United States Patent

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[54] **BAG-PRESSING MEMBERS FOR PACKAGING MACHINE**
13 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **53/385**
[51] **Int. Cl.** **B65b 43/36**
[50] **Field of Search** ..... 53/385, 386, 183, 187, 124 B

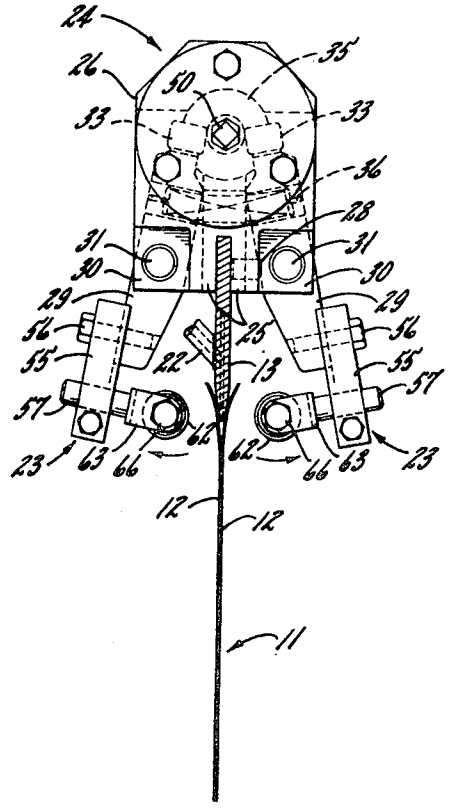
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ABSTRACT: A machine for opening thin, flexible walled bags as the bags are advanced edgewise along a predetermined path in upright positions with the walls of each bag positioned face-to-face and with the upper end portions of the bags straddling a splitter bar. To force the walls of each bag apart, air is expelled through an orifice in the splitter bar and into the bag. In timed relation with the expelling of air into the bag, a pair of pressing members are moved into engagement with the upper end portions of the walls to press the walls against the splitter bar and prevent escape of the air. To move the pressing members into engagement with the bags, an air-operated actuator is mounted on the upper edge portion of the splitter bar and is connected to the pressing members.

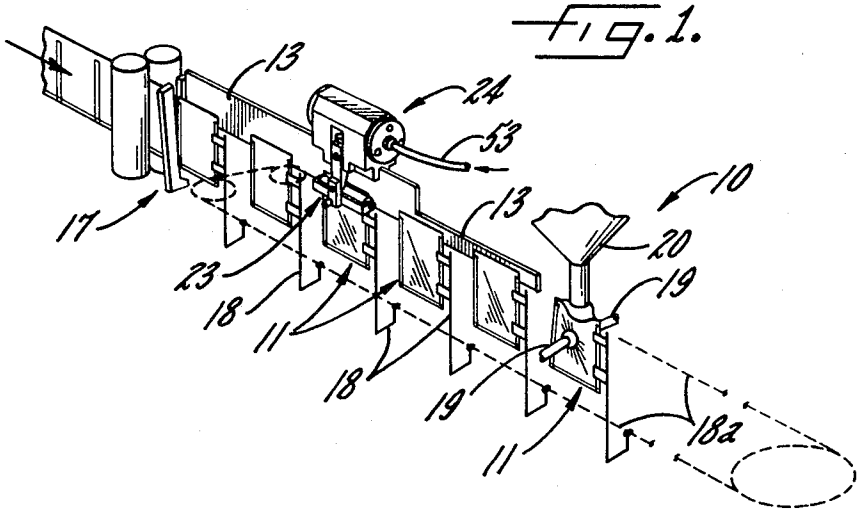


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SHEET 1 OF 2

Fig. 1.



