MACHINE FOR PACKING FLUID PRODUCTS IN BAGS

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ABSTRACT

This machine comprises two parallel, spaced filling units and an overpacking assembly comprising a distributor having a plurality of equal radial compartments, a fixed bottom provided with an aperture, a flap door normally closing said aperture and means for opening an overpacking bag beneath said aperture so that the primary bag or bags deposited into said compartments can drop by gravity into an overpacking bag while separating by gravity said thus filled overpacking bag from its supporting means; this machine is advantageously utilized for all fluid products, notably liquid, pasty, pulverulent or granular products.

6 Claims, 6 Drawing Figures
MACHINE FOR PACKING FLUID PRODUCTS IN BAGS

FIELD OF THE INVENTION

The present invention relates to a machine for packing fluid products in overpacking small bags and notably for packing any liquid, pasty, pulverulent or granular products.

DESCRIPTION OF THE PRIOR ART

At present products of this character are packed in small "primary" bags or the like at a packing station, then packed in an external or overpacking bag at a station remote from said packing station. Since between the two stations the bags are transferred by means of conveyors tending to modify the positions of these bags, a manual intervention or mechanical means is or are necessary for properly positioning the small bags in relation to each other and thus facilitate the introduction of these bags into the overpacking machine, i.e., the machine forming the final envelope of the products. Obviously, this increases considerably the manufacturing time and cost.

Moreover, the fact of handling or transporting the bags impairs the asepsis thereof and prevents their immediate commercialization in those Countries where very strict hygienic rules are applied to all food products.

SUMMARY OF THE INVENTION

This invention relates to a machine designed for avoiding impairing inconvenience set forth hereinabove.

This machine comprises on the one hand two parallel spaced filling units consisting each of a filling pipe, of vertical welding jaws adapted to perform a longitudinal weld seam on a plastic sheet forming a sheath around said pipe, of horizontal welding and cutting jaws capable of closing the lower end of the sheath and the upper end of the previously formed primary bag and then severing the primary bag from the sheath, and means for imparting a vertical downward movement to said sheath and said primary bag, and on the other hand an overpacking unit comprising a distributor having a plurality of vertical compartments each adapted to receive one of said primary bags means for moving said distributor and bringing each compartment thereof beneath one of said filling units, a fixed bottom comprising an aperture permitting the passage of at least one primary bag, a trap-door for temporarily closing said aperture, other means for displacing said trap-door to enable at least one of the primary bags contained in said distributor to fall by gravity, further means disposed laterally and beneath said distributor for supporting the overpacking bags and holding said overpacking bags by one or their edges, additional means for gripping the other edge of one of said overpacking bags and moving said other edge away from said one edge in order to open the relevant bag beneath said bottom aperture, and complementary means for discharging each overpacking bag when the primary bag or bags falling from said distributor has or have been received thereby, the thus loaded overpacking bag being released from the means supporting it only by the weight of said primary bag or bags.

Thus, as they are formed and filled the primary bags are deposited into the distributor and brought thereby, by turns, to a position in which they overlie the aperture formed in the bottom, so that when the trap-door associated with said aperture is retracted the filled primary bags fall by gravity into the overpacking bag and, also by gravity, the overpacked bag is released from its supporting means and drops in turn onto a conveyor by which it is transferred to an automatic sealing station.

Under these conditions, any manual operation is definitely precluded in the manufacture of overpacked bags, thus preserving the asepsis of the bags containing the product and permitting a considerable increment in the production rate of the machine.

According to a specific form of embodiment of this invention, the distributor of the overpacking unit, on the one hand consists of a pair of coaxial cylindrical walls separated by vertical radial partitions to provide equal compartments, namely even and odd compartments, there being an odd number of each type of compartments, and on the other hand is mounted for free rotation about a vertical shaft beneath the two filling units disposed with a view to correspond the one to the odd compartments and the other to the even compartments, and moreover said distributor is operatively connected to means adapted to cause said distributor to rotate through an angle corresponding to a multiple of the angle bounded by the radial walls of a compartment.

With this arrangement, the bags from the first filling unit are disposed only in the odd compartments of the distributor, and those issuing from the second filling unit are disposed only in the even compartments. Thus, if the distributor is rotated each time through an angle corresponding to two compartments, each one of the compartments disposed downstream of the second filling unit contains a filled primary bag brought by the distributor towards the discharge aperture.

