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BAG LIFTER AND OPENER

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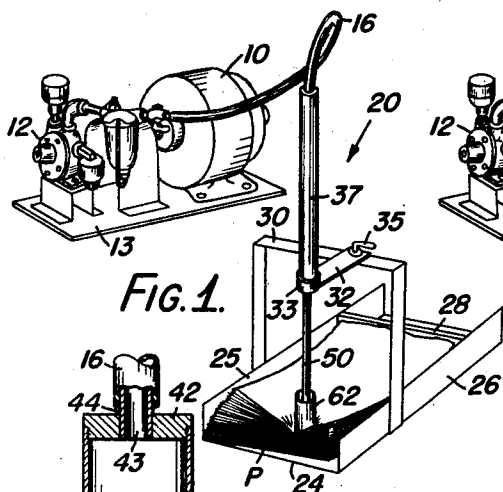


FIG. 1.

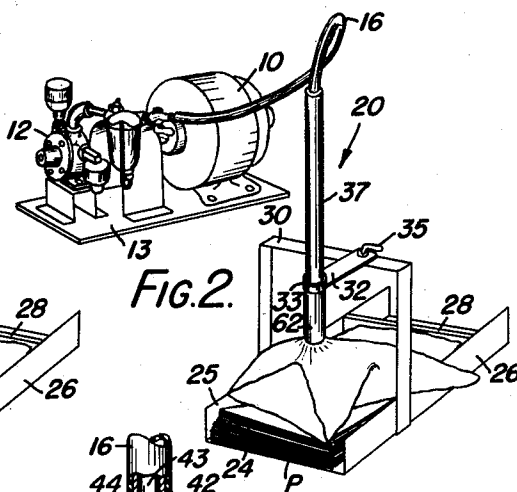


FIG. 2.

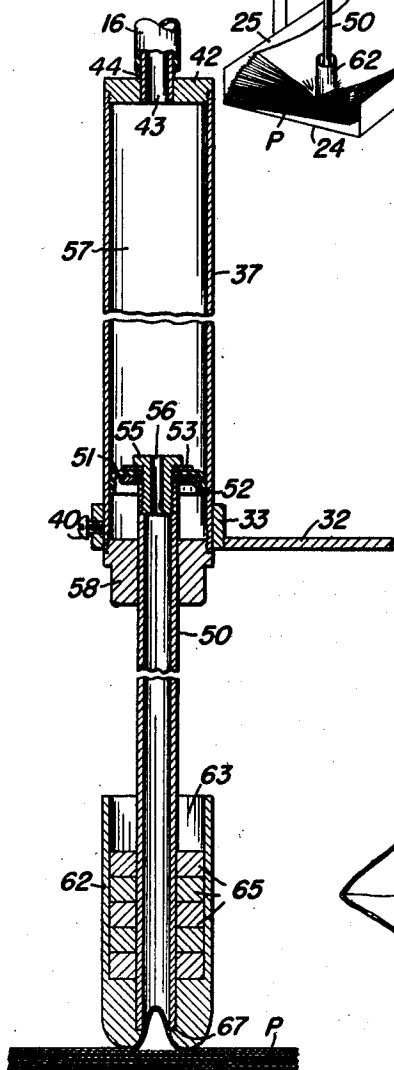


FIG. 3.

