March 19, 1935. L. A. BECKER 1,995,259

SUCTION BAG OPENING DEVICE

Filed July 23, 1932 2 Sheets-Sheet 1

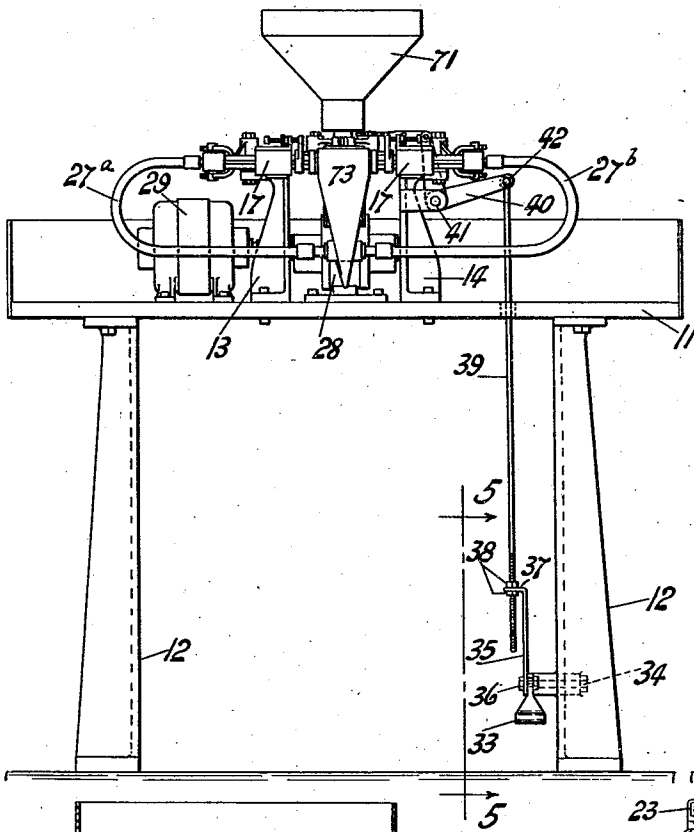

FIG. - 1

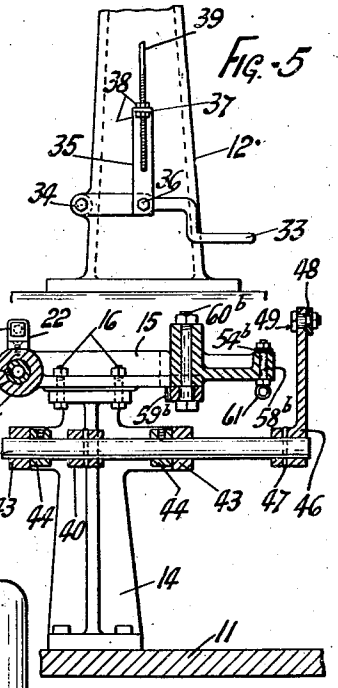

FIG. - 5

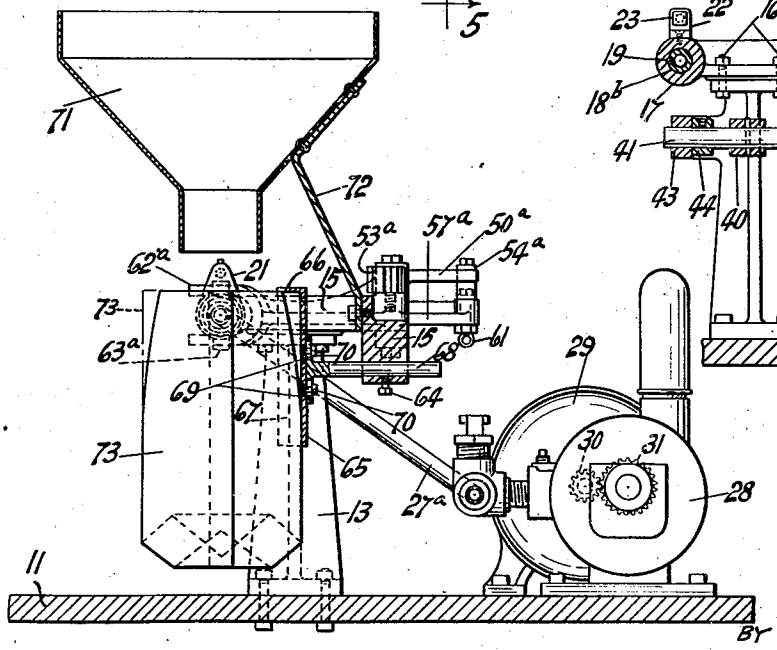

FIG. - 4

FIG. - 6

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SUCTION BAG OPENING DEVICE

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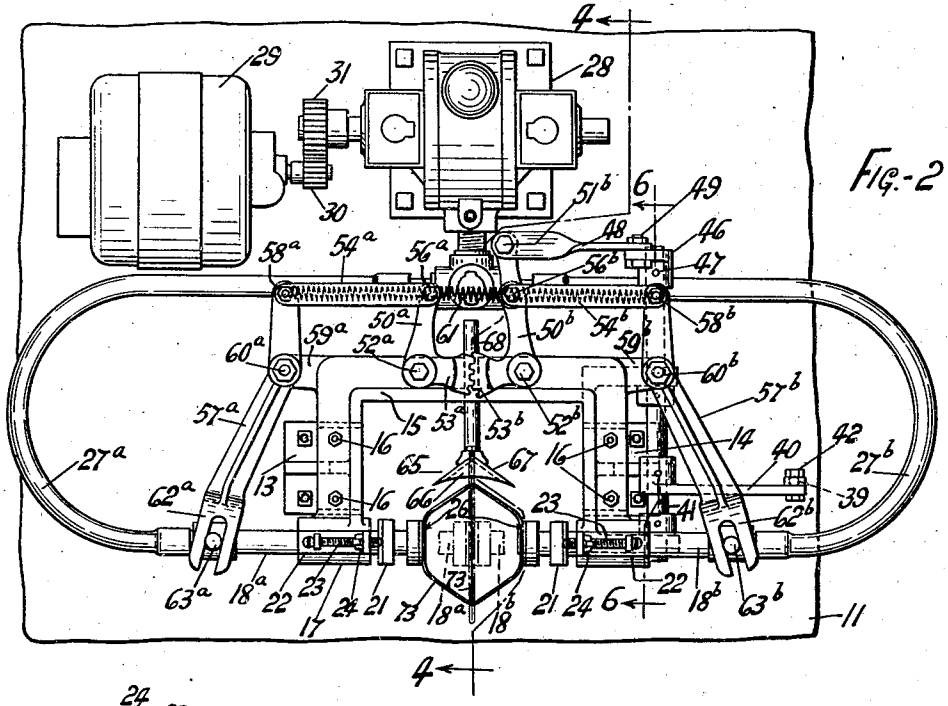

FIG.-2

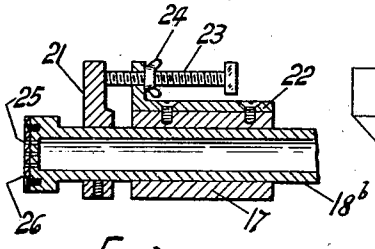

FIG.-7

FIG.-3

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SUCTION BAG OPENING DEVICE

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12 Claims. (Cl. 226—47)

This invention relates to packaging machines, and more particularly to a suction bag opening means to be used in cooperation with filling machines.

The charging of measured quantities of various kinds of food products into individual bags or envelopes has become quite common. Quite recently, bags made of regenerated cellulose sheeting, known in the trade as "Cellophane", have been extensively used on account of providing an especially attractive and transparent bag and possessing the additional advantage of providing a moisture proof bag. Bags of this type are difficult to open by hand, and it is the object of the present invention to provide an inexpensive and readily operable device by which the bags may be opened and held in open condition while the operator loads the bags. The mechanism is preferably operated by a foot treadle leaving the hands of the operator free to load the bags.

Suction means are quite commonly used for opening bags or cartons in connection with means for measuring materials and filling bags. Such suction opening means are provided with regulating means or valves for intermittently connecting the suction elements to a source of vacuum at periods co-related to the various other operations. Such regulating means or valves must be frequently regulated or replaced as they are subject to constant wear and the improper functioning of them effectively prevents the proper operation of the device. Furthermore, the vacuum regulating means or valves must be changed or especially regulated whenever such a machine is used to open bags or cartons of sizes and dimensions other than those for which it has been set. I have discovered that all of these disadvantages may be eliminated by providing suction elements constantly in communication with a source of vacuum and operating the suction elements entirely independently of any other devices such as the measuring, filling means and the like. Thus, the bag or carton opening means possesses the advantages of being operable on bags or cartons within a relatively wide range of sizes and shapes.

