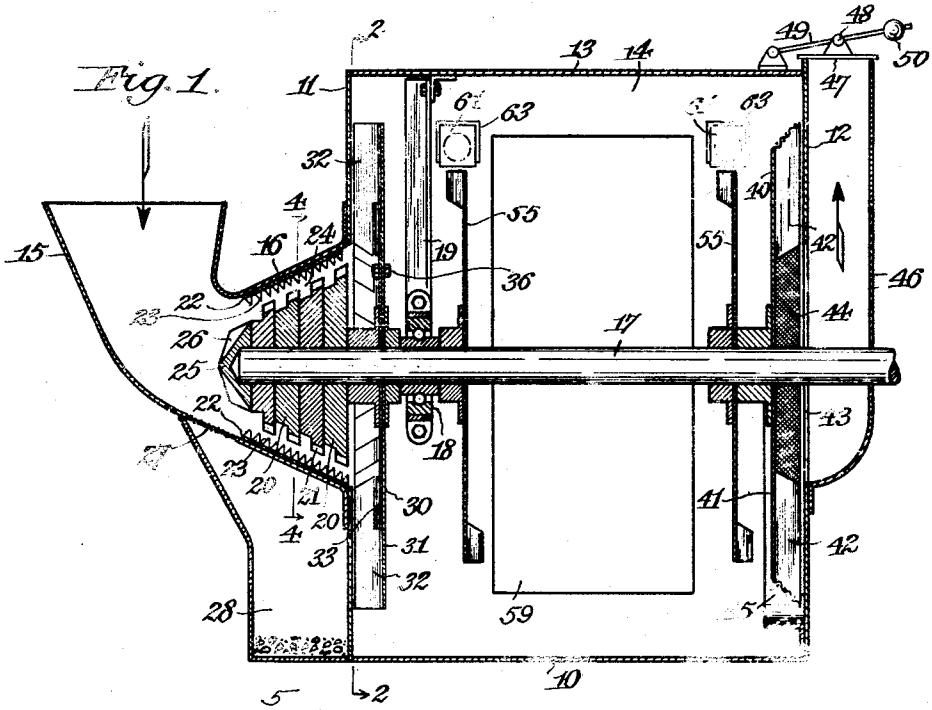
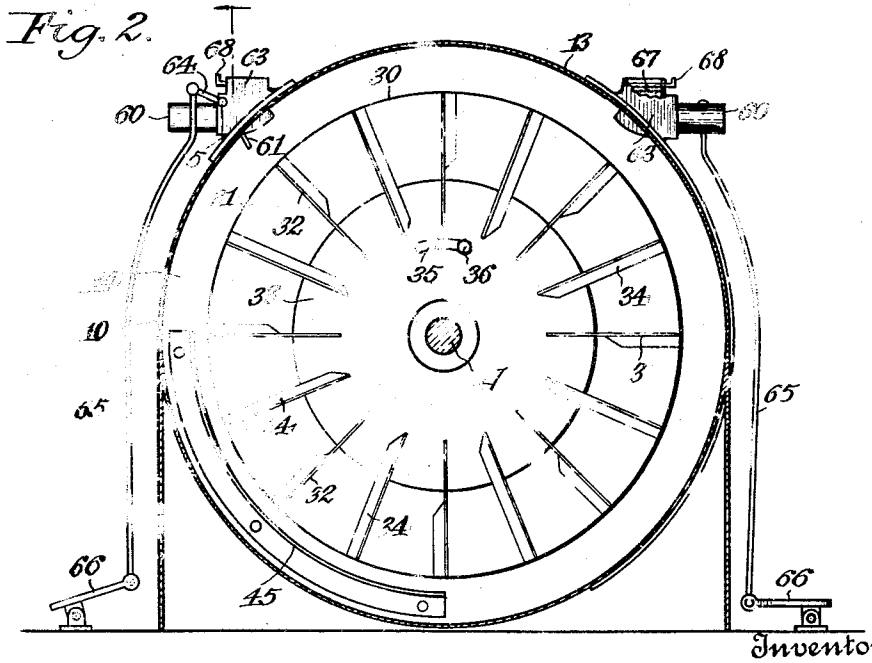


Fig. 2.