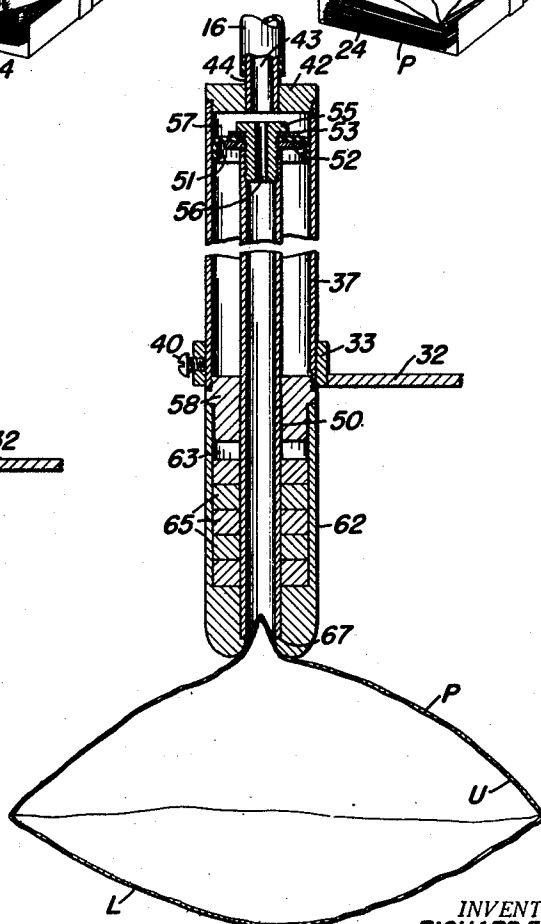


FIG. 4.

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1

2,814,488

BAG LIFTER AND OPENER

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2 Claims. (Cl. 271—26)

The present invention relates generally to bag lifters and openers and more particularly to bag lifters and openers for use in the packaging of fruits and vegetables.

In recent years, plastic bags have become widely used, especially for packaging fruits and vegetables. Plastic bags are inexpensive, durable, flexible and transparent.

Heretofore in packaging fruits or vegetables in a plastic bag, the operator has had to pick the bag up manually off a stack, open it, and then dump the desired amount of fruit or vegetables into it. Checks of such packaging operations show, however, that a surprising amount of time is required for the operator to get hold of a bag and open it, in order to fill it with produce. The bags are slippery by nature; and they tend, moreover, to stick together across their top openings.

The tendency of the bags to stick across their top openings is due to the natural stickiness of polyethylene, which is the plastic from which they are made, and also is due to the method of their manufacture. In manufacturing plastic bags, the side edges of long sheets of thin plastic are brought together and sealed to form tubular lengths of plastic which are then cut into sections. These sections are sealed at one end to form bags. Unless the blades used in the cutting operation are sharp, they will, however, press the two layers of plastic together, when they cut the lengths, causing them to stick at the cut lines. Consequently, after bags are formed by sealing one end of the pieces, the non-sealed ends are sometimes stuck together.

A primary object of the present invention is to provide means for picking up and opening bags which will reduce materially the handling time for the bags.

Another object of the invention is to provide a device for simultaneously lifting a bag off a stack and opening the bag.

Another object of this invention is to provide a device of the character described which will be automatic in operation.

Another object of this invention is to provide an automatic bag lifter and opener which will pick a bag off of a stack of bags, open it and hold it a sufficient distance above the top of the stack for convenient handling.

A further object of this invention is to provide an automatic bag lifter and opener which will open the top opening of the bag regardless of the stickiness of the plastic or other material from which the bag is made.

A still further object of this invention is to provide an automatic bag lifter and opener which will permit an operator to easily remove a bag from the lifter after it has been raised from a stack of bags.

Another object of this invention is to provide an automatic bag lifter and opener which is low in cost, yet high in efficiency and performance.

Other objects of this invention will be apparent hereinafter from the specification and from the recital of the appended claims.

In the accompanying drawing:

Fig. 1 is a perspective view of a bag lifter and opener

2

constructed according to one embodiment of this invention and showing the lifter plunger in its extended or down position;

Fig. 2 is a perspective view of the bag lifter showing the plunger retracted or raised, lifting a bag off a stack and opening the same;

Fig. 3 is a vertical section through the plunger assembly showing the plunger extended, as in Fig. 1 and in engagement with the topmost bag on a stack; and

Fig. 4 is a vertical section of the plunger assembly with the plunger retracted and lifting a bag, as in Fig. 2.

Referring now to the drawing by numerals of reference, 10 designates an electric motor; and 12 denotes a self-lubricating suction pump drivingly connected to the motor.