Therefore, it is an object of the invention to provide a relatively simple and inexpensive bag opening device which will require no complicated adjustments and may be used at minimum costs of maintenance and operation.

Another object is to provide a suction bag opening means which is easily adjusted to accommodate bags within a wide range of sizes, while another object is to provide a bag opening device characterized by simplicity of construction and operation by keeping the suction elements constantly in communication with a source of vacuum and thus eliminating the necessity of providing regulating means in the vacuum line.

While still another object is to provide a light, compact and portable device of the character described which is actuated by the simple operation of stepping on a foot treadle. These and other objects will become apparent as the description of the device proceeds. An illustrative embodiment of the invention is shown in the accompanying drawings in which:

Figure 1 is a front elevation of the device;

Figure 2 is an enlarged top plan view with the hopper removed;

Figure 3 is a front elevation;

Figure 4 is a section taken on the line 4—4 of Figure 2;

Figure 5 is a fragmentary view on the line 5—5 of Figure 1;

Figure 6 is a fragmentary sectional view on the line 6—6 of Figure 2; and

Figure 7 is a fragmentary sectional view of the right hand suction pipe with adjusting means.

The embodiment of the invention is shown as comprising a table 11 supported on standards 12, while two brackets 13 and 14, bolted to the table 11, support a main frame 15 secured thereto by bolts 16. As shown in Figures 2 and 7, the opposite front ends of the main frame 15 are shaped to provide two bearings 17 having longitudinal bores therethrough in which are mounted for reciprocation suction pipes 18*a* and 18*b*, which are prevented from rotating by keys 19. Collars 21 are fixedly mounted on the suction pipes 18*a* and 18*b* near the ends thereof as by set screws and constitute stop means, while angle plates 22, secured to the tops of the bearings 17 by screws, are provided with horizontally disposed threaded apertures receiving adjusting screws 23 constituting adjustable stops, and carrying wing nuts 24. The ends of the suction pipes 18*a* and 18*b* are provided with a series of apertures 25 over which are mounted rubber suction faces 26 having aligned apertures. Flexible rubber hoses 27*a* and 27*b* are received over the outer ends of the suction pipes 18*a* and 18*b*, and each are connected to a vacuum pump 28 which may be of any suitable construction and is driven by an electric motor 29, having a gear 30 driving a gear 31 on the pump 28.

The means for actuating the suction pipes 18*a* and 18*b* comprise a foot lever 33 pivotally mounted on one of the standards 12 by pivot pin 34 to which a link 35 is secured by a bolt

36. The upper end of the link 35 is provided with an outwardly extending portion 37 having a vertically extending aperture receiving the threaded lower end of a rod 39, on which adjusting nuts 38 are mounted, while a pivoted arm 40 is fixedly mounted on a horizontally extending shaft 41 by a pin, and is connected to the upper end of the rod 39 by a bolt 42. The shaft 41 is mounted in two bearing lugs 43 on the bracket 14, and is provided with two collars 44. An arm 46 is pinned to the rear end of the shaft 41 by pin 47, while a link 48 is secured at one end to the arm 46 by a bolt 49, and at the other end is secured to a gear sector arm 50*b* by bolt 51*b*. The arm 50*b* is pivotally mounted on the main frame 15 by a bolt 52*b*, and is provided with a gear sector 53*b*. A link 54*b*, operatively secured to the gear sector arm 50*b* by a bolt 56*b* at one end, is secured at its opposite end to an operating arm 57*b* by a bolt 58*b*. The operating arm 57*b* is pivotally mounted on lug 59*b*, forming a part of the main frame 15, by bolt 60*b*. The outer end of the operating arm 57*b* is forked as shown at 62*b*, and receives the ends of a pin 63*b* secured to a collar on the suction pipe 18*b*.