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Fig. 3.

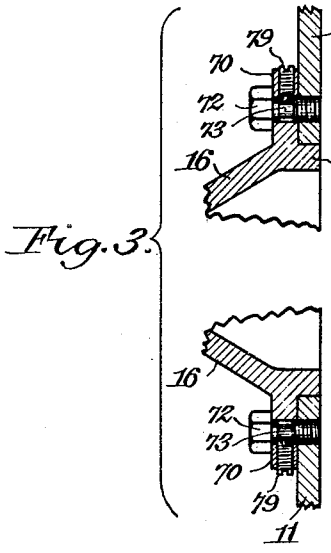
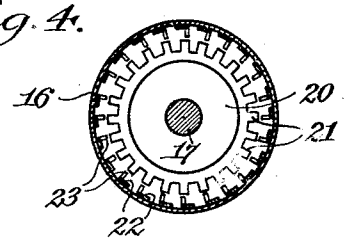


Fig. 6.

Fig. 4.



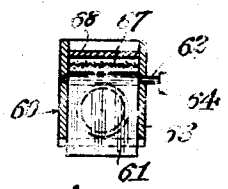


Fig. 5

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MACHINE FOR PROCESSING FIBROUS FILLING MATERIALS

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Fig. 8.

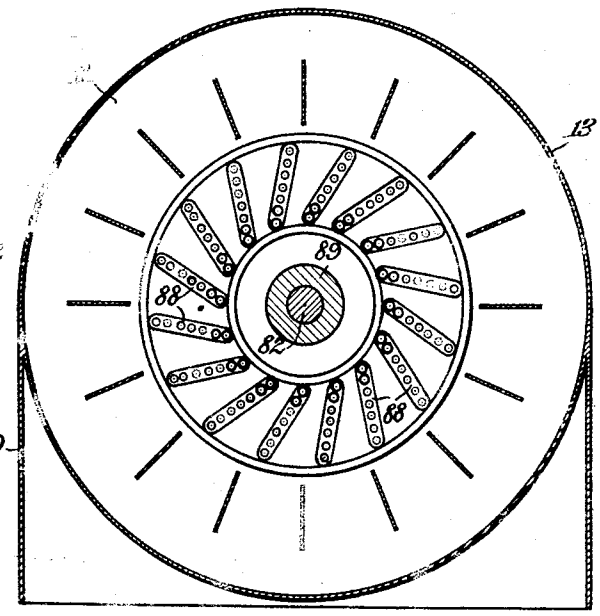


Fig. 7.

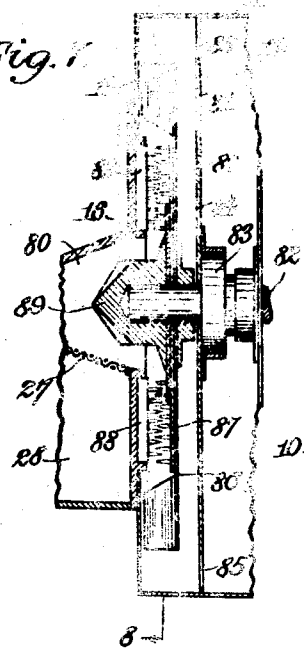
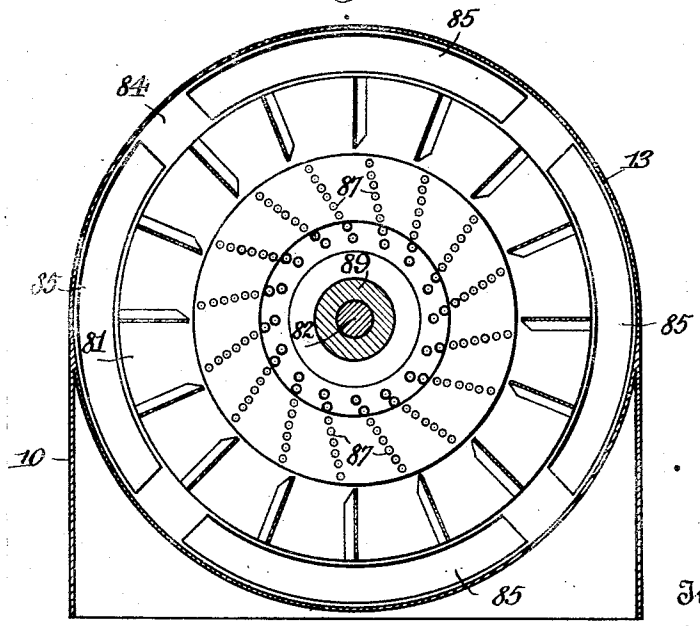


Fig. 9.



