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CLEANING AND RENOVATING APPARATUS

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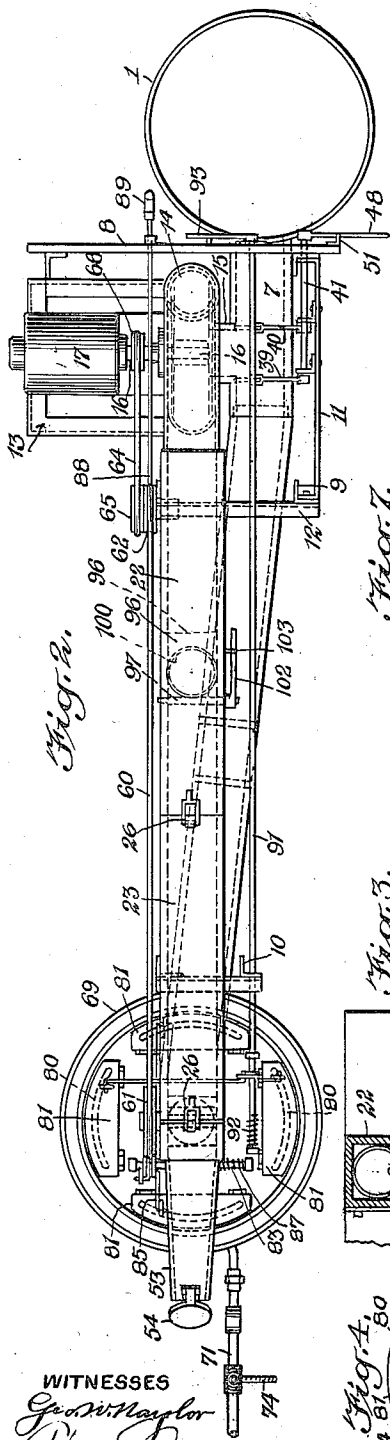


Fig. 2.

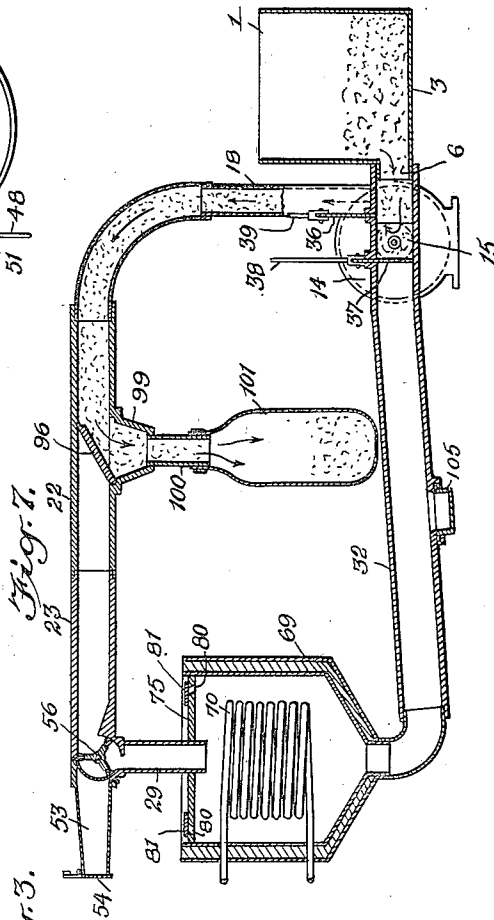
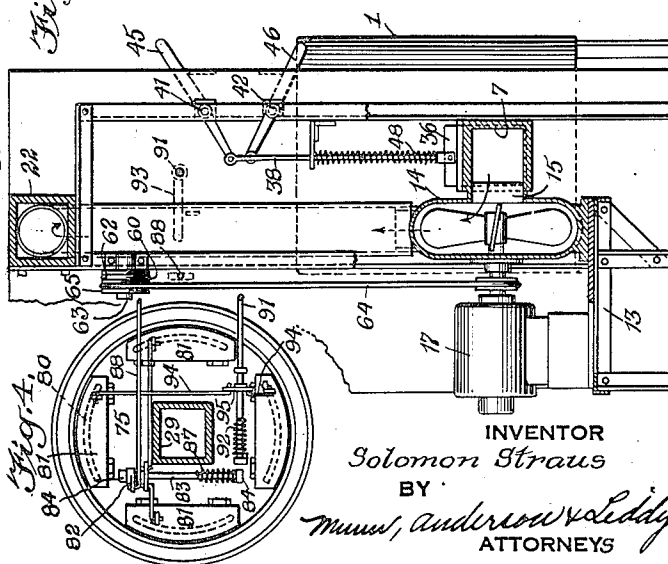