Both the motor and the pump are mounted on base plate 13. A flexible vacuum hose 16 made of rubber or similar material is connected at one end to pump 12, and at its opposite end to a lifting unit 20.

Lifting unit 20 comprises a metal tray 24, which is adapted to hold a stack of plastic bags P. Tray 24 has integral, parallel, vertical sides 25 and 26 and a longitudinally adjustable, transverse back plate 28 which is mounted on the rear end of the tray. The means for mounting the back plate on the tray so that it is adjustable is not shown. However, any suitable means may be used.

The closed ends of the plastic bags P abut against the back plate, with the bag openings facing the open or front end of the tray. Further, the open ends of the bags are positioned close to the front edge of the tray. Since plastic bags are very thin, as many as 1000 bags can be placed upon the tray at one time and such a stack is only a few inches high. Sides 25 and 26 and the adjustable back plate 28 enable the operator to snugly stack the bags so that they will not slip or slide when the bag lifter is in operation.

Straddling tray 24 is an inverted U-shaped bracket 30, the legs of which are secured at their free ends to sides 25 and 26 of the tray. A support arm 32, having a ring 33 at one end, is connected to and projects forwardly from bracket 30. A bolt and nut is used to affix arm 32 to bracket 30. The nut has a lever 35 integral with it which permits manual loosening and tightening of the connection so that arm 32 can be adjusted angularly and clamped in any adjusted position. Thus, the position of ring 33, angularly above the plastic bags P, can be varied easily so that, as will appear hereinafter, the lifting plunger can be located to lift a bag at any point near its top opening.

Support arm 32, with its ring 33, is adapted to carry a tube or cylinder 37. One end of the tube fits within ring 33 and is secured therein by a set-screw 40 (Fig. 3). The opposite end of the tube is internally threaded to receive a cap 42. This cap has a central bore in which is fitted the nipple 44 to which the hose 16 is connected.

Extending into tube 37 is a tube or piston rod 50 which carries a cup-shaped leather washer 51 that serves as a piston and that is secured to tube 50 between washers 52 and 53 by a hollow-bored plug 55 having an air passage 56 therethrough. Washer 51 has air-tight engagement with the inside wall of tube 37, and, as stated, acts as a piston reciprocable in the tube or cylinder 37.

The lower end of cylinder 37 is closed by a head member 58 that threads into the cylinder. This member acts as a guide for tube or piston rod 50.

Mounted on the lower end of rod 50 and rigidly secured thereto is a lifting head 62. This head is hollowed out as denoted at 63 to provide an annular space adapted to receive a plurality of weights 65. Head 62 has a mouth 67 registering with the bore of tube 50.

In operation the device works as follows: Pump 12, driven by motor 10, produces a suction or vacuum in

3

tube 50 and in mouth 67 of head 62. When nothing is covering the mouth 67, air is sucked freely through rod 50, air passage 56, chamber 57, hole 43 and hose 16; and there is nothing to resist the gravitational force of the weights 65. The weights 65, therefore, cause the head 62 and tube 50 to drop, as shown in Figs. 1 and 3, until the head comes into contact with the upper side of the topmost bag on the stack of plastic bags P. This bag thereupon closes mouth 67, thus making the suction effective. The suction thereupon not only lifts the upper side U of the bag P away from the lower side L thereof, as shown in Fig. 4, but also acts within chamber 57 to raise the piston 51. Consequently, head 62 is raised to the position shown in Figs. 2 and 4, and it will be maintained in this position as long as the suction remains effective.

The upper side of the top most bag is drawn by the suction up into the mouth or opening 67 (Figs. 3 and 4). This action separates the upper and lower sides of the bag; and when the plunger has reached a raised position the bag is fully open so that all that the operator has to do is to lift the now-opened bag off of the head or plunger 62. Although the suction created by pump 12 is sufficient to raise the plunger and the bag, it is of low magnitude and offers no appreciable resistance to the operator, when he or she pulls the bag off the plunger. Usually if plunger mouth 67 is positioned to lift a bag about an inch from one side and an inch from the open end, even sticky bags will be opened sufficiently to allow the operator to put his or her thumb inside a bag and take it off the plunger. Of course, bags that are not sticky are usually almost fully opened as they are lifted.