Advantageously, the door mounted under the aperture of the fixed bottom is wedged to the rod of a substantially horizontal pneumatic cylinder and piston actuator having a fixed cylinder and said rod is also provided with a gripping head connected to a source of pneumatic vacuum and formed with perforations in its face registering with the bags.

As a result, when the door is closed, the gripping head grips the edge of the corresponding overpacking bag and, while the door is slidably moved to its retracted or open position, moves this edge for opening the bag. Thus, the filled primary bags dropped through the bottom aperture cannot fall outside the overpacking bag.

Preferably, the bag supporting means (the overpacking bags having a lip higher than the other) consist of parallel rods adapted to engage perforations formed in the vicinity of the uppermost lip of each bag, said bags being so disposed that their lowermost lip registers with the aforesaid gripping head.

The invention will be better understood from the following description given with reference to the attached drawing illustrating diagrammatically by way of example a typical form of embodiment of the machine, in the case of the application thereof to the packing of liquid products.
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3

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a front elevational view of the machine;
FIG. 2 is a side elevational view of the same machine, illustrating in fragmentary section the overpacking assembly;
FIG. 3 is a plane view from above showing on a larger scale and more in detail the distributor driving means;
FIG. 4 is a section taken along the line 4-4 of FIG. 3, showing the distributor and overpacking assembly;
FIG. 5 is a fragmentary side and elevational view of the upper portion of the machine, showing a modified form of embodiment of the sheath driving means; and
FIG. 6 is a section taken along the line 6-6 of FIG. 5.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The packing machine according to this invention comprises essentially a frame structure 2 carrying two equal or identical filling units A and B and an overpacking unit or assembly C. Each filling assembly A or B comprises as shown more in detail in FIG. 2 a filling pipe or tube 3 having its upper portion surrounded by a tubular sleeve 4. The upper portion of this tubular sleeve is surrounded in turn by a shaping member 5 adapted to convert a continuous flat and relatively wide tape 6 reeled from a film spool 7 into a tubular sheath 8. The two overlapping edges of the thus formed sheath 8 are welded by a vertical welding jaw 9 co-acting with said sleeve 4. Each unit A or B comprises furthermore a pair of horizontal welding and cutting jaws 10. The two pairs of jaws 10, in the specific form of embodiment illustrated in FIG. 2, are mounted on a common frame structure 12 and responsive to a common actuator 13 through angle levers (not shown), as will readily occur to those conversant with the art.

The frame structure 12 comprises a pair of vertical lateral sockets 14 adapted to slide on vertical cylindrical guide rods 15. Moreover, each socket 14 is connected through a link 16 to one end of a lever 17 having its other end rigidly attached to a control shaft 18. This shaft 18 is operatively connected to means not shown adapted to cause this shaft to pivot in the direction of the arrows 19 (FIG. 2) for producing the vertical movement of frame structure 12 along the vertical guide rods 15.

The overpacking assembly C comprises a distributor 20 consisting essentially of a pair of coaxial cylindrical walls 21 and 22 separated by vertical radial walls 23. These partition divide the annular volume between walls 21 and 22 into a plurality of equal compartments constituting alternate odd and even compartments. The number of even compartments is the same as that of odd compartments, and this number is selected to be odd. Thus, in the typical form of embodiment contemplated herein the distributor 20 comprises thirteen even compartments and thirteen odd compartments. To facilitate the understanding of the mode of operation of the overpacking assembly, the odd compartments are designated by the reference numeral and letter 25a, and the even compartments by the reference numeral and letter 25b.

The inner cylindrical wall 22 of this distributor is connected to a sleeve 26 mounted for free rotation on a vertical shaft 27 and comprises at its lower end an inner flange 28 formed with spaced vertical cylindrical perforations 29 equal in number to the compartments of the distributor, i.e., thirteen in this example.

Underlying the distributor 20 is an annular bottom 31 comprising in the front portion of the machine a radial aperture 30 shown in dash lines in FIG. 3.

