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L. E. WARD

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METHOD AND MEANS FOR OPENING BAGS

Filed March 28, 1928

Fig. 1.

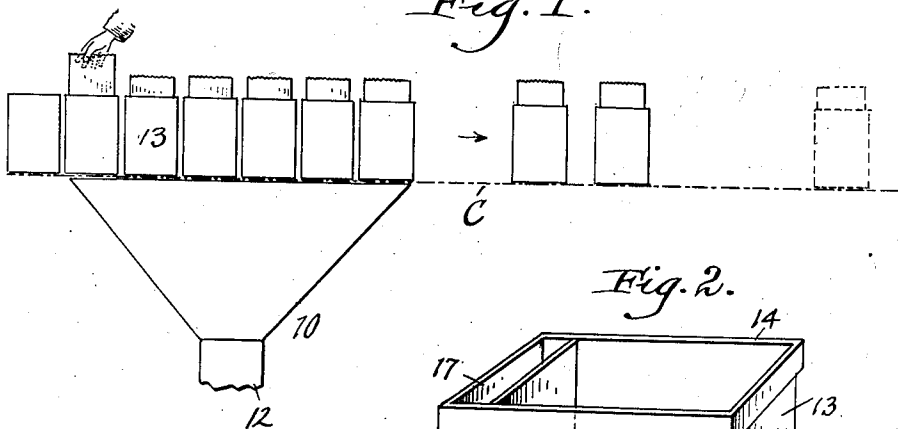


Fig. 2.

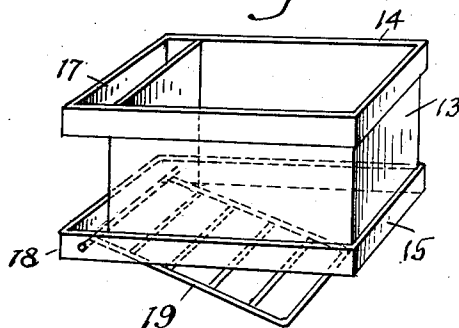


Fig. 4.

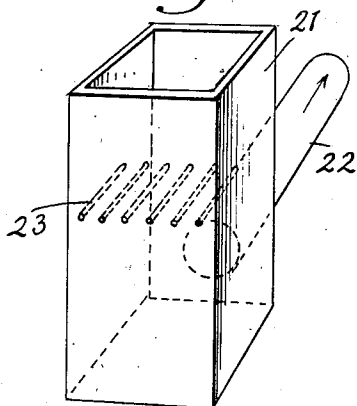


Fig. 3.

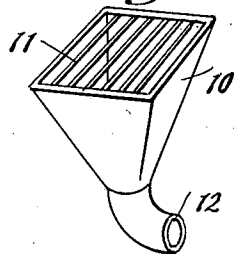


Fig. 6.

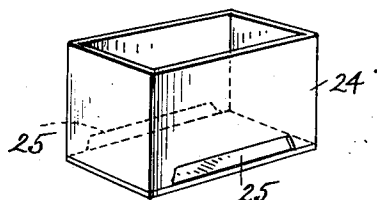
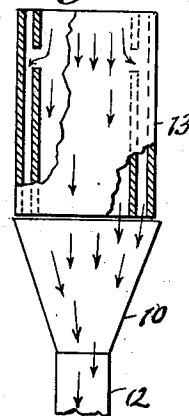


Fig. 5.

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METHOD AND MEANS FOR OPENING BAGS

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This invention relates to a method of and apparatus for opening bags or sacks. It is useful where a large number of bags or sacks are to be opened or used with a bag filling machine. It has particular advantages where the material with which the bags are being filled is dusty, tends to poison the air, or has other disagreeable and deleterious characteristics.

In the packaging of different materials, ordinarily the bags are initially opened manually for the filling operation, or opened by the introduction of a stream of compressed air into the end of the bag. The manual opening of the bags is slow and has required the employment of an extra man, while the air stream method stirs up the dust in the room, especially where the material being packed is of a dried, dusty or unwholesome nature such as dried arsenate or other insecticides.

An object of the present invention is to provide a method and apparatus for opening bags which lessens the labor cost of the operation, eliminates dust instead of stirring it up, and increases the speed with which the opening operation may be performed.

Other objects and advantages will appear hereinafter as the description proceeds.