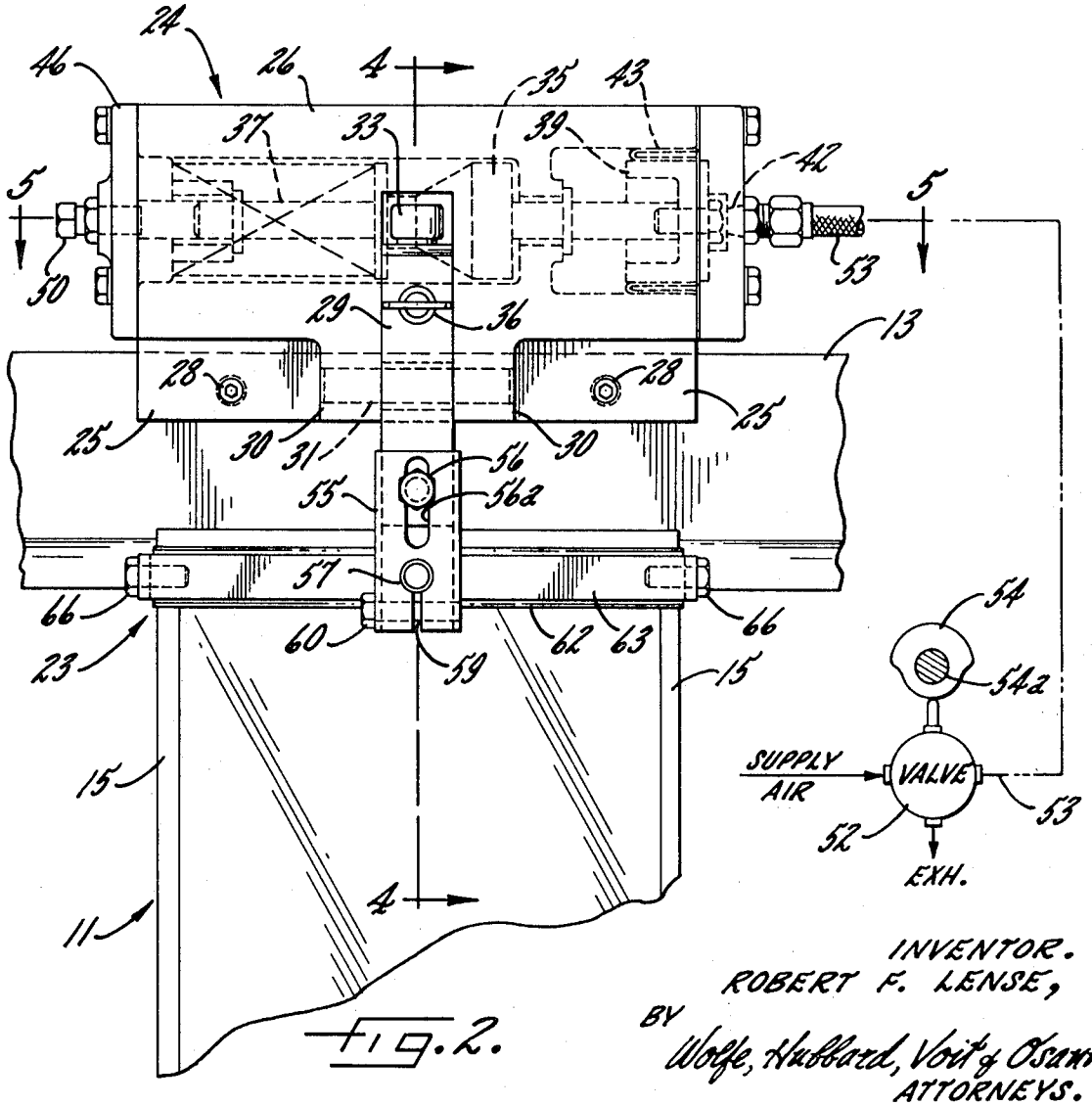


Fig. 2.

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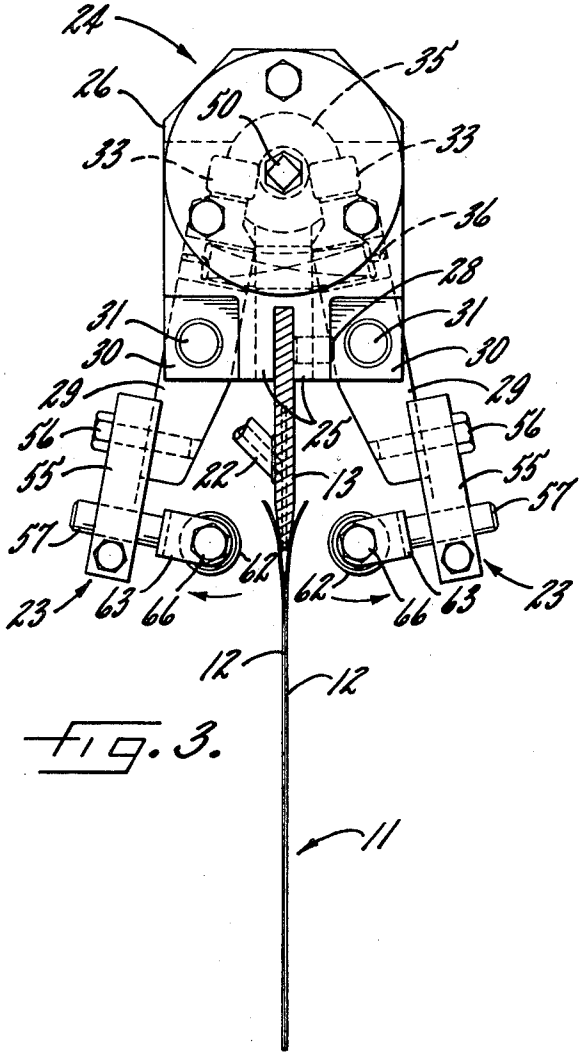