As soon as the bag is stripped from the head or plunger 62, the suction becomes ineffective; and the plunger 62 drops again, into engagement with another bag. As soon as the plunger engages this new bag, mouth 67 of head 62 is closed, the suction becomes operative again, the piston 51 and plunger 62 is lifted, and the new bag is opened. Thus, the operation of lifting and opening continues automatically as long as there are bags in the tray and as long as the operator strips the bags, as they are lifted, from the plunger head.

The lifter and opener of this invention can be placed at any convenient spot under or on the bagging machine so that it can be used most efficiently.

Obviously the amount of suction required to lift the bags will depend upon the weight and size of the bags to be lifted. A change in the suction force can be accomplished by merely varying the size of air passage 56 in plug 55. Further, if the device is to be used to lift paper bags or some other material, the mouth opening 67 in plunger 62 can be modified to adapt the plunger to the material to be lifted. Also, a manifold could be used on pump 12 so that one vacuum producing unit could be used to operate a plurality of lifters; or simpler still, hose 16 could have extensions connected to several different lifters.

While this invention has been described in connection with a specific embodiment thereof, then, it will be understood that it is capable of further modification, and this application is intended to cover any variations, uses, or adaptations of the invention, following, in general, the principles of the invention and including such departures from the present disclosure as come within known or customary practice in the art to which the invention pertains and as may be applied to the essential features herein-

4

before set forth and as fall within the scope of the invention or the limits of the appended claims.

Having thus described my invention what I claim is:

1. A device for picking up a bag off a vertical stack and opening the bag, comprising a vertically-disposed cylinder which is closed at both ends, a piston reciprocable in said cylinder and having substantially air-tight sealing engagement with the inside wall of said cylinder, said piston having a bore therethrough, a tubular piston rod fixedly secured to said piston and projecting downwardly through the lower end of said cylinder, the bore of said piston rod being open at both ends and communicating at its upper end with the bore in said piston, means connected to the upper end of said cylinder for producing suction in said cylinder above said piston and through the bores in said piston and piston rod, said piston rod having a head at its lower end formed with a reentrant opening constituting a mouth for the bore of said piston rod and adapted to engage the upper side of the uppermost bag on said stack when said piston is at the lower end of its stroke, and means on said head for supporting a weight around said piston rod, the amount of suction exerted by said suction-producing means being sufficient to raise said piston, piston-rod, head, weight, and bag against gravity when said mouth is closed by the upper side of a bag, but the combined weight of the piston, piston-rod, head, and weight being great enough to overcome the suction on the piston when the mouth is uncovered.

2. A device for picking up a bag off a vertical stack and opening the bag, comprising a vertically-disposed cylinder which is closed at both ends, a piston reciprocable in said cylinder and having substantially air-tight sealing engagement with the inside wall of said cylinder, said piston having a bore therethrough, a tubular piston rod fixedly secured to said piston and projecting downwardly through the lower end of said cylinder, the bore of said piston rod being open at both ends and communicating at its upper end with the bore in said piston, means connected to the upper end of said cylinder for producing suction in said cylinder above said piston and through the bores in said piston and piston rod, said piston rod having a head at its lower end formed with a reentrant opening constituting a mouth for the bore of said piston rod and adapted to engage the upper side of the uppermost bag on said stack when said piston is at the lower end of its stroke, said head being formed with an annular recess around the lower end of said piston rod to receive weights, the amount of suction exerted by said suction-producing means being sufficient to raise said piston, piston-rod, head, weights, and bag against gravity when said mouth is closed by the upper side of a bag, but the combined weight of the piston, piston-rod, head, and weights being great enough to overcome the suction on the piston when the mouth is uncovered.

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