Several embodiments of the invention are illustrated in the accompanying drawing, wherein—

Fig. 1 is a diagrammatic view showing a series of the bags being carried across the opening mechanism on a conveyor and to the various machines of a filling, weighing and stapling line;

Fig. 2 is a perspective view of one type of bag receiving form;

Fig. 3 is a perspective view of one type of the bag opening suction hopper;

Fig. 4 is a perspective view of one type of a combined bag receiving form and suction hopper adapted for opening the bags independently of the filling, weighing and stapling line;

Fig. 5 is a perspective view of another type of bag receiving form; and

Fig. 6 is a sectional view of a still different type of bag receiving form.

In Fig. 1 of the drawing the bag opening device is shown diagrammatically as forming part of a bag filling line wherein the bags after being opened are conveyed to a filling, weighing and stapling or fastening machine and then to a discharge point. Only the construction of the opening device and the manner of using the same, is embraced in the present invention, therefore, the location of the device in the line, as well as the location and construction of the other elements thereof, are not illustrated, it being understood that the opening device and the other elements of the line may be suitably arranged or constructed in any preferred manner. C represents a conveying mechanism of any suitable construction, travelling in the direction indicated by the arrow, which is adapted to transport the bags from the point where they are placed upon the conveyor across the opening device and to and from the filling, weighing, stapling or other machines in the line. Of course, where it is desirable to return the bag receiving forms to the initial position and complete the cycle a conveyor for that purpose may be included.

The bag opening device comprises a box or funnel 10 provided with or without a grid or grating 11 at its upper end, depending on the type of bag carrying form used, and a pipe 12 extending from its lower end which is connected with a suitable suction fan, not shown. This opening device may be arranged beneath the conveyor mechanism, as shown in Fig. 1, so that the bags may be placed in forms and carried along by the conveyor until over the top of the funnel.

One type of bag carrying form which may be used is illustrated in Fig. 2 and comprises a box-like member 13 having outstanding flange portions 14 and 15 adjacent its upper and lower edges, such portions being extended beyond one end of the box, as indicated at 17 and 18. The box is bottomless except for a grating 19 pivoted at one end in the extension 18 and normally held upward in bag retaining position by the conveyor slide.

The operator takes the bags to be opened from a conveniently located rack upon which they are stacked, and slips the fingers of one

hand into the top end of the bag (as shown in Fig. 1) but does not attempt to square out the bottom of the bag. He then inserts the bottom end of the bag into a form which is being carried toward the opening device by the conveyor, as shown at 20 in Fig. 1. The form with the bag therein travels over the opening device, the bag restricts the entrance of air into the device and a pressure differential is created by the suction of the opening device between the inside and outside of the bag, as air may enter the top of the bag which has been spread apart by the operator's fingers. The greater pressure within the bag tends to swell the same outwardly, further restricting the air opening and accentuating the pressure difference. The opening action is thus accelerated and the bag opens with a snap, unfolding the bottom and breaking out the creases which have been formed in the baling. The form is then carried along by the conveyor to the filling, weighing, stapling or other machines in the line.

It is understood that this operation is repeated as successive forms reach the bag receiving position and that the manner in which the forms are supported upon the conveyor may vary to suit different conditions. At the proper place the conveyor slide may be provided with an opening allowing the hinge grating 19 to swing downwardly and the bag to be discharged from the form. Of course, different types of forms may be used as, for example, one which is bottomless and in which the bag rests upon the conveyor slide or one in which the form has a fixed false bottom. A suitable return conveyor may be provided for the empty forms after the same have passed the bag discharging position.

In Fig. 4 a combined stationary form and bag opening device is shown which is suitable for use independently of any filling, weighing or other line. This device comprises a box 21 having a suction pipe 22 connected with its interior near the bottom thereof and with or without a false bottom or grid 23 arranged above the entrance of the pipe to support the bag. In this form the operator inserts with one hand the bags, bottom foremost, into the box thus restricting the air opening and bringing about the pressure differential between the inside and outside of the bag, as in the other instance above explained. As soon as the bag has fully opened the operator withdraws the same from the box and places it beneath a filling machine or otherwise disposes of it. It may, however, be filled while still in the suction box.

In Fig. 5 a still further modification of the form construction is shown. The form herein disclosed is a rectangular box-like member 24 having openings 25 at its side walls adjacent their lower edges. This form

is adapted to be brought into registry with suction ports arranged to engage the sides of the form at the openings 25. The operation would be the same in this case as in the others.

In Figs. 6 a double wall form is disclosed, the inner wall of which is provided with openings so that a side suction will be set up. This form also is made up either as a bottomless form or with the grating as shown in Fig. 2.

