

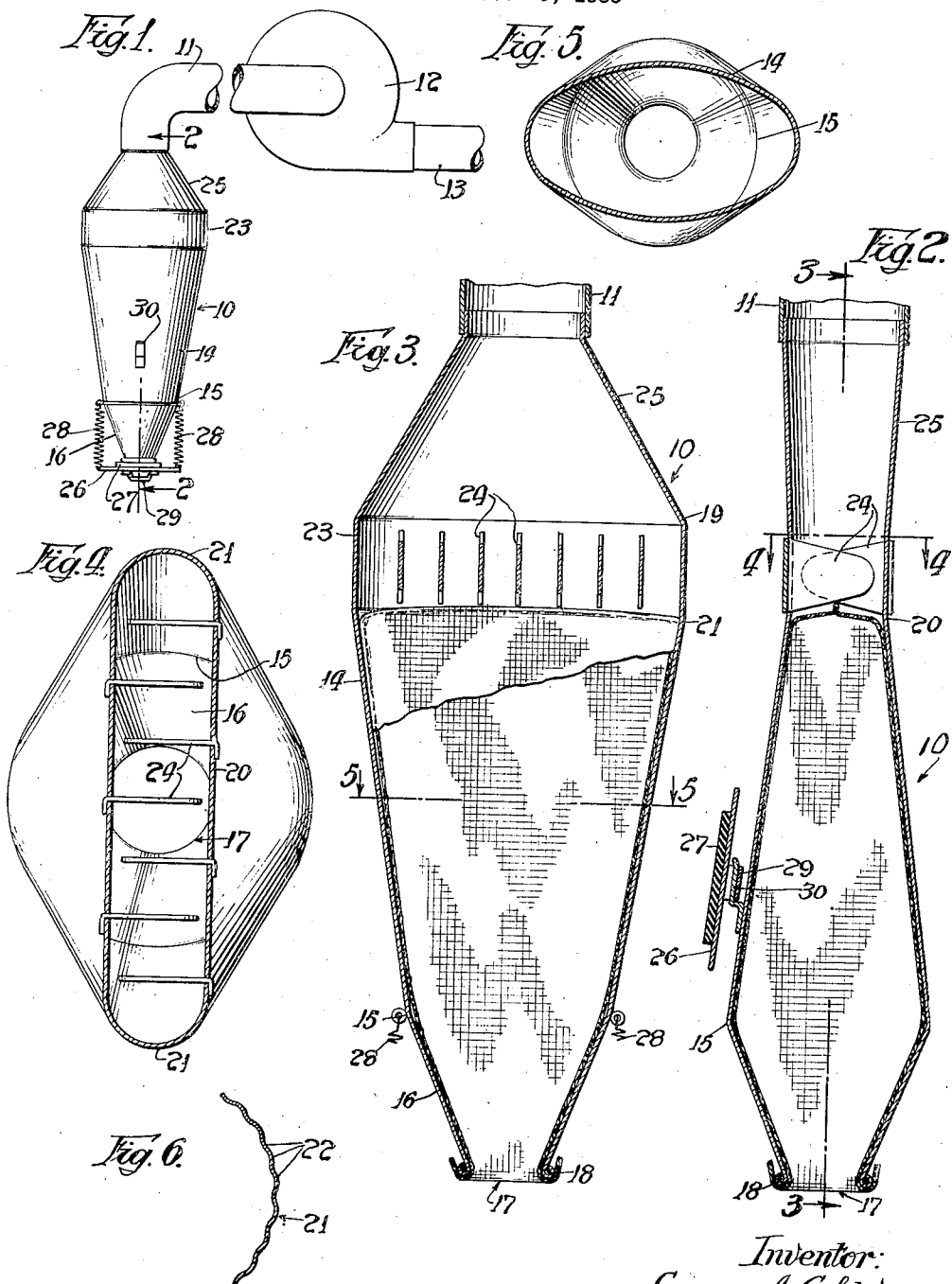
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APPARATUS FOR PNEUMATICALLY CLEANING BAGS

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APPARATUS FOR PNEUMATICALLY CLEAN-
ING BAGS

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This invention relates to improvements in apparatus for pneumatically cleaning bags and it consists of the matters hereinafter described and more particularly pointed out in the appended claims.

The bags, with which the present invention is more especially concerned, are those made of an air permeable textile fabric of which the so-called burlap and muslin may be mentioned as examples.

