Jan. 31, 1956 E. FEINSTEIN 2,732,988

APPARATUS FOR PACKING AND SEALING BAG-LIKE CONTAINERS

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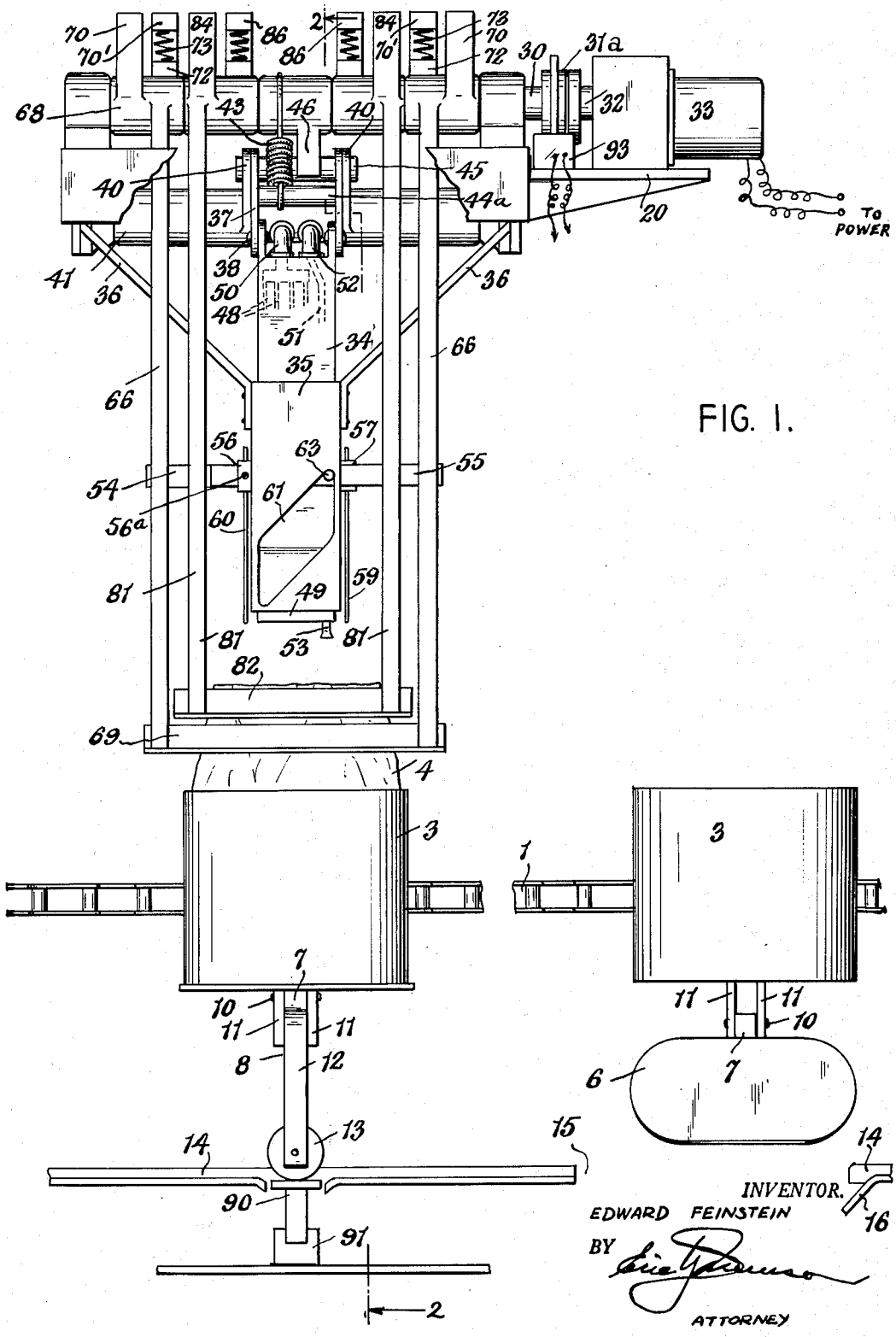


FIG. 1.

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FIG. 2.