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Patented Apr. 21, 1931 1,802,249

UNITED STATES PATENT OFFICE

MAX GOLDBERG, OF NEW YORK, N. Y.

MACHINE FOR PROCESSING FIBROUS FILLING MATERIALS

Application filed May 8, 1929. Serial No. 361,466.

This invention relates to a machine for processing fibrous materials such as are used for filling mattresses, pillows, comforters, cushions, and the like.

More particularly the invention relates to the type of machine disclosed in my allowed application filed September 23, 1927, and having Serial No. 221,516.

The machine of the present invention, unlike that disclosed in the said application utilizes pressure means for augmenting the movement of the materials to be processed through a picker unit, and also for building up air pressure within a chamber or compartment of the machine which receives the material from the picker unit, in which chamber or compartment, the processing action is continued, and results in a more finely divided and aerated product. The machine is designed and adapted to handle material such as cotton, feathers, jute, and similar materials. The materials are delivered to the machine in a compact and lumped mass. The materials in this condition are first broken up and are subjected to a picking action to separate the fibers into the original loose state. The material in the loose state is then subjected to a heating or fluffing action in the chamber therefor forming a part of the machine. The material is also subjected to a current of fresh air to produce a filling product which will be in a sanitary, aerated and thoroughly divided state, desirable in good filling materials.

The principal object of the invention is the provision of a machine embodying improved features of construction and operation by virtue of which the materials will be subjected to a number of processes, among which may be enumerated the following, namely, picking and fluffing or beating the material, removing or separating dust and foreign substances therefrom, aerating the materials, and discharging the materials under air pressure from the machine into different articles such as mattresses, pillows and enclosures in general, for the purpose of filling the same.

Another object of the invention is the provision of a machine which will be simple and compact, in which the correlated processing mechanisms are mounted on the same shaft, together with other novel features, whereby the intensity and fineness of the processing may be varied by simple adjustments.

Another object of the invention is the provision in a machine of the indicated character of an annular type of picker unit and a diffuser, which latter serves to remove seeds, pebbles and other foreign substances from the materials to be processed, and which protects the picker unit from damage.

Another object of the invention is the provision in a machine of the indicated character, means whereby the material may be fed substantially at the axis of an annular picker unit at one end of the machine and the material is subjected to a beating action causing movement thereof in a circulatory course into a storage chamber or compartment wherein it is continuously agitated and kept in suspension, and from which chamber or compartment it is forcibly ejected through one or more nozzles into articles to be filled.

With these and other objects in view, the invention resides in the arrangement and combination of means for carrying out the correlated processes and in the particular provision, construction and operation of the parts hereinafter described and claimed. It is to be understood, however, that the several forms of the invention disclosed are merely illustrative, and in no sense restrictive, and that such changes and modifications which are deemed desirable or necessary may be made without departing from the spirit of the invention as expressed in the appended claims.

In the drawings—

Figure 1 is a central vertical longitudinal sectional view of a machine embodying the features of the present invention.

Fig. 2 is a transverse sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary sectional view of one of the details.

Fig. 4 is a transverse sectional view taken on the line 4—4 of Fig. 1.

Fig. 5 is an enlarged detail sectional view taken on the line 5—5 of Fig. 2.

Fig. 6 is a side elevation of the machine,

partly in section showing a modified form of automatic pressure regulator and dust screen at the top of the casing.

Fig. 7 is a sectional view of a modified form of picker unit.

Fig. 8 is a sectional view taken on the line 8—8 of Fig. 7, looking in the direction indicated by the arrows.

Fig. 9 is a view similar to Fig. 8 looking in the opposite direction.