Fig. 3.

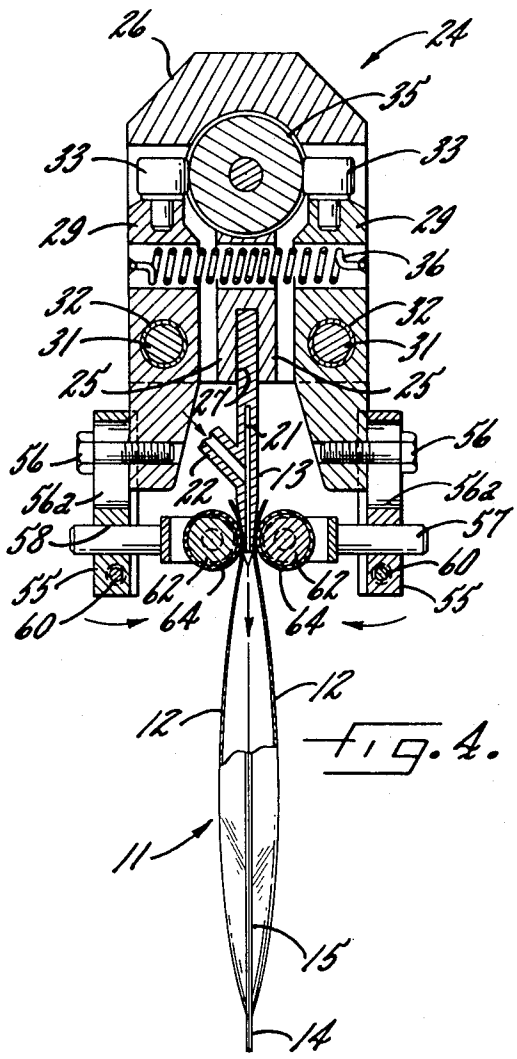


Fig. 4.

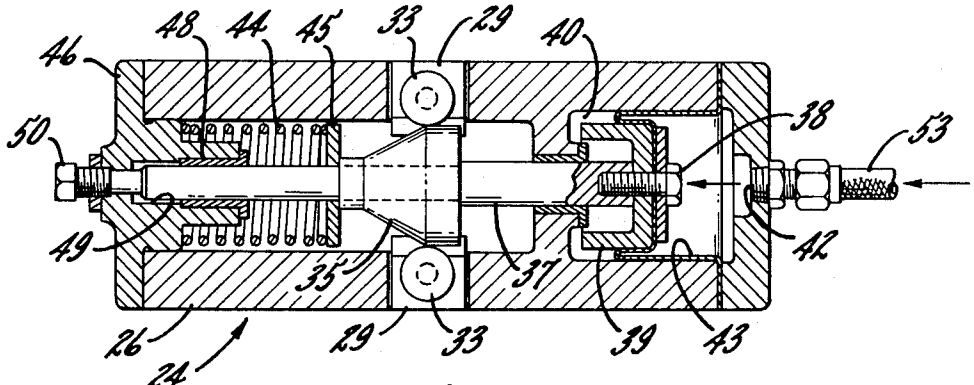


Fig. 5.

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BAG-PRESSING MEMBERS FOR PACKAGING MACHINE

BACKGROUND OF THE INVENTION

This invention relates to a packaging machine for opening and filling thin, flexible walled bags as the bags are advanced edgewise along a predetermined path in upright positions with the walls of each bag positioned face-to-face. Before filling of the bags, gas is injected into each bag to force the walls apart and, in timed relation, a mechanism moves pressing members against the upper edge portions of the walls of the bag to force the upper edge portions toward one another to prevent escape of gas from the bag so that the walls of the bag will be forced apart by the gas.