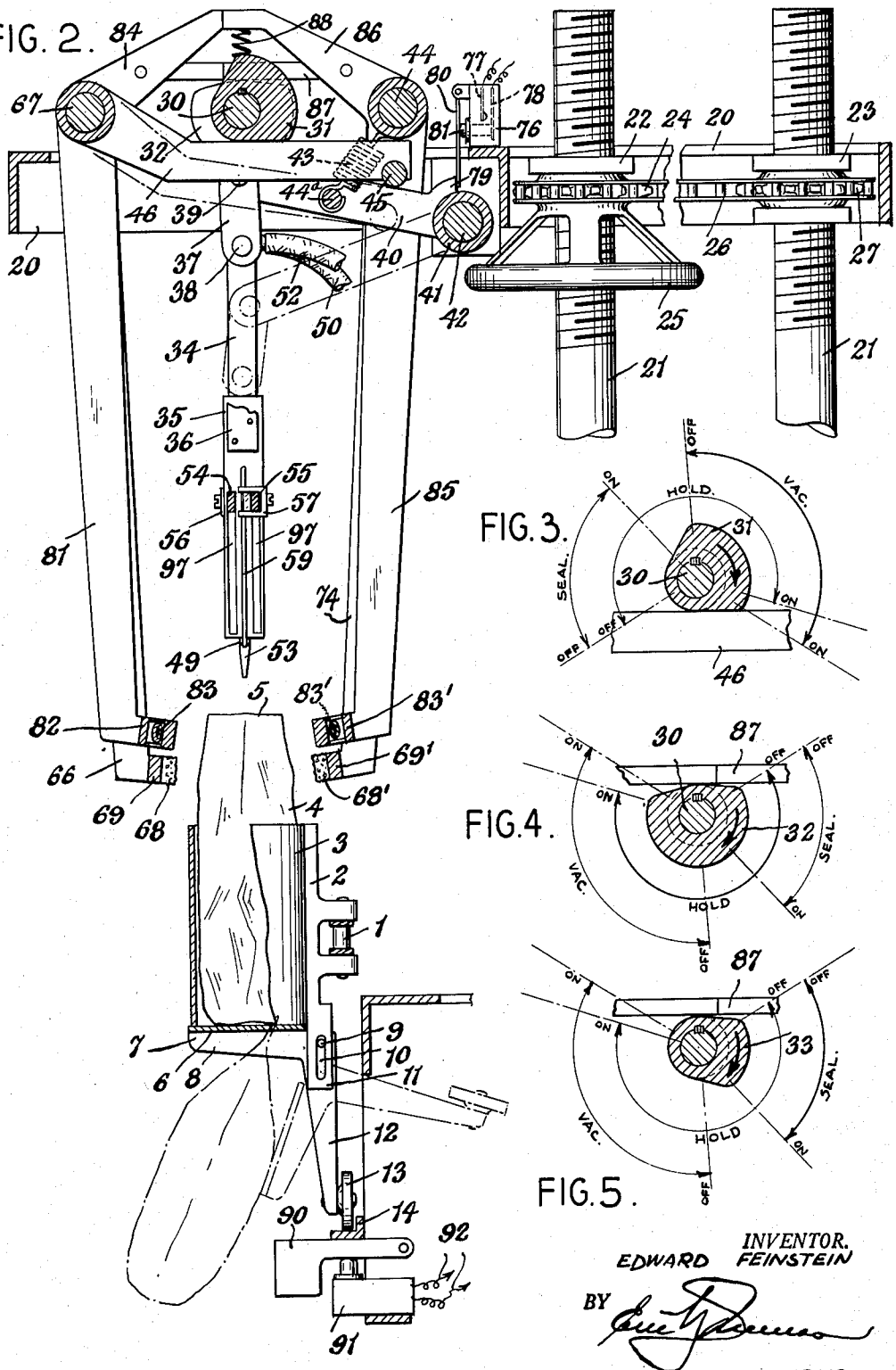


FIG. 3.

FIG. 4.

FIG. 5.

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FIG. 6.