Referring now more particularly to Figs. 1 and 2, it will be apparent that the machine of the present invention includes a casing 10 having end walls 11 and 12, and a circular wall 13 which defines a chamber or compartment 14. A hopper 15 formed on or secured to a housing 16 supported by the end wall 11 provides an inlet through which the material to be processed is fed into the chamber or compartment 14. A shaft 17 is preferably supported to extend through the chamber or compartment 14 and to project into the housing 16 by suitable bearings. One end of the shaft 17 is supported by an anti-friction and self-aligning type of bearing 18 which is preferably carried by a vertical hanger 19 suspended from the wall 13 of the casing 10. This provision for suspending the bearing prevents any material from collecting around the hanger and shaft, thereby averting ignition of the material due to friction caused by revolving parts against the stationary material which would collect on unsuspended bearings. The opposite end of the shaft 17 will be preferably supported by a bearing, not shown, outside of the casing 10.

The shaft 17 as stated projects into the housing 16 beyond the bearing 18 a suitable distance in order to support one of the elements of a picker unit presently to be described.

The picker unit employed in the present instance consists of a substantially circular rotor and an annular stator with which the rotor cooperates. The picker rotor is mounted on the projecting end of the shaft 17 and is composed of a plurality of sections 20 each of which has picker members 21. The object of dividing the picker rotor into sections is to provide convenient means for increasing or diminishing the length of the rotor and number of picker members, to the end that an increased or decreased picking effect may be obtained to suit the particular material to be processed. The sections 20 are of successively increasing diameter. The picker stator is composed of a plurality of picker sections or bars 22, each having picker members 23. The bars 22 are arranged on the inside of the housing 16, and said bars are secured thereto in any suitable manner. It will therefore be understood that the working surfaces of the bars 22 are substantially parallel to the working surfaces of the picker rotor, and that the picking members 21 of the rotor and the picking members 23 of the stator are disposed in cooperating relation so as to act on the material as it passes through an annular inlet passage 24 into the chamber or compartment 14. Keyed to the extremity of the shaft 17 so as to be disposed at the throat of the hopper 15 is a material diffuser 25. The said diffuser has radial projections or serrations 26 which serve to spread the material, to break up lumps, and to throw off pebbles, seeds, and other foreign matter which pass through a screen 27 positioned at the bottom of the hopper into a waste box or receptacle 28. The diffuser 25 and rotor picker sections 20 form the picker rotor, and the stator picker sections or bars 22 constitute the stator of the picker which cooperates with said rotor to set up a thorough picking action on the material.

The material to be processed is fed substantially at the axis of the picker, and moves radially in a spiral path from the smaller to the larger periphery of the picker. Due to the gradually increasing radii of the successive picker sections, the materials are thrown outwardly by the increasing centrifugal force imparted thereto thereby causing the material to pass along more readily into the chamber or compartment 14.

On reference to Figs. 1 and 2, it will be apparent that there is mounted on the shaft 17, within the chamber or compartment 14, and adjacent the outlet end of the passage 24 and near the end wall 11, a variable pressure fan 30 which cooperates with means to be described, to produce a pressure in the chamber or compartment 14. This fan 30 also serves to augment the movement of the material through the passage 24 formed by the picker sections and into the chamber or compartment 14. The fan 30 is of duplex construction, and comprises a large disk 31 having radialy disposed blades 32 spaced equidistantly around the disk and a small disk 33 having radially disposed blades 34 spaced equidistantly around the same. The disk 31 is fixedly mounted on the shaft 17. The disk 33 is freely rotatable on the shaft 17 in cooperative relation to the disk 31. The rotatable fan disk 33 is provided with a concentric slot 35 which accommodates a bolt or like fastening element 36 carried by the fixed fan disk 31. It will therefore be understood that the fan disk 33 may be rotated with respect to the fan disk 31, and that both may be fastened together in any desired relative position. It will be observed that the blades 32 of the fan disk 31 extend from the outer peripheral edge radially inward over or beyond the outer peripheral edge of the fan disk 33. It will also be observed that the blades 34 of the fan disk 33 project radially outward over the disk 31 to the outer peripheral edge thereof. Thus the effective working surfaces of the blades of both fan disks