In this specific form of embodiment this aperture 30 has an angular value corresponding to four times the angular value of a single compartment of the distributor. The aforesaid bottom 21 comprises laterally a pair of diametrically opposite horizontal lugs 32 each formed with an arcuate slot 33 engaged by the stud 34 of a locking member. With this arrangement, the angular position of bottom 31 may be modified as a function of the number of primary filled bags to be overpacked in a same outer bag.

A trap-door 35 having substantially the shape of a radial sector covering an angle corresponding to four adjacent compartments is disposed beneath the aperture 30 of bottom 31. This trap-door 35 is wedged to a member 36 rigid in turn with the rod 37 of a horizontal actuator having its cylinder 38 secured to the frame structure 2 of the machine. The member 36 is carried by guide rods 39 adapted to slide freely in sockets 40 rigid with a support 42.

The aforesaid member 36 has secured to its front face a gripping head 41 connected to a source of pneumatic vacuum and comprising a row of perforations (not shown) on its front face.

The overpacking assembly C further comprises parallel rods 44 acting as support members to the overpacking bags 45. These bags 45 have preferably a lip longer than the other and comprise a series of perforations formed in the vicinity of said longer lip which are engageable by said rods 44. As shown in FIG. 4, when the machine is loaded with these bags their shorter lip is nearer than the longer one to the gripping head 43.

The distributor 20 is connected to means adapted to drive it cyclically through one fraction of a revolution. In this exemplary form of embodiment these means consist of a lever 47 having one end rigid with a socket 48 mounted for loose rotation on the aforesaid vertical shaft 27 and its other end connected through a pivot pin 49 to the rod of a pneumatic actuator 50 having its cylinder pivotally connected at 52 to the frame structure 2 of the machine. Said lever 47 is further provided with a stud 53 adapted to be moved vertically by means of another pneumatic actuator 54 so as to engage or disengage said stud 53 with respect to one of the perforations 29 of the flange 28 of distributor 20. Finally, the distributor 20 is locked in its operative position by a lock bolt 55 adapted to move vertically in either direction with the rod of another pneumatic actuator 56.

Thus, when stationary the distributor 20 is locked by said lock bolt 55 engaging one of the perforations 29 of flange 28. Of course, when the distributor 20 is to be rotated, this bolt 55 is retracted into its cylinder and the stud 53 engages another perforation 29. Simultaneously, the actuator 50 is energized and its pivot pin 49 travels in the direction of the arrow 41 (FIG. 3), thus causing through lever 47 the angular movement of the distributor 20 in the direction of the arrow 51. At the end of this angular movement, the stud 53 is retracted.
3,724,163

and the lock bolt 55 engages the flange 28 to lock again the distributor 20 as the lever 47 is returned to its initial position by actuator 50. From the foregoing it is clear that the angle of rotation of the distributor is subordinate to the permissible stroke of actuator 50. Of course, this stroke can be modified but when it is desired to overpack two or four bags in a same overpack bag this stroke may be calculated to cause the distributor to pivot through a fraction of revolution having an angular value corresponding to two adjacent compartments of the distributor.

When the machine is operated, the two filling units operate simultaneously and as follows: the sheath 8 formed around the filling pipe 3 is firstly sealed by the horizontal welding jaws 10, then the structure 12 supporting these jaws is caused to travel in the direction of the arrow 60 by means of levers 17 and links 16. Thus, the sheath 8 is pulled downwards and when the structure 12 has accomplished a vertical downward movement corresponding to the height of the desired bag, the pressure exerted by jaws 10 is increased so that the bag 62a or 62b thus formed is severed from the bottom or lower portion of sheath 8 and falls by gravity into the corresponding or underlying compartment of distributor 20. Then the jaws 10 are released immediately and the structure 12 resumes its initial position as illustrated in FIG. 2.

The filling units A and B are advantageously disposed so that the bags 62a and 62b just formed thereby fall into the corresponding compartments 25a or 25b of the distributor. In other words, the bags 62a from filling unit A drop in all cases into the odd compartments 25a of distributor 20, and the bags 62b from the other filling unit B fall in all cases into the even compartments 25b of said distributor. Thus, as illustrated in FIG. 3, when the distributor travels beneath the filling unit A only every other compartment receives a bag. Consequently, only one-half of the distributor is loaded through the half-revolution accomplished by this distributor under the two filling units, and its loading is completed during its passage under the other filling unit B.