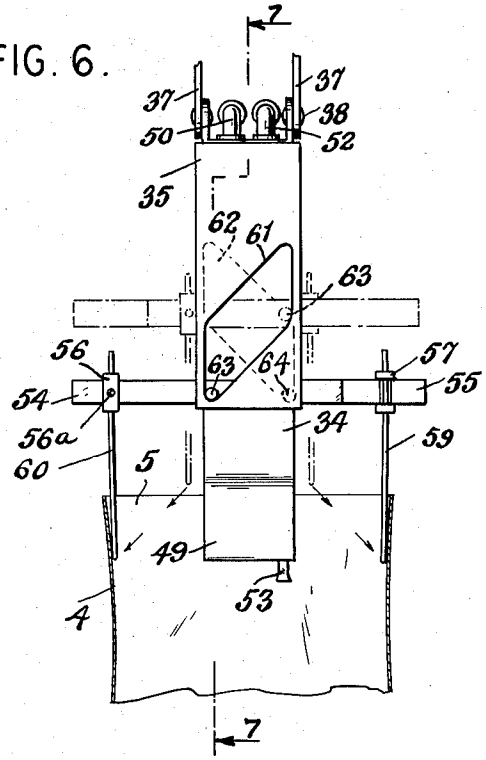
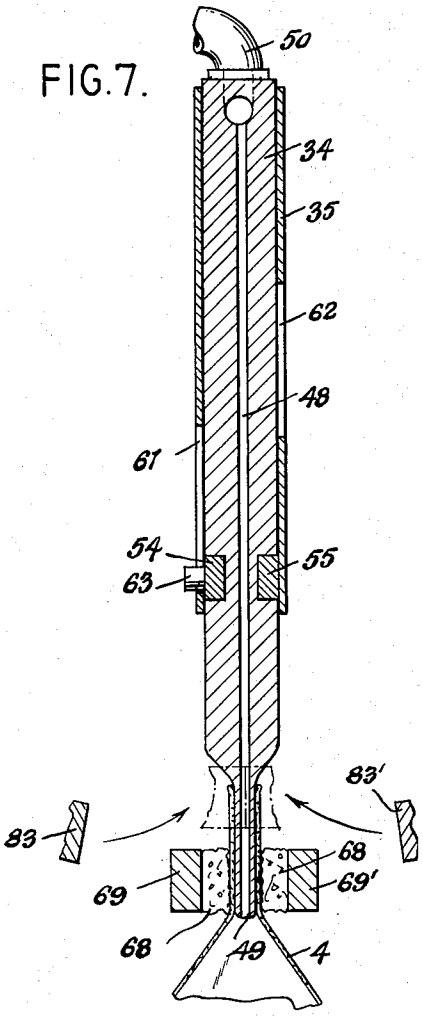


FIG. 7.



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APPARATUS FOR PACKING AND SEALING BAG-LIKE CONTAINERS

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5 Claims. (Cl. 226—51)

This invention relates to packaging machines, and more particularly to a device for sealing bags after the same have been filled, and then delivering the filled and sealed bags from conveying means.

At the present time, certain commodities, such as sauerkraut, pickles, and various other foods or other products which are partly composed of solids and partly of liquids, are sold in watertight bags, usually of sheet materials, such as cellophane, Pliofilm or other materials which can be sealed by the application of heat. Such bags are usually moved on a conveyor past a filling station where a predetermined quantity of the solid material is placed in each bag. The conveyor then carries each bag containing such solid material to a second filling station whereat a supply of liquid is deposited, the amount of solid material and liquid placed in each bag being usually regulatable by weight so that each bag, when filled, will contain a predetermined amount of the food or other product.

It is desirable that the filled bags be properly and effectively sealed, which sealing operation shall include a removal of trapped air or gases from the bag and shall, if necessary, include the supply of an additional charge of liquid to insure each bag, before it is sealed being provided with a definite amount of both solid and liquid contents. The present invention has for one of its objects, the provision of means by which a filled bag shall be suctionally treated to remove air; shall be charged with an auxiliary or supplemental amount of fluid if necessary; shall be distended into flat-mouth form and then gripped and held while sealing means operates to effectively heat-seal the flattened top or mouth of the bag. After the bag is thus treated, means are provided for the ejection of the filled and sealed bag from the support on the conveyor on which it is transported.