Although the use of bottomless forms, or forms with hinged bottoms has been suggested as a means of removing the bags therefrom, it should be understood that some mechanism for lifting the bags out of the forms might also be used.

Different types of bags are suitable for use with the device and these bags may be arranged in various ways so as to be conveniently grasped by the operator. If the bags used have one of their sides longer than the other so that their upper edges are uneven, they may be stacked with the long edge of the bags downward. The operator may then press downwardly on this longer flap, open the end of the bag slightly and spread his fingers or slip his hand slightly into the same. This arrangement proves convenient in the case of the portable forms passing around a conveyor system, as the bag may be readily inserted into the form and as the form passes over the suction box the bag will be automatically sucked into the same and opened.

The use of but one hand is required in handling the bag, thus leaving the other hand of the operator free for other purposes. The manipulation of the bag is so simple that other duties may be performed by the operator with his free hand.

The invention as thus described possesses the advantages of expediting the opening operation, of saving labor, and of eliminating the dust nuisance.

Although certain preferred embodiments of the invention have been illustrated, it should be understood that the invention is not limited thereto except in so far as the scope of the following claims so limits it.

Having thus described my invention, I claim:

1. A method of opening bags having the unsealed end in free communication with the atmosphere, which comprises creating a pressure differential between the outside and inside of a bag including the bottom thereof by reducing the outside pressure.

2. A method of opening bags having the unsealed end in free communication with the atmosphere, which comprises subjecting the inside of a bag to atmospheric pressure and the outside of the bag including the bottom thereof to less than atmospheric pressure.

3. A method of opening bags, preparatory

to filling same, which comprises inserting a bag into a receptacle so as to leave the inside of the bag in free communication with the atmosphere but restricting with the bag the passage of air into the receptacle, and exhausting the air in the receptacle to less than atmospheric pressure.

4. A method of opening bags having the unsealed end in free communication with the atmosphere, which comprises applying suction to the interior of a receptacle and inserting a bag bottom first into said receptacle.

5. A method of opening bags having the unsealed end in free communication with the atmosphere, which consists in inserting a bag bottom first into a receptacle adapted to be arranged over a suction device and simultaneously creating a pressure differential by means of the suction device between the inside of the bag and the surrounding space within the receptacle.

6. In a method of opening bags, the step which consists in inserting a bag bottom first into a tubular receptacle of suitable size freely open at the inlet end to the atmosphere, while applying suction externally to the bag surface within the confines of the receptacle.

7. A method of opening a bag which comprises inserting the bag bottom first into a draft tube while restrained from being drawn therethrough.

8. A method of opening bags, which consists in inserting a bag bottom first into a suction compartment having a bag receiving opening of suitable size, the unsealed end of the bag during said opening procedure being in free communication with the atmosphere.

9. A method of opening expansible containers, such as bags, preparatory to filling same, which comprises inserting a container into a receptacle so as to leave the inside of the container in free communication with the atmosphere while restricting with the container the passage of air into the receptacle, and exhausting the air in the receptacle to less than atmospheric pressure.

10. A method of opening a substantially imperforate container, such as a paper bag, which consists in inserting said container, sealed end first, into a compartment having a receiving opening of suitable size, wherein the outside and sealed end of the container within said compartment are subjected to a lower pressure than the inside of the container which has its unsealed end open.

11. An apparatus for opening bags comprising a suction device and a tubular bag receiving means arranged over the same and in free communication with the atmosphere at the bag receiving end, said suction device being adapted to exhaust air from the bag receiving means.

12. An apparatus for opening bags comprising in combination a conveyor mechanism, a suction device arranged adjacent said

conveyor mechanism, and a bag receiving means adapted to be arranged on said conveyor mechanism and to be brought thereby into communication with said suction device, said suction device tending to exhaust air from said bag receiving means when the same is brought into communication therewith.

13. An apparatus for opening bags comprising in combination a suction device and a substantially rectangular bag receiving means open at its upper end for receiving a bag and provided with means adjacent its lower end for effecting communication between said bag receiving means and said suction device, whereby when the bag is inserted bottom downwardly into the bag receiving means so as to restrict the opening at the upper end thereof, said suction device will exhaust air from said bag receiving means surrounding the bag therein, and a pressure differential between the exterior of the bag and the interior of the bag effected.

In testimony whereof, I hereunto affix my signature.

LOUIS E. WARD.