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METHOD OF AND APPARATUS FOR EVACUATING AIR FROM BAG BODY AT TIME OF FILLING

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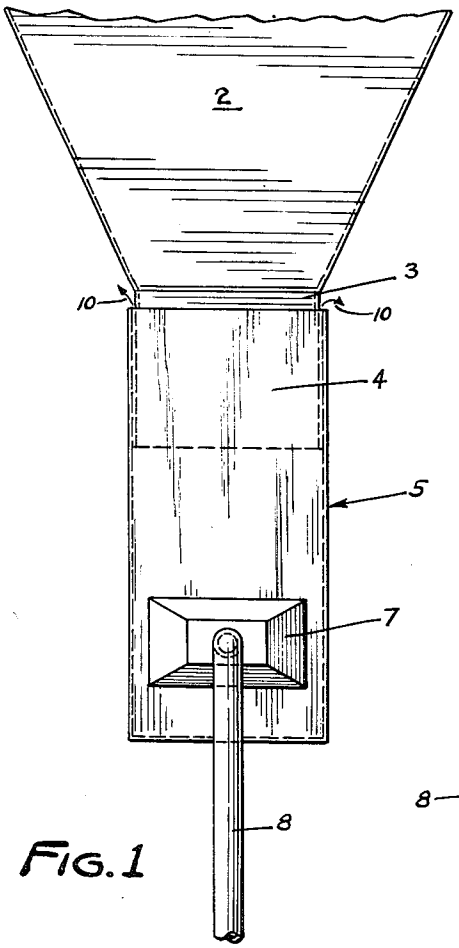


FIG. 1

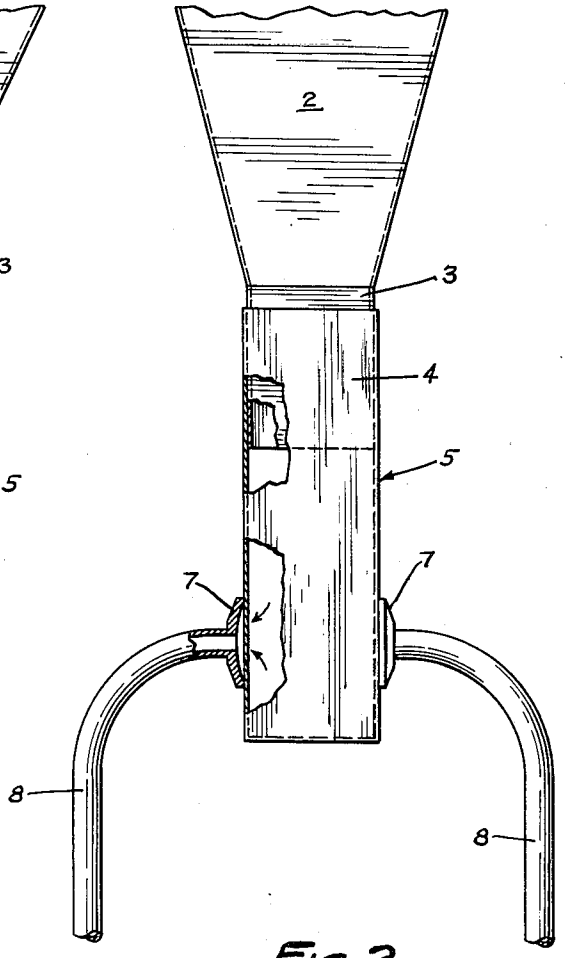


FIG. 2

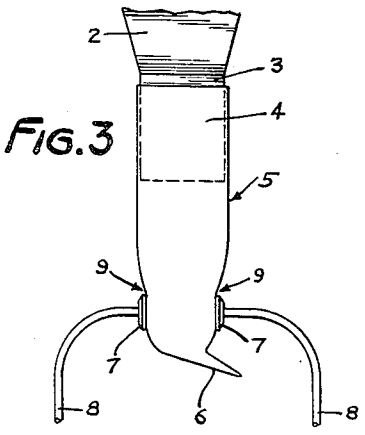


FIG. 3

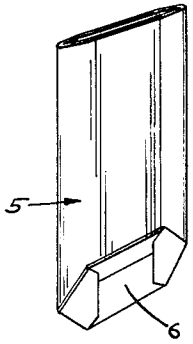


FIG. 4

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METHOD OF AND APPARATUS FOR EVACUATING AIR FROM BAG BODY AT TIME OF FILLING

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5 Claims. (Cl. 53—22)

This invention relates to a new and improved method of and apparatus for evacuating entrained air from a bag body during the bag filling operation, thereby to assure compact settling of the product into the bag body.

It is well known in the packaging industry that when filling bags with a product, a considerable amount of air may be entrained with the product from various causes. Such entrained air may prevent proper and complete filling of the bag body by not allowing the product to settle compactly into the bag body. At present it is customary to provide slight openings in the upper portion of the bag top, usually between the bag top walls and the periphery of the filling tube for allowing such entrained air to freely escape from the bag body to the atmosphere during the filling operation.