An object of the invention is to provide, in a machine of the character described, an improved bag-distension means, operative in the open top of a bag, to distend the bag and shape it into flattened formation and to assist gripping means in holding the top portion of the bag in perfectly flat and unwrinkled condition while sealing means becomes effective to join the contiguous faces of the mouth of the bag and thus seal the bag.

It is another object of the invention to provide an improved bag support having a pivoted bottom, and means by which said bottom will be swung to a lowered and open position after the sealed bag leaves its treating station, to thereby cause the sealed bag to fall out of the open bottom of the support.

With these and other objects to be hereinafter set forth, in view, I have devised the particular arrangement of parts to be described in the following specification and set forth in the claims appended hereto.

In the accompanying drawing, wherein an illustrative embodiment of the invention is disclosed,

Fig. 1 is a front elevation of the improved apparatus;

Fig. 2 is a sectional view, taken substantially on the line 2—2 of Fig. 1, looking in the direction of the arrows;

Figs. 3 to 5 inclusive are diagrammatic views of the several cams employed in the apparatus, showing the manner of operation of the same;

Fig. 6 is a front elevational view of the plunger and bag-distension means; and

Fig. 7 is a sectional view, taken substantially on the line 7—7 of Fig. 6, looking in the direction of the arrows.

Referring to the drawings, and particularly to Figs. 1 and 2 thereof, 1 indicates a portion of a conveyor, shown in the drawings as a chain, but which may be a flexible belt or other endless carrier. Secured to the conveyor chain by the brackets 2 are suitably spaced receptacles 3 which act as carriers for the bags 4 and the contents thereof. These bags may be composed of any suitable, flexible and water repellent material, which might be suitably coated paper, or some other sheet material, such as that made of unregenerated cellulose, or any other material which is capable of being fusibly joined. When supported in each of the receptacle 3, and which may be cylindrical or otherwise shaped to freely accommodate the bags, the bag rests on its closed bottom and has its open top or mouth 5 disposed uppermost, as clearly seen in Fig. 2.

Each of the receptacles 3 is provided with a hinged bottom 6 secured on the arm 7 of a bell-crank 8 provided with a pivot pin 9 that is pivotal, as well as vertically movable, in slots 10 provided in lugs 11 located at the lower end of the bracket 2. The second arm 12 of the bell-crank 8 carries a roller 13 which normally rides upon a horizontal rail 14 during most of the travel of the receptacle 3. While the roller 13 rides on the rail 14, the bell-crank 8 is held in the position shown in full lines in Fig. 2, or that in which the bottom 6 is maintained in a closed position to support the bag 4 in the receptacle 3. After the bag has been sealed, by a mechanism to be described, the conveyor moves away from the sealing station so that the roller 13 reaches a break or interruption 15 in the rail 14, whereupon the roller 14 being then unsupported, will allow the pivot pin 9 to drop down in the slots 10 under the weight of the bag and its contents and then permit the bell-crank 7 to swing on its pivot pin 9 to the open position shown in dot-and-dash lines in Fig. 2, to allow the bag to drop out of the then open bottom of the receptacle 3, into a suitable delivery chute or container. When the sealed bag has thus fallen out of its receptacle 3, the weight of the roller 13 will swing the bottom 6 to closed position, but since the pivot pin is then at the lower end of the slots 10, the bottom requires a slight elevating movement to bring it to its fully closed position, or that shown in full lines in Fig. 2. This rising movement of the bottom of the receptacle is attained by means of an inclined portion 16 of the rail 14, which inclined portion acts as a cam to engage the roller 13 and lifts the bell crank 3 and causes the pivot pin 9 to rise toward the top of the slots 10 and thus close the lower end of the receptacle 3. The receptacle 3 is then carried by conveyor 1 to a point where an empty bag is deposited in it and the bag next refilled with the goods at one or more filling stations.