Fig. 3.



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CLEANING AND RENOVATING APPARATUS

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4 Claims. (Cl. 34—44)

The present invention relates to a cleaning and renovating apparatus and more particularly such an apparatus for operating upon feathers and other materials employed as a filler for pillows, mattresses and upholstered cushions of various kinds.

An object of the invention is to provide an apparatus in which feathers or fibrous filling or cushioning material for pillows, mattresses, and similar cushions may be freed from all dust, dirt and foreign matter, loosened up and subjected to the cleansing effect of a blast of air and to the sterilizing action of heated air.

A further object is to provide such an apparatus with means whereby a pillow or other similar cushion may have its contents treated as a single charge from the time it is emptied from the casing into the apparatus until it is finally discharged therefrom into a new casing, the filling material being thoroughly cleansed of all dust, dirt and foreign matter of all kinds, and sterilized, and at the same time restored to its original fluffy and resilient character.

A further object is to provide such an apparatus which may be used for filling pillows or other cushions without subjecting such filling material, whether feathers or other suitable filling material, to the cleansing action or other treatment of such materials in the apparatus.

To the above ends the present invention consists of the improvements in such apparatus as shown and described embodying a hopper to receive the material to be operated on, a conduit leading therefrom, pneumatic means for transporting the material from the hopper into and through said conduit, and a discharge opening for delivering the materials into a pillow or other cushion casing.

It further consists of an improved apparatus wherein a screen and brushes are employed to cleanse the material, and a conduit leading therefrom to return the material for a continuous circulation with suitable valves or dampers controlling the passage of the material through the apparatus; and it further consists of such an apparatus in which a sterilizing and aerating chamber is interposed in the path of travel of the circulating material and which receives the material directly from the brushing and screening elements; and it further consists of the devices and combinations of devices which will be hereinafter described and claimed.

The present invention is shown in the accompanying drawings in which similar reference

characters will be employed to designate corresponding parts.

Fig. 1 shows, partly in elevation but for the greater part in longitudinal vertical section, an apparatus embodying the invention;

Fig. 2 shows a top plan view of the apparatus;

Fig. 3 shows a vertical sectional view taken on the line 3—3 in Fig. 1 and looking in the direction of the arrow on said line 3—3;

Fig. 4 is a top plan view of the sterilizing and aerating chamber, the conduit leading thereto being shown in horizontal section;

Fig. 5 is a fragmentary detail, partly in section, of the upper part of the sterilizing and aerating chamber showing the valves or dampers controlling the admission of atmospheric air thereto opened;

Fig. 6 is a detail showing the manner of temporarily securing the bag or casing of a pillow or other cushion to the discharge spout for refilling; and

Fig. 7 is a longitudinal vertical sectional view, similar to Fig. 1, certain parts being omitted, showing the employment of the apparatus for refilling the casings of pillows and other forms of cushions without subjecting the filling material to the action of the cleansing and sterilizing parts of the apparatus.