SUMMARY OF THE INVENTION

It is the primary object of the present invention to provide the machine with a unique mechanism for moving the pressing members such that there is more clearance around the bag path, less likelihood of the machine jamming due to malfunctions of the mechanism, and more ease in changing the position of the pressing members along the path than has been possible heretofore in machines of a similar nature.

It is a more detailed object to accomplish the above by moving the pressing members with a fluid operated actuator mounted on a splitter bar which is positioned stationarily in the path with the upper end portions of the walls of each bag straddling the bar and adapted to be pressed against the bar by the pressing members.

It is a further object of the present invention to provide a novel mounting arrangement for mounting both pressing members on a single fluid-operated actuator for movement of the pressing members in unison and, more specifically, the pressing members are mounted on the lower end portions of arms which are pivotally connected intermediate their ends to the actuator with the actuator operable to swing the arms and move the pressing members toward the splitter bar.

It is another object of the present invention to provide pressing members which have a longer life and engage the walls while conforming more easily to any irregularities in the walls or the splitter bar than pressing members previously used in similar machines.

Other objects and advantages of the invention will become apparent from the following detailed description when taken in connection with the accompanying drawings. BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary perspective view schematically showing a machine embodying the novel features of the present invention.

FIG. 2 is an enlarged fragmentary elevational view of a portion of FIG. 1 and showing the fluid-operated actuator and the pressing member on one side of the path.

FIG. 3 is an end view of the actuator of FIG. 2 and showing the pressing members out of engagement with the walls of the bag.

FIG. 4 is a cross section taken substantially along the line 4–4 of FIG. 2 and showing the pressing members engaging the walls of the bag.

FIG. 5 is a cross section taken substantially along the line 5–5 of FIG. 2. DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in the drawings for purposes of illustration, the invention is embodied in a packaging machine **10** (FIG. 1) for opening and filling thin, flexible walled bags **11** as the bags are advanced edgewise and open end up along a predetermined path with the walls **12** (FIG. 4) positioned face-to-face and with the upper end portions of the walls straddling a splitter bar **13** (FIG. 1) which is positioned stationarily in the path. The bags are formed from continuous strips of flexible material joined together at the bottom by a fold **14** (FIG. 4) and sealed vertically by a sealer (not shown) to form side seals **15** (FIG. 2) at predetermined intervals along the strips. Downstream of the sealer, the strips are cut along the vertical centerline of the seals by a cutter **17** (FIG. 1) to separate the individual bags which are then gripped and supported for further movement along the path by clamps **18** carried on a power-driven chain **18***a*.

As each bag **11** advances along the path, the bag passes through an opening station in which suction cups **19** grip the walls **12** of the bag and pull the walls apart to open the bag widely so that the bag can be filled rapidly with a product which is introduced into the bag through a spout **20**. The formation of the bags in the above manner creates an attraction between the inside faces of the walls of each bag, the attraction causing the bags to resist opening by the suction cups.

To open the bags **11** partially thus breaking the interface attraction and preparing them for full opening by the suction cups **19**, a gas, in this instance air, is blown into the bags to force the walls apart. Herein, the air is expelled periodically through a downwardly opening orifice **21** (FIG. 4) formed in the splitter bar **13**. An inlet pipe **22** communicating with the orifice is fixed to the side of the splitter blade and is connected to an air pressure source (not shown). To prevent the air from simply escaping out the top of each bag instead of remaining in the bag and forcing the walls apart, two pressing members **23** (FIG. 3) positioned on opposite sides of the path are periodically moved by a mechanism **24** into engagement with the upper end portions of the walls **12** in timed relation with the blowing of air into the bag so as to force the upper end portions of the walls toward one another and into engagement with the splitter bar thus closing the top of the bag sufficiently to prevent the escape of air.

In accordance with the present invention, the mechanism **24** for moving the pressing members **23** periodically into and out of engagement with the walls **12** of each bag **11** is a fluid-operated actuator which preferably is adjustably mounted on the upper edge portion of the splitter bar **13** with the pressing members suspended from the actuator. With this arrangement, the actuator is more compact than mechanisms heretofore used, and there is more clearance around the path, less chance of the machine **10** jamming due to mechanical failure, and greater ease in adjusting the positions of the pressing members than has been true of prior mechanisms for moving the pressing members.