Bags of the kind mentioned are originally made from a strip of salvaged burlap or muslin having a length approximating twice the width of the bag and a width approximating the length of the bag. Such a strip is folded over upon itself so that the two end edges coincide and a line of stitching is run along one side and end of the folded over strip, after which the stitched strip is inverted to form the completed bag. This places the margins of the bag material, outwardly beyond the line of stitching mentioned, inside of the bag which may thereafter be printed with the usual brand names, trade marks or other indicia that relate to the contents which the bag is to hold.

After the bags have been used for their intended purposes and the contents emptied therefrom, they still have an economic value and a number of large concerns have been established for the reclamation of such used bags. In the reclamation of such bags, they are not only turned inside out and cleaned of dust and lint pneumatically, but they are patched or darned, and are overcast at the seams so as to be substantially as good and strong as when originally made. When such a bag is turned inside out and cleaned, the original brand marks are disposed on the inside of the bag so as to be substantially invisible and such bags are often reprinted, should the purchaser so desire.

Apparatus as heretofore used in pneumatically cleaning such bags usually includes an air duct open at one end and connected at its other end to the inlet or suction side of a blower. The open end of the bag is applied to the inlet end of the duct and is drawn into the duct by suction action and simultaneously turned inside out so as to expose the frayed margins of the bag material outwardly beyond the line of stitching providing the seam. While the bag is being held in place by the operator, the air blast tends to expand or "balloon" out the bag and permeate through the walls thereof so as to carry off the dust and lint contained in the bag, as well as the

ravelled thread-like ends of the fabric margins outwardly of the line of stitching.

It is apparent that the seam across the closed bottom end of the bag cannot expand or elongate beyond its length, which is therefore greater than the diameter of the bag body when extended. With apparatus heretofore used for pneumatically cleaning bags, the excess in the width of the bag at its closed bottom end forms itself into folds through which the air blast cannot permeate efficiently. Therefore, the cleaning action is prevented at the folds which retain their dust and lint. Hence the bag is not as thoroughly cleaned as is desired.

One of the objects of the present invention is to provide an improved means for pneumatically cleaning an air permeable bag and wherein the closed end of the bag is reduced in area with respect to the body portion of the bag under conditions which prevent the formation of folds in said end of the bag but at the same time increases the velocity of the air at this point.

Also, it is an object of the invention to provide a simple but more efficient suction head for a pneumatic bag cleaning apparatus which is so constructed that it restricts the cross-sectional area of the closed end of the bag without causing the forming of folds therein and whereby the air is caused to pass through the closed end of the bag for a better cleaning action.

The above mentioned objects of the invention, as well as others, together with the advantages thereof, will more fully appear as the specification proceeds.

In the drawing:

Fig. 1 is a view partly in front elevation and partly in diagrammatic form of a pneumatic bag cleaning apparatus of which the suction head of my invention forms a part.

Fig. 2 is a vertical sectional view on an enlarged scale, through the suction head of the apparatus appearing in Fig. 1 as taken on the line 2—2 of Fig. 1.

Fig. 3 is a vertical sectional view through the suction head appearing in Fig. 2, the plane of the section being indicated by the line 3—3 of Fig. 2.

Fig. 4 is a horizontal sectional view through a part of the suction head as taken on the line 4—4 of Fig. 2.

Fig. 5 is another horizontal sectional view through a part of the suction head as taken on the line 5—5 of Fig. 3.

Fig. 6 is a detail horizontal sectional view through a modified form of wall structure for

the improved suction head and which will be more fully referred to later.

Referring now in detail to that embodiment of the invention illustrated in Figs. 1 to 5 inclusive of the accompanying drawing, 10 indicates as a whole the improved suction head of a pneumatic bag cleaning apparatus and the outlet end of which is connected by an air duct 11 to the inlet side of a blower 12. The outlet side of said blower may be connected by a second air duct 13 with any approved type of centrifugal separator (not shown).

The suction head 10, which normally stands or is supported in a perpendicular position, embodies a hollow or tubular sheet metal body 14 having a bottom end 15 of circular cross section. In the present instance the diameter of said bottom end is shown as approximating one-half the axial length of the body. In practice, the bottom end of the body has a circumference approximating that of a conventional burlap bag when extended or "ballooned" out and the length of the body from its bottom to its top end is somewhat shorter than the length of such a bag. These proportions, however, may be reasonably altered without departing from the spirit of the invention.