Before being brought to the sealing station, involving the construction shown in the drawings, the bags carried by the several receptacles 3, are filled with solid material and then with a fluid, so that as each bag 4 is carried to the sealing station, it has been filled with the goods to a required weight. Of course, the bags might well be filled solely with solid materials, since the initial contents placed in the bags does not affect the operation of the apparatus herein described. A bag so filled is shown in position to be suctionally treated, distended, gripped and then sealed in a manner to be presently explained. The mechanisms which perform these functions, include a supporting base 20 adjustably supported upon a plurality

of threaded posts or standards 21 which threadably engage supporting parts 22 and 23 on which the base rests. The supporting part 22 carries a sprocket 24 attached to or forming a part of a hand wheel 25, and a chain 26 extended about the sprocket 24, passes around sprockets 27 mounted on or forming part of the supports 23. This arrangement is such that by manual rotative movement of the hand wheel 25 the base 20 can be raised or lowered to compensate for bags of various heights carried by the receptacles 3 in position to be treated.

Rotatably supported in suitable bearings on the base 20 is a cam shaft 30 which is connected through a single-revolution clutch 31*a* of conventional form, to the shaft 32 of an electric motor 33. The cam shaft 30 carries a plurality of cams, namely, those indicated respectively at 31, 32 and 33.

The cam shown at 31 serves to cause the descent of a plunger 34 which is vertically reciprocated through a guide sleeve 35 supported by the brace members 36 from the base 20. At its upper end, the plunger 34 is pivotally connected at 38 to links 37 which have their upper ends pivoted at 39 to arms 40 formed on a hub 41 rotative on a shaft 42 secured in the base 20. A coil spring 43 has one end secured to a cross pin 44*a* extending between the arms 40 and has its opposite end extended about a shaft 44. The coil spring 43 tends to return the plunger 34 in an elevated position when the depressing cam 31 therefor permits it.

The cam 31 is operative against a lever 46, which carries a pin 45 that is operative to press down upon arms 40 and cause descent of the plunger 34 through the link connection 37 between said plunger and the arms 40. The cam 31 is operative upon the arm 46 to depress the same and cause descent of the plunger as above explained, and through the linkage just described, the plunger will be provided with a very substantial downward movement while employing only a relatively small-diameter cam to cause such movement. Through the mechanism described, it will be seen that the plunger 34 will be lowered toward the bag and held in lowered position and then caused to ascend at the conclusion of the operations to be performed.

The plunger 34 is shown in detail in Fig. 7, wherein it will be observed that the same is provided with one or more air passages 48 which lead out at the lower end of the plunger, and through an integrally formed relatively flat, nozzle-like end 49 that is entered into the top of the bag for the purpose of withdrawing air or gases in developing at least a partial vacuum in the bag by suction exerted through the passages 48. At the upper end of the plunger 34, the passages 48 connect into a suction tube 50 which extends to a pump or other vacuum-creating or suction means. Also extending downwardly through the plunger 34 is a liquid-supply passage 51 connected at the top of the plunger to a supply hose 52 which extends from a source of supply for liquid which may be required to be delivered into the bag 4. The lower end of the liquid-supply passage 51 connects to a projecting nozzle 53 which enters the bag upon the descent of the plunger 34 in a manner to be described.

Carried by the plunger 34 is a pair of bars indicated respectively at 54 and 55. Bar 54 carries a clamp 56 which is adjustable along the length of the bar, and said clamp holds a downwardly-extending, bag-distending spring finger 60 which is vertically adjustable in the clamp 56. The clamp 56 is adjustable along the bar 54 and can be fixed in any desired adjusted position by the set screw 56*a*. A similar clamp 57 is carried by the bar 55 which clamp 57 is also adjustable along the length of the bar 55 and carries a vertically adjustable resilient or spring finger 59 similar in shape and construction to that shown at 60. As seen in Fig. 6, these fingers are inserted into the mouth 5 of the bag 4 upon the descent of the plunger 34 and are caused to move apart as they

enter the mouth of the bag, as indicated by the arrows in Fig. 6, thus distending the mouth of the bag and causing it to assume a slit-like shape at its upper end and closely conform to the flattened nozzle portion 49 of the plunger, which portion of the plunger enters the mouth of the bag simultaneously with the bag-distending fingers 59 and 60. The plunger guide 35 is formed with the slots 97 in its side walls to permit up and down movement of the bars 54 and 55.