The present invention provides means for automatically evacuating such entrained air from the interior of a bag body during the operation of filling the bag, and at the same time it aids in opening or outwardly extending the lower portions of the bag walls and the bag bottom into their proper positions, as the product is delivered into the empty bag body.

An important object of the present invention therefore is to provide an improved method of automatically evacuating entrained air from a bag body during the bag filling operation, and at the same time aids in opening the bag walls and its bottom to assure complete and compact settling of the material into the bag body, and assuring the provision of a neatly shaped symmetrical bag body.

A further and more specific object of the invention is to provide in combination with a conventional bag filling machine comprising a bag filling tube over which the open top of an empty bag to be filled is put on, of a suction device located at an elevation below the lower end of the filling tube having means for directly engaging a portion of the wall of the bag body during the filling operation, thereby to evacuate from the interior of the bag body through the pores in the bag walls, any air which may have become entrained with the product during delivery of the product into the bag body.

Other objects of the invention reside in the simple and inexpensive construction of the apparatus; in the provision of such an apparatus comprising two suction devices preferably arranged to engage the bag walls at opposite sides of the bag body, and whereby said suction devices may function to simultaneously evacuate entrained air from the bag body and to aid in opening the bag walls and its bottom simultaneously as the charge is delivered

into the empty bag body, thereby to assure that the product will settle compactly into the bag body.

These and other objects of the invention and the means for their attainment will be more apparent from the following description taken in connection with the accompanying drawings.

In the accompanying drawings there has been disclosed a structure designed to carry out the various objects of the invention, but it is to be understood that the invention is not confined to the exact features shown, as various changes may be made within the scope of the claims which follow.

In the drawings:

Figure 1 is a view showing a portion of a conventional bag filling machine, including the usual filling tube over which the lower end of the open top of the bag to be filled is put on to receive a charge, and a suction device being shown engaged with the outer surface of the lower portion of the bag body, thereby to evacuate entrained air from the bag body;

Figure 2 is a side view of Figure 1 showing two suction devices engaged with opposite walls of the bag body;

Figure 3 is a view showing an empty bag body positioned on the filling tube with its lower wall portions partially collapsed, and also showing the suction heads in their normal positions, prior to the delivery of the product into the bag body; and

Figure 4 is a view showing an empty bag in its normal collapsed condition, said bag body having a conventional satchel-type bottom.

In the selected embodiment of the invention herein disclosed there is illustrated in Figures 1 and 2, for purposes of disclosure, a portion of a conventional bag filling machine comprising a hopper 2 having a bag filling tube 3 at its lower end over which the open top of a bag to be filled is put on, as shown. Means, not shown, is provided for securing the bag top to the filling spout, as is well known.

The bag 4 herein disclosed is commonly known to the trade as a flat bag with satchel bottom, and its body is normally collapsed, as shown in Figure 4. Obviously, the invention may be utilized equally well when filling bags having other types of bottoms. When the bag top 5 is initially opened to receive the filling spout 3, the lower portion of the bag body, including the bottom 6, is usually partially opened, as indicated in Figure 3.

When the product is delivered into the bag body from the filling tube 3 a certain amount of air may be entrained therewith which in some instances may be sufficient to prevent the material from settling firmly into the bottom portion of the bag body. It is therefore highly desirable that such entrained air be removed from within the bag body simultaneously as the product is delivered thereinto to assure complete and compact settling of the product into the bag body.

The novel method herein disclosed includes the step of evacuating the entrained air from within the bag body simultaneously as the product is being delivered thereinto, whereby the product or material may flow freely into the lower portion of the bag body without spouting, and with the assurance that it will become firmly and compactly settled therein.

To thus evacuate entrained air from the bag body one or more suction devices or heads, preferably two, generally designated by the numeral 7, are provided as shown

in Figures 1 and 2. These suction heads are preferably arranged to engage the bag walls at opposite sides of the bag body. Each suction head 7 has one end of a suction tube 8 connected thereto, the opposite ends of which are connected to a suitable vacuum pump, not shown in the drawings. The walls of the bag body being porous, the air entrained with the product may readily be evacuated from within the bag body by the action of the suction heads 7—7, as indicated by the arrows in Figure 2. By so evacuating the entrained air from the bag body during the filling operation, the material will settle firmly into the bag body and assure a full charge being precipitated thereinto. A portion of the entrained air may, however, still escape from the open end of the bag top, as indicated at 10 in Figure 1, because of the walls of the bag end not being snugly engaged with the bag walls, as is well known. The air thus escaping from the bag top will not be objectionable because of the relatively low pressure of the entrained air in the bag body.

The suction heads 7—7 are preferably positioned for movement toward and away from each other by suitable linkage not shown in the drawings. Normally, the suction heads may be positioned as shown in Figure 3, wherein it will be noted that the spacing between the suction heads is relatively less than the diameter or width of the upper portion of the bag body. By so initially positioning the suction heads 7—7 when an empty bag is put on the filling spout, the opposed wall portions of the partially opened lower portion of the bag body may engage the adjacent faces of the suction heads, as indicated at 9—9 in Figure 3. Simultaneously, as the product is delivered into the bag body, the suction heads 7—7 are caused to function, whereby any air entrained with the product is evacuated from the bag body through the pores of the bag walls, as hereinbefore stated.