An inverted frustro-conical inlet hood or tube 16 is operatively secured to and depends from the circular bottom end of the body to terminate in a circular inlet mouth 17 of a diameter somewhat smaller than that of said bottom end of the body. To provide a smooth surface for the inlet mouth so as to leave no barbs, edges or the like at this point, upon which bag fabric may catch, the associated end of the hood is beaded about a reinforcing ring 18.

The top end 19 of the body has an elongated cross-sectional shape of an area less than that of its bottom end 15 and has straight flat parallel sides 20 and rounded ends 21 considered horizontally. The body tapers at its sides downwardly from its rounded ends to its bottom 15. In this respect it is pointed out that the transition in cross-sectional shape of the body from its top end to its bottom end is so gradual that sharp inside corner portions are avoided. Thus, while the body changes in cross sectional shape from one end to the other, a smooth even surface is provided for the inside of the body. However, if desired, said body may be made of corrugated sheet metal with ribs and grooves 22 running longitudinally thereof and this appears in Fig. 6.

23 indicates an extension neck for the top end of the body of the same cross-sectional shape and dimension as the top end of the body. In this extension is provided bag barrier means which acts to catch and stop a bag when accidentally drawn from the operator's hand by draft action. As shown herein said means comprise a plurality of inwardly extending spaced apart, vertically edgewise fins 24 that extend inwardly from each side of the extension, with the fins on one side wall disposed in planes between those on the other side wall. These fins are so spaced apart laterally of the extension as to present little resistance to the passage of air therethrough but will bar the passage of a bag therethrough.

It will be noted from Fig. 2 that the fins 24 taper along their top and bottom edges toward their free ends and the reason therefor is as follows: In the pneumatic cleaning of the bags in accordance with the present invention, the bags operated on are drawn into the suction head

and simultaneously turned inside out. This, of course, presents the ravelled margins of the bag material outside of the original stitching, on the outside of the bag, as will be more fully referred to. Under these conditions, these ravelings are entrained with and carried away by the air blast and as they impinge on tapered bottom edges of the fins, they slide off the free ends thereof to be carried away by the blast action. Therefore these ravelings cannot catch on said fins and accumulate to such an extent that they will choke up and reduce or cut down the free draft action desired in the suction head.

The suction head also includes an outlet hood 25. The bottom end of the outlet hood has a cross sectional shape and area corresponding to that of the extension 23 and said hood tapers at its sides and flares at its front and rear down to an outlet of a circular diameter providing a good tight connection with the duct 11.

In cleaning an air permeable bag, with the aid of the improved suction head, the procedure is as follows: Assume that the bags to be cleaned are arranged flatwise in a pile with the side seams disposed at one side of the bag and with the open end of all of the bags at one end of the pile. The operator grasps opposite sides of the open end of the topmost bag in the pile and opens it sufficiently to apply it to the mouth end of the hood, with the seam at the bottom end of the bag disposed substantially in the plane of the greatest dimension of the top end of the body.

When the blower is being driven to produce a suction blast draft action, such action draws the bag through the inlet mouth into the body, the bag being turned inside out as it enters the body. As the suction draft action is continuous throughout the period of the actual use of the head, the bag is expanded or "balloons" out, with the major portion of the body slapping or beating against the inside surface of the body of the suction head. This action functions to dislodge dust and lint particles in the bag fabric and which are carried away by the blast.

It is pointed out at this time that as the closed end of the bag passes through the mouth to enter the head, and then upwardly towards its top end, its closed end positions itself with its seam extending in the direction of largest transverse dimension of the upper end of the body 14. Thus the closed end of the body can only expand to such extent as allowed by the flattened upper end of the body and the bottom end seam of the bag and which is of a length greater than the cross-sectional diameter of the bag body but of a cross sectional area less than the same. Thus the closed end of the bag assumes the shape which the top end of the body 14 causes it to assume. This is one which substantially prevents folds from forming in this end of the bag. As the closed end of the bag thus has a cross sectional area less than that distended part of the bag in the bottom end 15 of the body 14 of the casing, the passage of air is restricted at said end of the bag so as to increase the static pressure of the air in the bag and at the same time increase the velocity of the air as it passes through the closed end of the bag. As the static pressure exerts itself in all directions, a better distribution of air is provided. The cleaning of the bag walls and the dust and the like removed therefrom, is more efficiently accomplished by the air blast. Also, as the velocity of the air is higher at the relatively smooth unfolded closed end of the bag, the air has a better cleaning action on that part

of the bag hardest to clean and which is its closed end and the associated seam. The bag which is now cleaned, is withdrawn from the head by the operator and another bag is then applied to the head in the same way before described.