The bars 54 and 55, carrying the fingers 60 and 59, are slidable transversely of the plunger to bring fingers 60 and 59 toward one another or move them apart to the bag-distension position. This movement of the bars is caused by a pin-and-slot arrangement. Such arrangement includes an angular or inclined slot 61 formed in the front wall of the plunger guide 35, and a similar but reversely-inclined slot 62 formed in the rear wall of the guide 35. A stud 63, extending from a face of the bar 54 fits and is movable within the slot 61, while a similar stud 64, extending from the rear face of the bar 55, enters into the slot 62. When the plunger 34 is in its elevated position, the fingers 59 and 60 will be located in their contracted position, as indicated in the upper dotted lines in Fig. 6, at which time pin 63 will be located toward the right in the slot 61, while the pin 64 will then be located toward the left in the slot 62. As the plunger descends, the pins 63 and 64 will follow the vertical ends of their respective slots until the inclined lower edge of the two slots are reached, whereupon the pins 63 and 64 will start down such inclined edges, which edges will act as cams to slide the bars outwardly and cause the fingers 59 and 60 to spread apart while descending into the mouth of the bag, as indicated by the arrows in Fig. 6. When the limit of outward movement of the pins occurs, and such movement is limited by the confines of the slots 61 and 62, the fingers 59 and 60 will have entered the mouth of the bag to the required extent and will have engaged the wall of the bag at diametrically opposite points and have spread the mouth of the bag into slit-like formation, causing the bag to closely fit about the flattened nozzle portion 49 at the end of the plunger 34. At this time, the suction means and the filling means will become effective to fill the bag with such additional fluid as may be required and exhaust the air from the bag preparatory to the sealing operation, and this is facilitated by bag-gripping means to be now described.

Oscillatingly mounted on a shaft 67 supported by base 20 is a pair of arms, both of which are indicated at 66. At their lower ends, these arms are connected by a cross member 60 which carries a facing 68 of sponge rubber or similarly soft and compressible material providing a gripping or holding surface. At its upper end, each arm 66 is formed with a hub 68 which is mounted for oscillating movement on the shaft 67, and extending from the hub is a finger 70. A similar pair of arms 74 is located at the back of the apparatus, which arms are connected at their lower ends by the cross member 69′ provided with the compressible facing 68′. Arms 74 are provided at the top with the fingers 70′ to which one end of a bar 72 is pivotally attached and a coil spring 73 is interposed between the bar 72 and the finger 70′ and provides a resilient cushion means by which the bar 72 is resiliently maintained at a given position and will allow for compression of the facings 68 and 68′ against the bag top. The springs 73 rest on the bars 72 and the bars 72 rest on two of the cams 32. The arms 66 also have the fingers 70, the bars 72 and the coil springs 73.

The arrangement just described is such that when the plunger 34 has its lower end entered into the mouth of the bag and the bag is distended by the fingers 59 and 60 into slit-like formation to flatten the bag at the top and form it closely around the nozzle-like end 49 of the plunger, the arms 66 and 74 will then be swung toward one another to bring the facings 68 and 68′ into contact

with opposite sides of the mouth portion of the bag and thus firmly hold the mouth of the bag closely about the nozzle portion 49 of the plunger 34. At this time the fluid may be directed into the bag and suction exerted to withdraw gases or air from the bag.

The control of the vacuum or suction-producing means and liquid flow is had by a switch shown at 76 in Fig. 2. Said switch includes a fixed contact member 77 and a movable contact member 78 and is a normally closed switch. That is to say, that while the plunger is in its lowered position with the filling and vacuum-creating nozzles disposed in the mouth of the bag, the switch will be closed so that an electric circuit controlled by the switch will be effective to operate such devices as are controlled by said circuit to exert the suction and supply a controlled amount of the filling fluid through the plunger 34 and into the bag. When the plunger rises at the time permitted by the cam 31, a shoulder 79 provided on one of the arms 40 will engage a finger 80 and cause it to exert pressure against a push-button 81 which will urge the movable contact 78 away from the fixed contact 77 and thus open the switch and shut off the operation of the vacuum-creating means and the liquid supply.