In addition to evacuating the entrained air from the bag body, the suction heads 7—7 are forced to move outwardly by the pressure exerted by the contents on the bag walls to aid in opening the walls of the lower portion of the bag body including the bottom wall 6, during the filling operation, as clearly indicated in Figure 3. Thus, in addition to being assured of a full charge being delivered into each bag body, the operator is also assured that the filled bag body will have a pleasing and attractive appearance, a highly desirable attribute in the packaging industry.

The suction heads 7—7 may be of any suitable size or shape applicable for the purpose. In some instances a single suction head may suffice, but two such heads are desirable in that they assure prompt and complete evacuation of the entrained air from within the bag body. In the drawing the invention is shown as used for evacuating entrained air from bags having satchel-type bottoms. It is to be understood that the invention is equally applicable for use in conjunction with any form or type of bag of this general type having porous walls whereby the entrained air may be drawn or evacuated from the bag body through the pores of its walls by the action of the suction heads 7—7.

In the operation of the novel apparatus herein disclosed it is to be understood that the suction through the wall portions engaged by the suction devices 7—7 is such that free air delivered into the bag body simultaneously with the delivery of a product thereinto may readily and completely be evacuated from the bag body during the filling operation.

The suction heads, as hereinbefore stated, also aid in opening the lower wall portions of the bag body including its bottom wall, thereby assuring that each bag will receive a full charge and that the walls of each bag will assume their desired fully open positions, thereby assuring that each bag body will be neatly and accurately shaped, a highly desirable attribute in the packaging industry, as is well known.

The invention may be embodied in other specific forms

without departing from the essential characteristics thereof. Hence, the present embodiments are therefore to be considered in all respects merely as being illustrative and not as being restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all modifications and variations as fall within the meaning and purview and range of equivalency of the appended claims are therefore intended to be embraced therein.

I claim as my invention:

1. A method of evacuating entrained air from the interior of a porous-walled bag body suspended from the filling tube of a conventional bag filling machine which includes the step of applying dual suction devices to restricted exterior wall surfaces of opposed walls of the bag body, said dual suction devices being applied to said wall surfaces at opposed spaced positions, said positions being in opposition to each other and spaced apart a distance less than the open diameter of the bag body and said positions being adjacent the closed end of the bag body, thereby to evacuate entrained air from within the bag body through the pores of the bag walls during the filling operation, said suction devices simultaneously being moved outwardly by the pressure exerted by the contents on the bag walls.

2. The method of claim 1 in which a portion of the entrained air is permitted to escape adjacent said filling tube while entrained air is being evacuated from the bag body by said suction devices during the bag filling operation.

3. The combination with a bag filling machine comprising a filling tube from which an empty porous walled bag body is adapted to be suspended to receive a charge, of a suction device comprising a pair of suction heads adapted to engage diametrically opposed wall portions of the outer surface of a wall of a bag body suspended from the filling tube, at an elevation below the bottom end of the filling tube and adjacent the closed end of the bag body, said suction heads when engaged with a wall of the bag body during the bag filling operation, withdrawing the entrained air from the bag body through the pores in the bag walls, thereby to effect compact settling of the product into the bag body, the spacing between the suction heads normally being less than the open diameter of the bag body, said suction heads being adapted to operatively engage the partially collapsed walls of an empty bag body supported on the filling tube, simultaneously with delivery of a charge of material into the bag body, whereby when the charge is precipitated into the empty bag body, said suction heads are moved outwardly by the pressure of the opening bag walls thereagainst, assisted by the action of the suction heads, thereby opening the walls of the bag body simultaneously as the bag body is being filled and the entrained air is evacuated therefrom.

4. In combination with a bag filling machine comprising a filling tube from which an empty porous-walled bag body may be suspended to receive a charge, a suction device comprising dual suction heads arranged to engage diametrically opposed wall portions of the bag body; the spacing between said suction heads normally being less than the expanded diameter of the bag body, said suction heads being adapted to engage the partially collapsed walls of an empty bag body supported on the filling tube simultaneously with delivery of a charge of material into the bag body, whereby when a charge is precipitated into an empty bag body said suction heads are forced to move outwardly by the pressure exerted by the contents on the bag walls, assisted by the action of the suction heads, thereby expanding the walls of the bag body simultaneously as the bag body is being filled and the entrained air is evacuated from the bag body.

5. The combination with a bag filling machine comprising a filling tube from which an empty porous-walled bag body may be suspended to receive a charge and

whereby the partially collapsed portion of the bag body is disposed at an elevation below the lower end of the filling tube, of a suction device comprising a pair of suction heads movably supported below the lower end of the filling tube in opposed relation to one another, said suction heads being adapted to be moved into direct contact with restricted exterior areas of the lower wall portions of the bag body thereby to pneumatically assist in opening the lower wall portions of the bag body simultaneously as a charge is delivered into the bag body.

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