The parts last described are shown on the right hand side of the machine, as shown in Figure 2. The left side of the machine is provided with similar parts comprising a co-operating gear sector 53*a* mounted on the end of a gear sector arm 50*a* which is pivotally mounted on the frame 15 by the bolt 52*a*, while a link 54*a*, operatively secured to the gear sector arm 50*a* by a bolt 56*a* at one end, is secured at its opposite end to an operating arm 57*a* by a bolt 58*a*. The operating arm 57*a* is pivotally mounted on a lug 59*a*, forming a part of the frame 15, by a bolt 60*a*. The outer end of the operating arm 57*a* is forked as shown at 62*a*, and receives the end of a pin 63*a* secured to a collar on the suction pipe 18*a*.

A bag guide 65, comprising a top 66 and converging sides 67, is mounted on a bracket 68 which is mounted for reciprocable adjustment in the main frame 15 by means of set screw 64. The bag guide 65 is also capable of vertical adjustment by means of vertical slots 69 in the bracket and the screws 70 fitting therein. A hopper 71 for guiding the material into the mouth of the bag, is mounted on an arm 72 secured to the main frame 15, while a bag formed of transparent material such as "Cellophane" is shown at 73 in position to receive material from the hopper 71. A coil spring 61 is secured to the ends of the operating arms 57*a* and 57*b* and normally keeps the suction pipes 18*a* and 18*b* in the retracted position shown in Figure 2, which may be considered as the normal position as some actuation is required to move the suction pipes 18*a* and 18*b* from this position. It will be noticed that no means are provided for interrupting or regulating the vacuum line, consequently both of the suction faces 26 are constantly connected to the vacuum pump.

It is not intended to limit this invention to a single pair of suction elements as it will be understood that any suitable number of suction elements may be used. This invention is not limited to uses in connection with opening bags as it can conveniently be used in opening cartons, packages and containers of various descriptions. Also, various modifications may be substituted for the means shown for actuating the suction pipes without departing from the spirit of the invention.

To operate the machine the operator first adjusts the bag guide 65 to the proper height for the bag to be filled by means of the screws 70, and regulates it for the proper bag width by loosening the adjusting screw 64 and sliding the bracket 68 longitudinally. Then the vacuum pump 28 is set in operation by means of the electric motor 29 causing a vacuum to be created in the suction pipes 18*a* and 18*b*. At the proper time, preferably just preceding the feeding of the goods into the hopper 71, the operator places a bag having an open top in the bag guide 65, as shown in dot and dash lines in Figures 2 and 4. The coil spring 61 normally keeps the operating arms 57*a* and 57*b* in a retracted position so that a bag is easily inserted in the bag guide 65 for opening and filling. Then the operator presses down the foot lever 33 which, through the arm 40, rocks the shaft 41 and this moves outwardly the arm 46 secured to the back end of the shaft 41 which, through the link 48, moves the gear sector arm 50*b* while the link 54*b* rocks the operating arm 57*b* on the bolt 60*b* causing the forked end 62*b* thereof to be moved inwardly, thus carrying the suction pipe 18*b* mounted thereon also inwardly to permit the suction face 26 mounted on the end thereof, to contact one side of the bag, as shown in Figure 2.

The cooperation of the two gear sectors 53*a* and 53*b* causes the opposite suction face 18*a* to be simultaneously and similarly actuated to contact the opposite face of the bag. The operator then releases the foot lever 33 and the coil spring 61 connecting the ends of the operating arms 57*a* and 57*b* causes the suction pipes 18*a* and 18*b* to be retracted to their normal position, thus separating the two suction faces 26 which are each in contact with a side wall of the bag, and thereby holding the bag open at the top. While the bag is thus held open the goods are dropped therein, and the operator withdraws the filled bag from between the two suction faces and the cycle of operation is repeated for the next bag to be filled.

It will be understood to those skilled in the art that my invention at least accomplishes the principal objects thereof, and that it may be variously changed, used or modified without departing from the spirit of the invention or sacrificing the advantages thereof. It will also be understood that the embodiment of my invention shown herein is illustrative only, and that my invention is not limited thereto.

What is claimed is:

1. A bag opening device comprising, suction elements continuously connected to a source of vacuum and adapted to grip the walls of a bag, means for causing said suction elements to approach and separate from each other, and centering means adjustable vertically and horizontally for positioning bags of varying heights and widths between said suction elements.