For mounting the actuator **24** on the splitter bar **13**, a pair of flanges **25** (FIG. 4) depend from the bottom of the housing **26** of the actuator and define a longitudinally extending slot **27** therebetween. The actuator is positioned on the splitter bar with the upper edge portion of the splitter bar inserted into the slot and is held in position by a pair of setscrews **28** (FIG. 2) which extend through one of the flanges and bear against the splitter bar. When it is desired to change the position of the pressing members **23** along the path, the setscrews are loosened, and the actuator and the pressing members can then be slid along the splitter bar to a new location.

To mount each pressing member **23** for movement toward and away from the walls **12** of the bags **11** and the splitter bar **13**, the pressing member is mounted on the lower end portion of an arm **29** (FIG. 4) which is pivotally mounted intermediate its ends between a depending bifurcated flange **30** (FIG. 2) on the housing **26** of the actuator **24**, and a pin **31** extends through the flange and through a bushing **32** (FIG. 4) in the arm. A cam follower **33** is journaled in the upper end portion of each arm to turn about a generally vertical axis. To move the pressing members on the lower end portions of the arms inwardly toward the splitter bar, a tapered cam **35** (FIG. 5) is moved longitudinally of the bag path and between the cam followers thus forcing the latter outwardly to swing the upper ends of the arms outwardly. As the cam forces the upper ends of the arms to swing outwardly, the arms pivot about the pins **31** and the lower ends of the arms swing inwardly. A contractile spring **36** (FIG. 4) is connected to and extends between the arms above the pins **31** thus biasing the cam followers toward one another and against the cam. As the cam is moved from between the cam followers to allow the upper ends of the arm to swing toward one another under influence of the

spring, the lower ends of the arms swing away from the splitter bar.

In this instance, the cam 35 is telescoped on the piston rod 37 (FIG. 5) of the actuator 24. At one end (the right end in FIG. 5), the piston rod is connected by a screw 38 to a piston 39 which is positioned within a chamber 40 formed in the housing 26. To move the cam 35 to the left and move the pressing members 23 into engagement with the walls 12 of one bag 11, pressure fluid, herein air, is forced into the head end of the chamber through a port 42 thus forcing the piston and piston rod to the left. The interior of the chamber is lined with a rubber diaphragm 43 which is connected to the head end of the piston to maintain the chamber airtight as the piston moves. A spring 44 (FIG. 5) biases the piston and piston rod to the right to return the cam to a position freeing the upper ends of the arms 29 for inward swinging. As shown most clearly in FIG. 5, the spring is telescoped over the piston rod and is biased between a washer 45 on the piston rod and a cap 46 in the rod end of the actuator housing, the washer bearing against one end of the cam. The end of the piston rod opposite the piston is slidably telescoped in a bushing 48 (FIG. 5) mounted in an axial bore 49 in the cap 46 and, to enable adjustment of the stroke of the piston and thus the action of the cam 35, a screw 50 extends through the end of the cap and into the bore to engage the end of the piston rod. The extent to which the screw extends into the bore determines the degree of travel of the piston rod and thus the piston to the left under the force of the air introduced into the chamber 40. Thus, by adjusting the travel of the piston rod, the extent to which the cam forces the arms outwardly can be changed to vary the movement of the pressing members 23 toward the splitter bar 13.

With the above arrangement, the piston 39 and piston rod 37 with the tapered cam 35 are normally biased to the right and held by the spring 44 in a position in which the cam does not force the cam followers 33 outwardly thus allowing the pressing members 23 to be held in positions away from the splitter bar 13 by action of the spring 36 on the upper end portions of the arms 29. To move the piston at predetermined intervals to swing the pressing members toward the splitter bar, air under pressure is forced into the chamber 40 through the port 42. The admission of the air is controlled by a three-way valve 52 (FIG. 2) in a line 53 leading to the port. A cam 54 on the cycle shaft 54*a* of the machine 10 controls the opening and closing of the valve. When the cam 54 opens the valve, air is forced into the chamber, and the pressing members are moved into engagement with the walls 12 of one bag 11 and the splitter bar 13. As the cam continues to revolve with the cycle shaft, the valve is vented to the atmosphere and disconnects the air source from the chamber. The spring 44 thus forces the piston to the right with the air exhausting from the chamber through the port 42 and the exhaust port of the valve. The timing of the above operation is controlled by the shape of the cam and is such that the pressing members engage the bag walls when air is injected into the bag.