The apparatus comprises a hopper 1 supported upon vertical standards 2. As shown, hopper 1 comprises an open cylinder having a bottom 3, preferably made of some light thin metal, and the standards 2 of any suitable material such as the angle-iron strips secured to the depending flange 4 by the rivets 5. Just above the floor level 3 of the hopper there is an opening 6 in the wall leading into a spout 7 extending horizontally from one face of a vertically disposed plate 8. Preferably the spout 7 and plate 8 will be formed integrally, and the spout 7 is preferably rectangular or square in cross section. The plate 8 may be said to constitute a part of the supporting frame which comprises in addition thereto the intermediate vertically extending standards 9 and 10 spaced from each other (as shown in Fig. 1), and plate 8 and standards 9 and 10 are connected by longitudinally extending angle-bars 11 and transversely extending angle-bars 12, all of which constitute a suitable supporting frame for the various parts, as will be hereinafter more specifically described. Between the plate 8 and the upwardly extending standards 9 there is a stand or table 13 upon which is mounted a blower 14, the casing of the blower opening into the spout 7 by a short extension

15 (see Figs. 2 and 3). Within the casing of the blower are the blades of a rotary fan mounted upon the shaft 16 of a motor 17, preferably an electric motor.

5 The blower also communicates with a vertically extending section 18 of a conduit which at its lower end receives a tangentially extending coupling 19 forming a part of the blower case, which fits into the lower end of the section 18. Above the section 18 there is a curved section 20 which is coupled at 21 to a section 22 which is in turn coupled to a section 23 at 24. The sections 18 and 20, 22 and 23—for a purpose which will be hereinafter described—are preferably square in cross section. At its extreme forward end the section 23 is coupled to a relatively short section 25. Suitable latches 26 are employed to maintain the sections 22, 23, and 25 in coupled relation. The section 25 is connected by a hinge 27 so that it may be dropped down, as indicated in dotted lines in Fig. 1, for a purpose which will be hereinafter set forth.

The section 23 is coupled upon its under forward end as at 28 to a relatively short cylindrical section 29 leading into a combined sterilizing and aerating chamber 30. At its lower end the chamber 30 is connected by means of an elbow section 31 to a lower conduit 32 which extends from the lower open end of the elbow section 31 to the spout 7 to which it is coupled as indicated at 33.

It will be noted that the sterilizing and aerating device will be supported in proper relation to the other instrumentalities with which it cooperates by an angle-iron frame 34 and vertical standards 35.

It will be noted also that the parts which have been described constitute what might be defined as a continuous path of travel for the material under treatment and that the sections of the conduit leading into and out of the blower casing are displaced laterally with relation to each other (as indicated in Fig. 2), the spout which leads from the hopper constituting a part of the lower conduit which leads into the central opening of the blower casing, whereas the upper portion of the conduit and the vertical portion thereof immediately adjacent the blower casing is connected thereto by a tangent extension 19 leading from the periphery of the blower casing. In this arrangement the material taken from the hopper 1 will be drawn into the center of the blower and projected therefrom into the upwardly extending section 18 of the conduit. The result is that the movement of the material through the conduits is produced by a combined pulling and propelling air stream.

All the parts which have been described, with the exception of the blower and the sterilizing and aerating chamber, each of which are supported on independent stands of their own, are supported by the frame comprising the vertically extending plate 8 and the vertical angle-iron standards 9 and 10 and the other transversely extending angle-iron braces 11 and 12, and while the frame constructed as shown and described has been found to be effective, nevertheless it is to be understood that the identical construction, as shown and described, is not a material part of the present invention and that any other construction of frame which will properly support the operating parts may be substituted therefor.

The spout 7 is provided with vertically sliding gates 36 and 37 positioned at opposite sides of the branch or connection 15 leading therefrom to the center of the blower. The gates may be raised

or lowered as required. When raised they permit the passage of the material being operated upon through the spout 7 from one end thereof to the other, but when lowered the passage of the material through the spout 7 is cut off, for a purpose to be described. The gates are connected to the lower end of rods 38 and 39 which are pivotally connected at the upper end to bell-crank levers 39 and 40 mounted upon the inner ends of rocking shafts 41 and 42 supported in bearings 43 and 44. The shafts 41 and 42 project through the plate 8 and each of them carry operating levers 45 and 46 respectively. By means of the levers 45 and 46 and the intermediate connections, the gates 36 and 37 may be raised when required. Each of the gates is forced downward by a spring 47 and 48, respectively, mounted upon the rods 38 and 39, the upper ends of the springs bearing against the under surface of crossbars 49 and 50. Suitable detents will be provided as indicated at 51 and 52 (see Fig. 1) to hold the levers 45 and 46 in position to maintain the gates 36 and 37 raised against the tension of the respective springs 47 and 48.