2. A bag opening device comprising, suction elements continuously connected to a source of vacuum and adapted to grip the walls of a bag, spring means normally holding said suction elements apart in a retracted position, arms and links for causing said suction elements to be moved towards each other, a lever for actuating said arms and links, and centering means adjustable vertically and horizontally for positioning bags of varying heights and widths between said suction elements.

3. A bag opening device comprising, suction elements continuously connected to a source of

vacuum and adapted to grip the walls of a bag, means for causing said suction elements to approach and separate from each other, centering means adjustable vertically and horizontally for positioning bags of varying heights and widths between said suction elements, and adjustable means for limiting the extent of separation of said suction elements.

4. A bag opening device comprising, suction elements continuously connected to a source of vacuum and adapted to grip the walls of a bag, spring means normally holding said suction elements apart in a retracted position, arms and links for causing said suction elements to be moved towards each other, a lever for actuating said arms and links, centering means for positioning a bag between said suction elements, and adjustable means for limiting the extent of separation of said suction elements.

5. A bag opening device comprising, suction elements continuously connected to a source of vacuum and adapted to grip the walls of the bag, spring means normally holding said suction elements apart in a retracted position, arms and links for causing said suction elements to be moved towards each other, a lever for actuating said arms and links, centering means adjustable vertically and horizontally for positioning bags of varying heights and widths between said suction elements, and adjustable means for limiting the extent of separation of said suction elements.

6. A bag opening device, comprising movable suction elements continuously connected to a source of vacuum and adapted to grip the walls of a bag, spring means normally holding said suction elements apart in a retracted position, arms and links for causing said suction elements to be moved towards each other to grip a flattened bag inserted therebetween, the return movement of said suction elements to their normal retracted position serving to open and hold open said bag during a filling operation, and a lever for actuating said arms and links.

7. A bag opening device, comprising movable suction elements continuously connected to a source of vacuum and adapted to grip the walls of a bag, spring means normally holding said suction elements apart in a retracted position, arms and links for causing said suction elements to be moved towards each other to grip a flattened bag inserted therebetween, the return movement of said suction elements to their normal retracted position serving to open and hold open said bag during a filling operation, a lever for actuating said arms and links, and centering means for positioning a bag between said suction elements.

8. A bag opening device, comprising a frame, suction elements mounted on said frame and continuously connected to a source of vacuum and adapted to grip the walls of a bag, means for causing said suction elements to approach and separate from each other, stop means provided on said suction elements, and adjustable stops mounted on said frame and adapted to be engaged by said stop means for adjustably limiting the extent of the retractive movement of said suction elements.

9. A bag opening device, comprising a frame, suction elements mounted on said frame and continuously connected to a source of vacuum and adapted to grip the walls of a bag, means for causing said suction elements to approach and separate from each other, collars mounted on said suction elements, adjusting screws mounted on said frame, the ends of said adjusting screws being adapted to be engaged by said collars, for adjustably limiting the extent of the retractive movement of said suction elements.

10. A bag opening device comprising a frame, suction elements mounted on said frame and continuously connected to a source of vacuum and adapted to grip the walls of a bag, said suction elements being normally held apart in a retracted position, means for causing said suction elements to move towards each other, stop means provided on said suction elements, and adjustable stops mounted on said frame and adapted to be engaged by said stop means for adjustably limiting the extent of the retractive movement of said suction elements.

11. A bag opening device, comprising a frame, suction elements mounted on said frame and continuously connected to a source of vacuum and adapted to grip the walls of a bag, said suction elements being normally held apart in a retracted position, means for causing said suction elements to move towards each other, collars mounted on said suction elements, adjusting screws mounted on said frame, the ends of said adjusting screws being adapted to be engaged by said collars for adjustably limiting the extent of the retractive movement of said suction elements.

12. A bag opening device, comprising a frame, suction elements mounted on said frame and continuously connected to a source of vacuum and adapted to grip the walls of a bag, said suction elements being normally held apart in a retracted position, means for causing said suction elements to move towards each other, adjustable centering means for positioning a bag between said suction elements, stop means provided on said suction elements, and adjustable stops mounted on said frame and adapted to be engaged by said stop means, for adjustably limiting the extent of the retractive movement of said suction elements.

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