are substantially the same. It will also be noted that the fan disk 33 may be rotated relatively to the fan disk 31 to bring the blades thereof into abutting engagement with the blades of the disk 31. When said blades are in the abutting relationship, the effective number of blades is thus reduced to the number of blades on one disk, and the air pressure produced by such adjustment will be low. When processing materials such as kapok or down, low pressure is desirable, and it will therefore be obvious that the setting of the fan blades in the abutting relation serves advantageously for this purpose. When a high pressure is desired, as is the case when processing cotton, the blades are spaced from each other and set in such relative position that any blade of one fan is equidistantly positioned between two adjacent blades of the other fan, consequently the effective number of blades is then equal to the number of blades on both of the disks 31 and 33 and results in the increased pressure. Any desired pressure between the two limits described may be produced by adjusting the relative positions of the blades 32 and 34 for the purpose of varying the air pressure in the chamber or compartment 14, and also for varying the intensity of the processing action. It will be understood that the fan 30 serves as a mechanical propulsion means as well as an air pressure producing means. A paddle wheel 40 consisting of a disk 41 having radially disposed paddles 42, is secured to the shaft 17 adjacent a dust and air outlet opening 43 in the end wall 12 of the casing 10. The paddle wheel is preferably screened by a revolving screen 44 extending around the peripheral edge of the disk 41 and is disposed between said disk 41 and the end wall 12 of the casing, to enclose the paddles 42. The screen 44 is preferably of conical formation. When the wheel 40 rotates, the screen 44 serves to centrifugate the material coming in contact therewith and prevents the escape of the materials. The paddles 42 produce a counter pressure slightly less than the minimum air pressure produced by the duplex fan 30, and augments the action of the screen in retaining the materials within the chamber 14. The screen prevents the desired materials from leaving the chamber or compartment 14, while allowing dust and air to pass through the outlet opening 43. In this manner the dust is continuously removed from the materials.

It will be obvious from the foregoing that while the machine is in operation, the fan 30 produces an air pressure within the chamber or compartment 14, and sends a current of dust laden air out of the chamber 14 through the opening 43. The fan 30 also induces a suction action outside of the hopper 15, and it will therefore be understood that a circulation of fresh air takes place through the machine, with the result that the materials are constantly aerated. An arcuate shield 45 secured to the end wall 12 is positioned substantially concentrically with, and a suitable distance from the screen 44 to limit the air flow through a certain area of the screen. Any material which may accumulate on the screen 44 will be thrown off the screen by centrifugal force, and the cooperative effect produced by the shield 45.

In order to regulate the pressure within the chamber 14 there is provided a suitable duct or tube 46 in communication with the opening 43, while the outlet end thereof is controlled by a valve member 47 pivotally connected as at 48 with a lever 49 on the top of the casing 10. A suitable weight 50 on the lever 49 may be adjusted to obtain the desired percentage of dust and air extraction or regulation.

In order to insure a more thorough intermixing and suspension of the materials which remain in the chamber 14 under air pressure, there are provided beaters secured to the disks 55, and these beaters cause the materials to be in a continuous state of agitation. The beaters may be of any preferred construction, and in the present instance they consist of a plurality of arms extending radially from a disk 55 mounted on the shaft 17, as best shown in Fig. 1.

In order to discharge the processed material from the chamber or compartment 14 one or more outlet nozzles 60 may be provided on the wall 13 of the casing. Each nozzle 60 is controlled by a valve member or gate 61 rotatably mounted on a shaft 62 carried by an outlet casing 63. One end of the shaft 62 has an arm 64 preferably connected by a rod 65 with a pedal 66 supported by the floor adjacent the machine. The gate 61 is normally in a closed position and projects into the chamber 14. When the operator presses downwardly on the pedal 66 the gate 61 will be moved to a position allowing the material to pass along the under side thereof through the nozzle. An article such as a pillow, mattress or the like held in receiving position with respect to the nozzle may be readily filled with material from the chamber 14. The spout of each nozzle may be removable from the casing 63 for the purpose of substituting other spouts of different sizes. As shown in Fig. 5, a screen 67 may also be arranged in the casing 63 below a slide 68 positioned above the gate 61. The slide 68 may be moved to an opened position to allow any accumulations of dust in the casing to escape, also any air in the processed material, at the point of ejection in the nozzle. The screen 67 regulates the percentage of dust extraction.