The lower end portion of each arm 29 is formed in two parts to allow for vertical adjustment in the location of the pressing members 23. A channel-shaped link 55 (FIG. 4) forms the lower part of each arm and is connected to the upper part of the arm by a screw 56. For vertical adjustability, the upper end portion of each link is formed with a vertically extending slot 56*a* (FIG. 2) through which the screw 56 extends. The link can be moved vertically to the desired location, and then the screw can be tightened to hold the link in place. To connect each pressing member to its respective arm, a rod 57 (FIG. 4) extends from the back of the pressing member and through a hole 58 formed in the lower end portion of the link. A slot 59 (FIG. 2) extends downwardly from the hole splitting the lower end portion of the link into two parts, and a screw 60 extends through the two parts. The position of the pressing member 23 laterally of the arm and the splitter bar 13 can be adjusted by sliding the rod through the hole to the desired location and then turning the screw 60 to force the two parts of the lower end portion of the link toward one another to clamp the rod in the link.

Advantageously, each pressing member 23 is formed by a roller 62 (FIG. 4) journaled for rotation in a support 63 and surrounded by a cover 64 of yieldably resilient material such as rubber formed as a tube and telescoped over the roller. With this arrangement, the roller is free to rotate thus exposing the entire surface of the cover to wear, this arrangement resulting in a longer service life for the cover. Additionally, this arrangement allows the pressing members to conform to any irregularities in the surfaces of the bag walls 12 and the splitter bar 13. The support 63 is formed by an elongated rectangular back member which is rigidly fixed to one end of the rod 57 and by a pair of side flanges which extend outwardly at right angles on each end of the back member. The roller 62 is journaled on and supported between the flanges by pins 66 (FIG. 2) and extends longitudinally of the splitter bar. As shown in FIG. 2, the roller is longer than the edge-to-edge length of the bag 11 so as to engage the bag along its entire length.

It will be observed that providing the machine 10 with the fluid-operated actuator 24 to move the pressing members 23 and, more particularly, mounting the actuator above the bag path is a particularly advantageous arrangement. With this arrangement, there is greater clearance around the bag path and the bag 11, and there is less likelihood of the machine jamming due to a malfunction than has been true of most previous devices wherein a series of linkages driven by the machine cycle shaft are connected to pressing members to move the latter. Moreover, mounting the actuator on the upper edge portion of the splitter bar 13 together with the elimination of mechanical linkages from the pressing members to the cycle shaft 54*a* results in easier adjustment of the pressing members longitudinally along the path. The utilization of the fluid-operated actuator allows the timing control for the operation of the pressing members to be optionally located remotely from the physical location of the pressing members rather than on the cycle shaft in the immediate vicinity of the pressing members as required by the mechanical linkages previously used. Further, the particular construction of the actuator is particularly well adapted to operate both pressing members and to operate the latter in unison. Another advantage is the formation of the pressing members as rollers 62 with covers 64 of resiliently yieldable material, this arrangement resulting in a longer service life for the pressing members and more sure contact between the bag wall 12 and the splitter bar 13 even if the surface of the splitter bar is uneven.

I claim:

1. In a machine for opening thin, flexible walled bags as the bags are advanced edgewise along a predetermined path in upright positions with the walls of each bag positioned face-to-face, the combination of, splitter bar positionable between the walls of each successive bag for periodically injecting gas into the bag to force apart the walls, mechanism for pressing the upper edge portions of the walls toward one another to seal the bag around said splitter bar said mechanism being movable between positions in and out of engagement with the walls, and a fluid-operated actuator adjustably and removably mounted on said splitter bar whereby the location of said actuator along said path may be changed and said actuator may be easily removed for servicing, said actuator having a reciprocating rod operably connected to said mechanism, and being operable to reciprocate said rod and thereby move said mechanism into pressing engagement with the walls in timed relation with the injecting of gas into the bag to prevent escape of gas from the bag so that the walls of the bag are forced apart.

2. The machine of claim 1 in which said splitter bar is disposed between the upper end portions of the walls to hold the latter apart and in which said actuator is mounted on said splitter bar above the path.