The sealing means for the mouth of the bag includes a pair of oscillating arms 81, connected at the bottom by the cross member 82 which carries a suitable heating element 83. The arms 81 rock on the shaft 67, and have their hubs provided with the fingers 84 and connected bars and springs similar to those shown at 72 and 73 employed in connection with the gripping arms 66. At the back of the apparatus is provided a pair of arms 85 having a cross bar 83' at their lower end and which carries a heating unit 83'. These arms 85 have their hubs provided with the fingers 86, the pivotally attached bars 87 and the coil springs 88 operative in the manner described with respect to the similar elements 70, 72 and 73 forming part of the gripping or holding mechanism.

The operation of the improved apparatus is briefly as follows:

The empty bags carried in the various receptacles 3 on the conveyor 1 are transported to one or more filling stations, not herein shown, but known in this art, where the bags are successively filled with the goods. Such goods mights be wholly composed of solid materials or of solid and liquid materials. If the goods are wholly of solid material it is possible that one filling station will suffice. It is sufficient to state that each filled bag is presented below the sealing means during a halt in the movement of the conveyor for the performance of the steps herein described. In Figs. 1 and 2, a bag ready for air evacuation, supplemental filling and sealing treatment is shown and it will be there noted that the roller 13 has come to rest upon a pivoted switch-actuator 90, thus depressing the same and causing it to close an electric switch 91. Wires 92 extend from the switch 91 to a source of current and to a solenoid 93 which when energized by closing of switch 91 will operate the one-revolution clutch 31*a*. As the clutch 31*a* engages shaft 32 of the constantly-operating electric motor 33, it will cause the cam shaft 30 to be rotated for a single revolution and the clutch then automatically disengaged. During this rotation of the cam shaft, the cam 31 will cause the plunger 34 to descend to the necessary extent to cause its nozzle end 49 to enter the mouth 5 of the bag. At the same time, the bag-distending fingers 59 and 60 will enter the bag and will be spread outwardly by the action of the slots 61 and 62 on the pins 63 and 64. As the fingers 59 and 60 are thus spread apart they will form the top or mouth of the bag into a narrow slit-like opening and cause the opposite sides of the mouth of the bag to closely conform to the shape of the flattened nozzle portion 49 of the plunger.

Cams 32 now cause the arms 66 and 74 to be swung toward one another to bring their facings 68 and 68' into contact with the opposite sides of the bag mouth a short distance below the top of the bag thus firmly holding the bag surfaces against the faces of the nozzle part 49 of the plunger, as clearly seen in Fig. 7. The delivery of fluid through passage 51 and nozzle 53 will now take place and the creation of a vacuum by exertion of suction through passages 48 can next be had, in suitably timed relation to the liquid filling, so that when the plunger 34 moves upwardly and withdraws the nozzles 49 and 53 and fingers 59 and 60 out of the top of the bag, the bag will have been filled to a required weight and the air or gases evacuated.

The action of the several cams 31, 32 and 33 will be clearly apparent from Figs. 3 to 5, wherein the relative operations of the plunger, the vacuum means; the gripping or holding means and the sealing means will be noted. When the parts have reached the position shown in Fig. 7, the plunger 34 begins its ascent and as its nozzle portion 49 as well as the fingers 59 and 60 leave the top or mouth of the bag, the gripping arms 66 and 74 move inwardly to bring the opposite sides of the mouth of the bag into contiguous relation and without wrinkling, holding the top of the bag in such position while arms 81 and 85 are swung inwardly to contact the top portion of the bag above the gripping means and by the application of heat to these parts of the bag unite the same with a perfect seal.