In order to vary the fineness of the processing, means is provided whereby to adjust the relative positions of the cooperating picker

rotor and picker stator. On reference to Fig. 3 it will be apparent that a simple and practical form of means may consist in providing the housing 16 with a flange 70 and a neck 71, the latter fitting in an opening in the end wall 11, with the flange contiguous said wall. Bolts 72 are screwed into tapped holes in the wall 11 and are free to turn in holes in the flange 70. Each bolt 72 has a groove 73 into which a set screw 79 may enter. Each set screw is screwed into the flange 70. This arrangement serves to maintain each bolt 72 in fixed position with relation to the flange 70. It will now be apparent that the bolts 72 may be adjusted, thereby making it possible to shift the position of the housing 16. In this manner the picker sections or bars 22 may be adjusted relatively to the rotor picker sections 20 for the purpose of varying the fineness of the processing action of the picker.

In certain machines it is desirable to substitute a stationary screen in lieu of the rotatable screen 44 and paddle wheel 40 hereinbefore described; such stationary screen, best shown in Fig. 6, is designated 75 and is arranged in an enlargement 76 of the chamber or compartment 14. The enlargement 76 is preferably at the top of said chamber or compartment. The screen 75 allows dust and air to pass from the chamber 14 into the atmosphere through an outlet opening 77, which is controlled by a pressure regulator 78 similar to the one hereinbefore described which functions for a similar purpose.

Referring now to Figs. 7, 8 and 9, it will be apparent that there is shown a modified form of picker which cooperates with a material inlet passage 80 and a pressure fan 81. The fan 81 is rotatable with a shaft 82 supported by a bearing 83 on a partition 84 within the casing 10. The partition 84 has openings 85 to allow material and air to pass therethrough into the chamber 14. The disk 86 has radially disposed groups of picker members 87. The disk 86 together with the picker members 87 serve the same purpose as the disks or rotor sections 20 shown in Fig. 1. The housing 16 has groups of picker members 88. The groups of picker members 87 constitute the rotor, whereas the groups of picker members 88 constitute the stator of the picker. The shaft 82 has secured thereto a diffuser 89 which is disposed in the inlet passage 80.

A suitable door 29 is provided for cleaning out the waste box 28, and another door 59 is provided for the casing 10, for the purpose of cleaning out said casing and for accessibility to all interior parts.

The materials to be processed are usually taken from bales in a lumped or compacted mass and are placed in the hopper 15. The projections or serrations of the diffuser 25 break up the lumps. The foreign substances such as pebbles, seeds, etc., are thrown off by the centrifugal force imparted by the diffuser 25, and find their way through the screen 27 into the waste box 28. The fibers of the material are swept by the rotating picker members 21 past the stationary picker members 23, which further separate the fibers and the lumped materials are thus thoroughly divided substantially into the original loose state. From the picker members the material is forced by the variable pressure fan 30, or a constant pressure fan 81 into the chamber or compartment 14, where the beaters or disks 55 further fluff and mix up the fibers into a uniform, finely divided, clean and desirable filling material which may be removed from the chamber 14 through any one of the nozzles 60, by manipulating the related pedal 66. The beater arms agitate and keep the material in a state of suspension, and also assist in throwing and directing the material toward the nozzles. It will be obvious that one operator may attend each nozzle 60 independently of the other nozzles, while one attendant feeds the machine. Consequently the machine may have a number of nozzles operated simultaneously and process a comparatively large amount of material during a given period of time.

When the processed material is ejected into pillows, or the like, made of porous fabrics, the operator closes the slide 68 of the related nozzle, and allows all the air to enter the pillow or the like. The pressure regulator member 47 is set to shut off the dust and air outlet 46, when the nozzles are opened, and the air pressure in the chamber 14 drops to a predetermined pressure. When the nozzles are closed, the pressure regulator 47 opens the dust outlet 46 the moment the predetermined pressure in the chamber 14 is exceeded. During the periods when the nozzles are closed, the excess air escapes through the dust outlet 46 and takes along the dust. It will therefore be apparent that besides removing the dust from the material it is also aerated and therefore put into a sanitary condition in one continuous process.