The foregoing arrangement is such that when the gates 36 and 37 are in the position shown in Fig. 7, the material in the hopper 1 will be drawn through the spout 7 leading to the center of the blower and discharged into the upwardly extending conduits 18 and 20. After all the material has been withdrawn from the hopper 1 and started on its passage through the system of conduits, the gate 36 will be lowered and the gate 37 will be raised (as shown in Fig. 1), thus permitting the material to circulate through the system in accordance with the passage of the air therethrough.

At the lefthand end of the apparatus (as shown in Fig. 1) is located a discharge funnel 53 carried by and forming a part of the hinged section 25, and the outer end of this funnel 53 is provided with a pivoted gate 54 which may be operated by the air passing therethrough and caused to assume an open or closed position. Also the gate 54 will be forced open by the blast of air passing through, and at times it will be automatically closed by air suction.

Immediately over the downwardly extending tubular section 29 is a cleaning apparatus comprising a curved screen 55 which is carried by the section 25, against which the material being operated upon will be forced by the blast of air passing through the upper conduit. Cooperating with the screen is a rotary brush 56 mounted on a shaft 57 having radially extending brushes 58 projecting therefrom arranged to engage the inner curved face of the screen 55. The brushes operate not only to brush and smooth out the feathers or other filling material being operated upon but frees such material of dust and dirt which passes through the screen 55 and is discharged through the funnel 53. The cleaning brush also insures that there will be no clogging of the materials being operated on at this point and will direct the materials into the downwardly extending section 29 of the conduit, from thence passing into the sterilizing chamber.

To further insure that there will be no clogging of this cleaning mechanism there is provided in the section 23 of the conduit a deflecting sill 59 of a lateral width coinciding with that of the rotary cleaner and of such a height at its forward end that it will impart to the materials being operated upon an upward movement so that it will be propelled into the space be-

tween the adjacent lines of brushes above the center of rotation.

Preferably the forward end of the deflecting sill will be curved to conform to an arc defined by the circular path of rotation of the cleaning brush. Rotary movement is imparted to the cleaning brush by means of a belt 60 which engages a belt pulley 61 at one end of the shaft 57 (see Fig. 2). The belt 60 is driven from a pulley 62 carried by a stub shaft 63 which in turn is driven by a belt 64 engaging a pulley 65 on the said stub shaft, the belt 64 being directly driven from a pulley 66 carried by the shaft 16 of the motor 17 (see Fig. 2). It will thus be seen that the brush not only frees the material delivered against the screen of impurities but also assists in feeding such material to the screen and thence into the sterilizing chamber.

The sterilizing and aerating apparatus comprises the chamber 30 having a conical bottom 67 and a substantially circular wall 68 jacketed and insulated as indicated at 69. Within the chamber 68 is located a steam coil 70 receiving steam from any suitable source of supply through an inlet pipe 71 and discharging steam through a discharge pipe 72. Of course the inlet pipe may have any usual form of pressure indicator 73 and also may be provided with a valve controlled flexible steam tube 74 for the purpose of subjecting a casing or other article to a blast of steam for cleansing purposes.

The upper end of the chamber 68 is provided with a flat circular top 75 which may be removably inserted therein resting upon an internal flange 76. The top 75 has a central opening to receive the lower end of the tube 29. The top also will be provided with segmental slots 80 arranged in pairs. The slots are covered by hinged dampers 81 which may be raised or lowered at will to close or open the slots in diametrically disposed pairs. One pair of dampers 81 is controlled by a crank arm 82 (see Fig. 4) carried by one end of a shaft 83 mounted to rock in bearings 84. One of the crank arms is connected by means of a link 85 (see Figs. 1 and 5) to one of the dampers of a pair, and by a link 86 to the other damper of the pair. A spring 87 surrounding the shaft 83 acts to normally hold the dampers 81 of a given pair in closed position. A pull rod 88 extends toward the right (as shown in Fig. 1) passing through the vertical plate 3, and is provided with a handle 89 whereby a particular pair of dampers 81 may be raised. The rod 88 is provided with a notch 90 which may be engaged with the plate 3 to hold the dampers against the tension of the spring 84.