In practice several heads are connected by a trunk duct to the same blower. Under such conditions, any one or more heads may be taken out of service by means such as follows: Each head is provided with a closure disk comprising a metal plate 26 with a rubber sealing face 27 of a diameter larger than that of the mouth 17. Each plate has contractile springs 28 connected at one end thereto, the other end of said springs being fastened to opposite sides of the body. The plate 27 carries a handle-like clip 29 on its bottom face whereby it may be grasped and this clip may be engaged upon a hook 30 carried by the body at an elevation which will hold the closure disk in a convenient out-of-the-way condition on the head.

When it is desired to remove one of the heads from service without interfering with the use of the other heads, the closure disk for that head is removed from its engagement with the hook 30 and is placed in position with its rubber sealing disk engaged with the mouth 17 of that head. In this position, the springs 28 function to draw the closure upwardly so as to cause the disk 27 to seal the mouth, the springs being assisted by the sub-atmospheric condition in the head. To remove the closure disk it is only necessary to pull down on the clip 29 to break the seal of the closure at the mouth 17 and then reengage said clip in supporting engagement on the hook 30.

The head is of simple construction and is not only efficient, but is economical in operation, as is evidenced by a substantially reduced current consumption of the motor which drives the blower.

The cleaning of bags pneumatically is a highly competitive business requiring a large volume of bags to make such a business profitable and while the saving of current consumption for one bag may be relatively small, such a saving multiplied by the great number of bags operated upon is quite considerable.

By the use of the novel suction head described, the bags are more efficiently pneumatically cleaned at a lower cost per bag than has heretofore been possible.

While in describing the invention I have referred in detail to the form, arrangement and construction of the parts involved, as well as to the steps of the method capable of being carried out by said parts, the same is to be considered only in the illustrative sense so that I do not wish to be limited thereto except as may be specifically set forth in the appended claims.

I claim as my invention:

1. A suction head for a pneumatic bag cleaning apparatus embodying therein an upright elongated hollow body having lateral walls including opposed side portions and opposed end portions and also having a lower portion of an annular cross sectional shape, annular means connected to the bottom of said lower portion of said body and providing a restricted combined air and bag inlet therefor, said opposed sides of the body converging and said opposed ends of the body di-

verging upwardly from said lower portion toward the top of said body to there provide a transversely elongated air outlet portion for the body adapted to receive the closed end portion of the bag being cleaned and to impart thereto a cross-sectional shape different from that of the first mentioned one, and means for connecting the air outlet portion of the body to an air duct.

2. A suction head for a pneumatic bag cleaning apparatus embodying therein an upright elongated hollow body having lateral walls including opposed side portions and opposed end portions and also having a lower portion of an annular cross sectional shape and predetermined area, annular means connected to the bottom of said lower portion of said body and providing a restricted combined air and bag inlet therefor, said opposed sides of the body converging and said opposed ends of the body diverging upwardly from said lower portion toward the top of said body to there provide a transversely elongated air outlet portion for the body of a cross sectional area less than the first mentioned one, said air outlet portion being adapted to receive the closed end portion of the bag being cleaned and to impart thereto a cross sectional shape and area different from the first mentioned cross sectional shape and area, and means for connecting the air outlet portion of the body to an air duct.

3. Suction head for a pneumatic bag cleaning apparatus embodying therein an upright elongated hollow body having lateral walls including opposed side portions and opposed end portions and also having a lower portion of a substantially circular cross sectional shape and of an area approximating that of the bag being cleaned when the same is in an extended condition, annular means connected to the bottom of said lower portion of the body and providing a restricted combined air and bag inlet therefor, said opposed side portions of the body converging and said opposed end portions of the body diverging upwardly from said lower portion toward the top of said body portion to there provide a transversely elongated air outlet portion for the body having a dimension in one direction greater than that of said lower portion and having a dimension in another direction less than that of said lower portion, said air outlet portion having a cross sectional area less than that of the closed end of the bag which it is adapted to receive, and means for connecting the air outlet portion of the body to an air duct.

4. A suction head for pneumatic bag cleaning apparatus embodying therein an elongated body with a circular portion at one end having a predetermined cross-sectional diameter and dimension, a frusto-conical hood connected at one end to said portion of the body and having a combined bag and air inlet at its other end of a cross-sectional area less than that of said circular portion of the body, said body flattening out fanlike from said end portion toward its other end so as to have a major dimension greater and a minor dimension less than that of said circular portion, to provide an outlet end for the body of a cross-sectional area less than that of said circular portion of the body.

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