The revolving screened paddle wheel is constructed to produce a predetermined pressure in the chamber 14, slightly lower than the minimum pressure produced by the fan 30. When the fan 30 is set to produce the minimum pressure, the weight 50 is moved towards the fulcrum of the lever 49, so that the member 47 will function at the minimum pressure. When the fan 30 is set to produce the maximum pressure, the weight 50 is moved away from the fulcrum of the lever 49, a corresponding distance, so that the member 47 will function only when the desired higher pressure is reached. Any desired intermediate pressure regulation and air flow may be obtained by adjusting the fan disks 31 and 33, and also by adjusting the weight 50. The fineness of the processing may be

varied by adjusting the housing 16 and the relative axial positions of the rotor and stator picker members.

From the foregoing it will be apparent that there has been described an improved processing and filling machine, in which the materials are fed substantially at the axis of an annular picker, and move radially in a spiral path from the smaller to the larger periphery of the picker, thus utilizing the entire 360° of the picking area; that the intensity and fineness of the processing may be varied by simple adjustments; that the processed materials are constantly aerated and cleaned of foreign matter; and that means is provided for filling different articles with the processed and aerated materials.

I claim:

1. In a machine for processing filling materials, a stator housing, a picker interiorly of said housing consisting of a rotor built up of separate detachable disk sections, each having picker members, and an annular stator built up of separate detachable bar sections each having picker members positioned on said housing, the picker members of the rotor sections cooperating with the picker members of the stator sections to set up a picking or mixing action.

2. In a machine for processing filling materals, a stator housing, a picker consisting of a rotor built up of separate disk sections each having picker members, and an annular stator built up of separate bar sections, each having picker members positioned on said housing, the picker members of the rotor sections cooperating with the picker members of the stator sections to set up a picking or mixing action, and means for axially adjusting the stator in relation to said rotor, for the purpose of varying the fineness of the processing.

3. In a machine for processing filling materials, an annular picker comprising a rotor and stator having picker members, the picker members of the rotor cooperating with the picker members of the stator to set up a picking or mixing action, and means for axially adjusting the stator in relation to said rotor, for the purpose of varying the fineness of the processing.

4. In a machine for processing filling materials, a casing having an annular inlet passage at one end thereof, stationary and relatively movable cooperating picker members arranged in said passage, a pressure fan operatively positioned with respect to said annular passage to augment the movement of the processing material through said picker members, said pressure fan having adjustable means for varying the air pressure and the intensity of the processing.

5. In a machine for processing filling materials, a casing having a material rceiving chamber and an annular inlet passage at one end thereof, stationary and relatively movable cooperating picker members arranged in said passage, a pressure fan to augment the movement of the processing material through said picker members, and also for keeping the processed material entering said chamber under air pressure, and one or more valved outlets for discharging the material therefrom at will.

6. In a machine for processing filling materials, a casing having a material receiving chamber and an annular inlet passage at one end thereof, stationary and relatively movable cooperating picker members arranged in said passage, a pressure fan to augment the movement of the processing material through said picker members, and also for keeping the processed material entering said chamber under air pressure, means for agitating and directing the processed material within said chamber, a plurality of outlets for discharging the processed material at will, and means for opening and closing each of said outlets.

7. In a machine for processing filling materials, a casing having a chamber and an annular passage at one end of said chamber, stationary and relatively movable cooperating picker members arranged in said passage, a pressure fan operatively positioned with respect to the annular passage, and means cooperating with said chamber for aerating the material during the processing thereof by said picker members.

8. In a machine for processing filling materials, means for aerating the processed materials, said means comprising a chamber, means for causing an air pressure within the chamber, and a screened outlet for said chamber, said screened outlet having means serving to allow only a predetermined air outflow substantially as described.

9. In a machine for processing filling materials, a projecting shaft supported for rotation on a bearing, an axially-fed picker rotor mounted on the projecting portion of the shaft, a material guide surrounding the rotor and adapted for feeding material endwise to the picker rotor all around the entire inner circumference of the picker rotor substantially as described.