The other pair of dampers 81 are similarly coupled for simultaneous operation to a rotary shaft 91 which is likewise controlled by a spring 92 and which extends rearwardly (see Fig. 2) projecting through an opening in the plate 3 (see Fig. 3) and at the rear of the plate is provided with a crank arm 93 whereby it may be turned to turn the rod 91 and through the interconnecting links 94 and lever 95 operate the other pair of dampers 81 to open or permit them to be closed by the spring 92. Suitable means will be provided to hold the crank arm 93 against the tension of the spring 92.

By means of these dampers the temperature of the air in the sterilizing and aerating chamber may be controlled by the admission of atmospheric air through the plate 75, and also atmospheric air may be permitted to enter at times to facilitate the removal of the contents of the

sterilizing and aerating chamber and to dislodge any of the material under treatment which may have a tendency to adhere to the inner wall of the chamber.

In the cleansing and renovating process the material acted upon will be circulated through the blower and the conduits for as many times as its condition seems to require in order that such material shall be thoroughly cleansed and sterilized and "fluffed up" and at each trip through the conduits the material will be acted upon by the brushing mechanism and will pass through the sterilizing and aerating chamber. When the material has been subjected to the operation of the apparatus to that extent necessary to produce a satisfactory rejuvenation, it is discharged into a suitable receptacle which may be a bag or casing constituting the covering of the pillow or mattress of which the material treated by the apparatus constitutes the filling. For this purpose the upper run of the circulating conduit is provided with a pivoted leaf or flap 96 carried by a rocker shaft 97, the said flap or leaf 96 constituting a valve of a size which when raised (as indicated in dotted lines in Fig. 1) closes the conduit and prevents the material from advancing beyond that point where the leaf or flap is located. In the drawings it is shown as carried by the section 22 of the conduit. Upon its under surface the conduit 22 is provided with a valve seat or opening 98 in which the flap 96 may be seated when turned down (as shown in full lines in Fig. 1). The opening 98 leads into a conical chamber 99 from which depends a short tubular nipple 100. To the lower end of this nipple the bag or casing 101 is releasably connected and suspended by any suitable detachable clamping device which will firmly hold the gathered open end of the casing 101 to the nipple 100 with sufficient force to resist the force of the air which will enter therein with the material being discharged thereinto. As shown in Fig. 6, this clamping device consists of a split spring ring 102, the opposite overlapping ends of which are provided with radially extending projections 103, by means of which the split ring may be expanded and released and the casing removed.

It is of course to be understood that while the material is being circulated the plate or valve 96 will be lowered to close the opening 98 and clear the conduit and that it is only open when it is desired to discharge the material from the apparatus. The apparatus (as shown in Fig. 7) shows the condition of the parts when the material is being discharged therefrom. As hereinbefore intimated, should it be desired to use the apparatus for the purpose only of transferring the filling material from one pillow or casing to another, this may be done by emptying the casing into the hopper 1 from which it will be drawn and discharged into the casing 101, all of which will be clearly understood by those skilled in this art.

For the purpose of raising and lowering the flap 96, the shaft 97 is provided with a lever 102 which is positioned upon the outer side of the conduit 22 so that it may be readily operated and a suitable stop 103 will be provided to hold the flap 96 in its raised position (as indicated by dotted lines in Fig. 1).

While the brushing and screening elements effectively remove all dust and dirt particles small enough to pass through the screen 55, it frequently happens that other foreign substances, 75

too large to pass through the screen, are found in the filling of pillows and other cushions. For the purpose of removing them, the section 32 of the conduit is provided with an opening 104 beneath which is mounted a sliding drawer or trough 105 into which will drop the large particles of foreign matter, thus removing such matter from the material which passes through the blower and the other parts of the apparatus which falls into and remains in the drawer or trough 105 which may be opened and emptied as required.