It is to be noted that the sealing of the top of the bag occurs closely adjacent to the top edge of the same so that no projecting parts or flaps are present along the top of the bag, and the possibility of the bag being thus inadvertently stripped open along the top is avoided. After the sealing of the top of the bag is thus effected, the conveyor will move the filled and sealed bag to a point where the roller 13 reaches the break or interruption 15 in the rail 14, whereon the receptacle-bottom 6 will drop down until pin 9 reaches the lower end of the slots 10, and the bottom 6 will be tilted to allow the filled and sealed bag to slide out as clearly shown in dot-and-dash lines in Fig. 2. As the then empty receptacle 3 is moved farther to the right, as viewed in Fig. 1, the inclined portion 16 of the rail will engage and elevate the roller 13 to cause the bottom 6, as the roller progresses farther along the rail, to be swung back into closed position and in readiness for the insertion of an empty bag that is then carried to the filling station or stations.

While I have herein described the apparatus as employed for containing certain products partly composed of solids and partly of liquids, it will be apparent that the device may be used for almost any products, solid or liquid, or both, which can be satisfactorily contained in bags of the character described. Also while I have herewith suggested that the suction nozzle and the liquid-supply nozzle might work in cooperation or in close association, it will be understood that either or both of these means may be independently operated as necessitated by the requirements of the products being packaged.

Having thus described one embodiment of the invention, it is obvious that the same is not to be restricted thereto, but is broad enough to cover all structures coming within the scope of the annexed claims.

What I claim is:

1. In a machine of the character described, a bag-support for holding a bag with its open top directed upwardly, a vertically movable plunger and means for moving the same to and from the top of the bag while the bag rests on said support, bag-distension means carried by the plunger and entering into the bag in company with the plunger and distending the same to form the top of the bag into slit-like formation after the plunger has entered into the top of the bag, the plunger including a suction nozzle and a liquid-supply nozzle, said nozzles entering the bag prior to the distension of the same by the said distension means, gripping means for engaging the bag near its top and flattening said top portion of the bag as the distension means is withdrawn from the bag,

and sealing means for sealing the top portion of the bag while the said top portion is held in flattened condition by said gripping means.

2. In a machine of the character described, an intermittently-moved conveyor, a receptacle carried thereon, said receptacle being provided with a movable bottom, a plunger beneath which the receptacle is halted while carrying an open-top bag, said plunger having suction means, liquid-supply means and bag-distension means entering into the bag upon descent of the plunger, the bag distension means being operative after the suction means and liquid-supply means have entered the bag gripping means for flattening the top portion of the bag after the plunger ascends, sealing means for sealing the top of the bag while said bag is engaged by the gripping means, and means for causing the movable bottom of the receptacle to be moved to open position after the receptacle has been moved from below the plunger, whereby the sealed bag carried by the receptacle will fall out of the then-open bottom of the same.

3. In a machine of the character described, a vertically-movable plunger, suction means carried by said plunger, liquid-supply means carried by the plunger, bag-distension means carried by the plunger, means for supporting an open-top bag below the plunger whereby descent of said plunger will carry the liquid-supply means, the suction means and the bag-distension means into the bag, means for causing the bag-distension means to form the top portion of the bag into flattened formation, means for gripping said flattened top of the bag while held in distended position by the bag-distension means and means for sealing the top of the bag while held by the gripping means.

4. In a machine of the character described, means for supporting an open-top bag, a vertically movable element and means for lowering the same into the open top of the bag, said element carrying a pair of fingers movable apart

to distend the top of the bag and bring its walls in close, flat relation, gripping means operable from the opposite sides of the bag to grip the flattened top portion of the same below the upper edge of the bag and while the bag is held distended, and sealing means for compressing and heat-sealing that portion of the top of the bag which is located between the gripping means and the top edge of the bag.

5. In a machine of the character described, means for supporting an open-top bag, a vertically movable element and means for lowering the same into the open top of the bag, said element carrying a pair of fingers movable apart to thereby distend the top of the bag and bring its walls in close, flat relation, gripping means operable from the opposite sides of the bag to grip the flattened top portion of the bag below the upper edge of the bag, sealing means for compressing and heat-sealing that portion of the top of the bag which is located between the gripping means and the top edge of the bag, said sealing means being effective to seal the top edge of the bag while the bag is gripped by the gripping means at a point below the area sealed by said sealing means, suction means and fluid supply means carried by the movable element and operable while a portion of said element is disposed within the bag and has the bag mouth held closely about it by the gripping means.

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