10. In a machine for processing filling materials, a projecting shaft supported for rotation on a bearing, an axially-fed picker rotor mounted on the projecting portion of the shaft, a diffuser mounted on said shaft in advance of said rotor at the inlet end, and a pressure fan mounted at the discharge end of the said picker rotor, substantially as described.

11. In a machine for processing filling materials, a projecting shaft supported for rotation on a bearing, an axially-fed picker rotor mounted on the projecting portion of the shaft, a diffuser mounted on said shaft in

advance of said rotor at the inlet end, and a variable air pressure means mounted at the discharge end of the picker rotor.

12. In a machine for processing filling materials, a casing having a material receiving chamber and an annular inlet passage at one end thereof, stationary and relatively movable cooperating picker members arranged in said passage, a pressure fan positioned within said chamber at the discharge end of the inlet passage, agitating arms within the chamber, means for aerating the processed material, and a plurality of valved outlets for said chamber for discharging the processed material therefrom at will.

13. In a machine for processing filling materials, a casing having an annular inlet passage at one end thereof, stationary and relatively movable cooperating picker members arranged in said passage, a pressure fan in communication with the discharge end of the inlet passage, a chamber opened to the inlet passage, agitating arms within the chamber, means for aerating the processed material, and a plurality of outlets for removing the processed material from said chamber, said outlets each having a removable nozzle at the discharge end, and controlling means to open and shut each nozzle at will.

14. In a machine for processing filling materials, an annular picker, a casing, a pressure fan to augment the movement of the processing material through the picker into said casing and to cause a pressure within said casing, a dust outlet for the casing, means for removing the dust from the processed material within the casing, said means comprising a revolving screened paddle wheel adjacent the dust outlet to centrifugate the material and to prevent the desirable material from escaping while allowing the dust to flow out through the said dust outlet.

15. In a machine for processing filling materials, an annular picker, a casing, a pressure means to augment the movement of the processing material through the picker into said casing and to cause a pressure within said casing, a dust outlet for the casing, means for removing the dust from the processed material within the casing, said means comprising a rotor adjacent the dust outlet to impart a centrifugal force to the processed material in contact with the rotor and to prevent the escape of the material while allowing the dust to flow out, said rotor having a screen all around its periphery.

16. In a machine for processing material, an annular picker, a casing, a pressure means arranged in relation to said picker to augment the movement of the processing material through the picker into said casing and to cause a pressure within said casing, a screened dust outlet for said casing to prevent the processed material from passing through while allowing the dust to flow out, and an adjustable regulating valve automatically operable in conjunction with said outlet to maintain a predetermined pressure within the casing.

17. A machine for processing fibrous materials having the combination of means for initially subjecting the material fed thereto to a breaking and picking action, a chamber which receives the material from the first mentioned means, mechanical and pneumatic means which operates in said chamber to beat the material and to keep it in suspension in said chamber and also to build up air pressure in said chamber, said chamber having material outlets, and an adjustable regulating valve means in communication with said chamber automatically operable to maintain a predetermined pressure within said chamber.

18. A machine for processing fibrous materials having the combination of means for initially subjecting the material fed thereto to a breaking and picking action, a chamber which receives the material from the first mentioned means, mechanical and pneumatic means which operates in said chamber to beat the material and to keep it in suspension in said chamber and also to build up air pressure in said chamber, said chamber having material outlets, said chamber having a dust discharge tube, a screen within said chamber over the inlet end of said tube to separate the dust from the material, and an adjustable regulating valve means in communication with said tube automatically operable to maintain a predetermined pressure within said chamber.

19. In a machine of the class described, a chamber having a material inlet, material outlets and a dust outlet, devices for opening and closing said outlets, a rotary fan within the chamber adjacent the inlet, and a rotary fan within the chamber adjacent the dust outlet, said fans cooperating with said chamber and devices to build up air pressure in said chamber.

20. In a machine for processing filling materials, an annular picker, a material chamber, an air pressure producing means in communication with said chamber to cause an air pressure within said chamber, one or more outlets for removing the processed material from said material chamber, and a device for each outlet to open and close the outlet.

Signed at New York, in the county of New York and State of New York, this 6th day of May, A. D. 1929.

MAX GOLDBERG.