In the operation of the apparatus the material to be renovated is emptied into the hopper 1 with the slide 36 raised (as indicated in Fig. 7) but with the flap 96 lowered (as indicated in Fig. 1). The slide 37 will be lowered (as indicated in Fig. 7) at the beginning of the operation with the parts of the apparatus (as indicated in Fig. 7) with the exception that the flap 96 is lowered instead of raised. The operation of the blower is started thereby drawing the material from the hopper 1 and discharging it into the upwardly extending conduit. After the hopper has been emptied and before the material reaches the gate 37 on its return, that gate is raised and gate 36 is lowered (as shown in Fig. 1). As thus arranged the material begins its circuit through and along the upper conduit past the brushing and screening elements through the sterilizing and aerating chamber along the lower conduit and through the blower to be again propelled and drawn through the apparatus by the propelling and suction effect on the air stream created by the blower. As it passes the screen 25 the brushes smooth out and loosen the dust and dirt adhering thereto which will be discharged through the funnel 53. As it is drawn through the sterilizing and aerating chamber it will be subjected to heat and air which may include fresh air drawn through the damper-controlled openings in the top of the chamber. Relatively large and heavy particles of foreign matter will be deposited in the sliding drawer 105, and after the apparatus has treated a charge of the material, usually the filling of one casing, through one or more complete cycles to that extent its condition seems to require, it will then be discharged and delivered into the casing 101, as has been hereinbefore set forth. The resultant effect of subjecting the filling material of pillows and other cushions to the operation of this apparatus thoroughly cleans such material and practically restores such material to a condition closely approximating similar materials when new.

It will of course be observed that the sectional construction of the pneumatic conveyor permits ready access thereto and to the several instrumentalities acting on the materials passing there-through for the purpose of cleaning and the prevention of clogging of the materials at any point along the course of travel.

I claim:

1. In an apparatus of the class described, in combination, a blower, upper and lower conduits connected at one end to the outlet and inlet respectively of the blower, a hopper connected to the conduits near the blower, a rotary brush mounted in the outer end of the upper conduit, a dust discharge spout hinged to the upper conduit, a curved screen carried by said dust spout, a latch to hold said dust spout in operative position and an automatic valve at the outer end of the dust spout.

2. In an apparatus of the class described, in combination, a blower, upper and lower conduits connected at one end to the outlet and inlet respectively of the blower, a hopper connected to the conduits near the blower, a curved screen and a rotary brush positioned at the opposite end of the upper conduit, a conduit section extending at right angles from the upper conduit and connected thereto beneath the screen and brush, a sterilizing chamber connected with the angularly disposed conduit section and a lower conduit section connected to the bottom of the sterilizing chamber.

3. In an apparatus of the class described, in combination, a blower, upper and lower conduits connected at one end to the outlet and inlet respectively of the blower, a hopper connected to the conduits near the blower, brushing and screening mechanism located near one end of the upper conduit, a sterilizing chamber below the brushing and screening mechanism and connected thereto by a short conduit section, the lower conduit connected to the lower end of the sterilizing chamber, and a removable receptacle mounted upon the under side of the lower conduit to receive waste materials removed from the material being operated upon.

4. In an apparatus of the class described, in combination, a blower, upper and lower conduits connected at one end to the outlet and inlet respectively of the blower, a hopper connected to the conduits near the blower, brushing and screening mechanism within and located near one end of the upper conduit, a sterilizing chamber located below the brushing and screening mechanism, a short conduit section connecting the sterilizing chamber to the upper conduit, the lower end of said chamber being connected to the lower conduit, an opening in the top of the sterilizing chamber to admit air thereto, a manually controlled valve for said opening, a valve controlled discharge spout carried by the upper conduit between the blower and the brushing and screening mechanism, said valve comprising a pivoted flap which when lowered closes the opening to the discharge spout and when raised closes the upper conduit to the passage of air and material beyond the opening of the said discharge spout, and means to secure a bag or casing to said discharge spout.

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