3. The machine of claim 1 in which the splitter bar is disposed between the upper end portions of the walls to hold the latter apart, said mechanism including a pair of arms with one arm positioned on each side of the path, a pressing member mounted on each arm, and said actuator being operably connected to said arms to move the pressing members into engagement with the upper end portions of the walls to press said upper end portions against said splitter bar to prevent the escape of gas.

4. The machine of claim 3 in which said pressing members comprise rollers which extend longitudinally of the path and which are at least as long as the edgewise length of one bag so that said pressing members engage the upper end portions of the walls along the entire length of the walls.

5. The machine of claim 4 in which said rollers are covered with a resiliently yieldable material whereby the rollers may conform to any irregularities in the surface of the splitter bar and still press the walls against the splitter bar sufficiently to prevent the escape of gas.

6. The machine of claim 5 in which said rollers are journaled in said arms to turn about axes extending longitudinally of said path whereby the entire surface of each roller may be used to engage the walls to reduce wear of the rollers.

7. The machine of claim 3 in which each said arm is pivotally connected intermediate its ends to said actuator to turn about an axis extending parallel to the path, each said pressing member being connected to one of said arms on one end portion of that arm, and said actuator being operable to engage each arm on the other end portion to force said other end portion outwardly away from the path whereby the arm swings about the pivotal connection thus moving the pressing member toward the path.

8. The machine of claim 7 in which the actuator is mounted on the splitter bar above the path.

9. The machine of claim 8 in which the pressing members are mounted on said arms for adjustment laterally of said path.

10. In a machine for opening thin, flexible walled bags as the bags are advanced edgewise along a predetermined path in upright positions with the walls of each bag positioned face-to-face, the combination of, a splitter bar positioned stationary along said path with each bag passing along the splitter bar with the upper end portions of the walls straddling the bar, said bar having an orifice opening downwardly at the lower edge of the bar, means for periodically expelling gas through said orifice and into each successive bag to force apart the walls, means for pressing the upper end portions of the walls against the splitter bar adjacent said orifice, said pressing means being movable between positions in and out of engagement with the walls, a fluid-operated actuator positioned above the path with said pressing means suspended from said actuator, said actuator being adjustably mounted on said splitter bar so that the actuator and said pressing means can be moved to a plurality of positions longitudinally of the path, and said actuator having a reciprocating rod operable to move said pressing means into pressing engagement with the walls in timed relation with the expelling of gas into the bag to prevent escape of the gas from the bag so that the walls of the bag are forced apart.

11. The machine of claim 10 in which said pressing means comprise two arms pivotally connected intermediate their ends to opposite sides of said actuator to swing toward and away from the path, a cylindrical member mounted on the lower end portion of each arm and extending longitudinally of the path with each cylindrical member being longer than the edge-to-edge length of one bag, and means on said actuator to swing said arms in unison to force the cylindrical members against the upper edge portions of the walls.

12. The machine of claim 11 in which said cylindrical members are rotatably mounted on said arms so that each said member may be turned to reduce the wear on any given part of the member and increase the usable life of the member.

13. In a machine for opening thin, flexible walled bags as the bags are advanced along a predetermined path in upright positions with the walls of each bag positioned face-to-face, the combination of, a splitter bar positioned stationarily along said path with each bag passing along the splitter bar with the upper end portions of the walls straddling the bar, said bar having an orifice opening downwardly at the lower edge of the bar, means for periodically expelling gas through said orifice and into each successive bag to force apart the walls, a fluid-operated actuator having a housing adjustably mounted on the splitter bar, a pair of arms pivotally connected intermediate their ends to said housing on opposite sides of the path, a roller rotatably mounted on the lower end portion of each arm, a piston rod mounted in said housing for sliding movement longitudinally of the path, a cam telescoped on said piston rod with the upper end portions of the arms positioned to engage opposite sides of said cam as the piston rod slides, said cam being tapered outwardly away from the path at the opposite sides, and means for sliding said piston rod in timed relation with the expelling of gas into the bag, whereby as the piston rod slides in one direction, the cam forces the upper end portions of the arms outwardly away from the path to swing the lower end portions of the arms toward the path and thus move the rollers into engagement with the upper end portions of the walls to press the upper end portions of the walls against the splitter bar and prevent escape of gas from the bag so that the walls of the bag may be forced apart.