The bags regularly disposed in the compartments located downstream of filling unit B are gradually brought above the aperture 30 of bottom 31 closed by trap-door 35. Just before the trap-door 35 begins its movement, the gripping head 43 is connected to its suction source and attract the lower lip of the nearest overpack bag 45. Thus, when the door 35 is moved in the direction of the arrow 64, it not only frees the bottom aperture 30 but also moves the lowermost lip away from the upper most lip of bag 45, so that this bag is opened under the aperture 30, as shown in FIG. 2.

When the aperture 30 is released completely the compartments overlying are discharged into this bag. The primary bags 62a and 62b will thus drop into the underlying overpack bag 45. Due to the weight of these primary bags the edges of the perforations of bag 45 are torn out, thus enabling this bag to fall upon a conveyor 65 and be transferred thereby to a next station (not shown) where the overpacking bag containing the two bags 62a and 62b is sealed.

In the case of the form of embodiment illustrated in FIG. 3 the upstream edge of the aperture 30 of bottom 31 is superposed to the upstream edge of trap door 35, whereby in case this trap door operates each time the distributor is rotated through an angle corresponding to two compartments, two primary bags are caused to drop into an overpacking bag. On the other hand, if the door 35 frees the aperture 30 only after two such pivotal movements of the distributor there will be four primary bags dropped into the overpacking bag.

It may also be noted that with this machine it is also possible to overpack three primary bags simultaneously by disposing in the bottom 31 a device adapted to move the trap door alternatively in the downstream and in the upstream direction through the angular value of one compartment. In this case, the door 35 will be opened alternatively (a) when the distributor has been moved angularly to the extent of twice two compartments, and (b) when the distributor has been moved angularly to the extent of only two compartments.

From the foregoing it will be seen that the machine according to the present invention is capable of accomplishing fully automatically on the one hand the filling of primary bags with liquid or like fluid products and on the other hand the overpacking of these primary bags. Moreover, due to the particular arrangement of the machine, the bags containing the product are caused to travel only through a relatively short distance, thus reducing considerably the possibility of impairing their sterility, i.e., their asepsis before the overpacking of said primary bags.

In a modified form of embodiment illustrated in FIGS. 5 and 6 of the drawing the vertical downward travel of the sheath 8 and of the filled and sealed primary bag is not performed by means of horizontal welding jaws 10 carried by a fixed frame structure, but by pairs of rollers 70a, 70b and 72a, 72b, respectively. These pairs of rollers are disposed between the vertical jaw 9 and the horizontal jaws 10, and diametrically opposite on either side of the sheath 8. The rollers of each pair have parallel axes and engage tangentially in mutual contact in the vertical median plane of the sheath. Under these conditions, they can pinch the corresponding edge of the sheath. The rollers 70b and 72b are operatively connected to suitable means (not shown) adapted cyclically to drive them in the counter-clockwise direction as seen in FIG. 5.

With this arrangement the inertia forces to be overcome with the conventional arrangement described hereinabove are eliminated, so that the production rate of the filling units and therefore of the machine is accelerated appreciably.

From the foregoing it will readily appear to those conversant with the art that the present invention should not be construed as being strictly limited by the specific forms of embodiment of the machine described and illustrated herein, since various modifications may be brought thereto without departing from the basic principles of the invention, notably by substituting means equivalent for those disclosed herein for producing the same results.

What is claimed as new is:

1. Machine for overpacking fluid products contained in primary bags, which comprises on the one hand two parallel, spaced filling units consisting each of a filling pipe, of vertical welding jaws adapted to weld and seal longitudinally a plastic sheet shaped to form a sheath around said pipe, of horizontal welding and cutting
jaws adapted to seal the lower portion of the sheath and the upper portion of the previously formed bag and subsequently to sever the bag thus formed from the sheath, and of means for imparting a vertical downward movement to said sheath and bag, and on the other hand an overpacking assembly comprising a distributor having a plurality of vertical compartments adapted to receive each a primary filled bag, from said filling units, means for actuating said distributor so as to bring by turns each compartment thereof beneath one of said filling units, a fixed bottom comprising an aperture adapted to permit the passage of at least one primary bag, a trap door adapted temporarily to close said aperture, means for actuating said trap door to permit the fall by gravity of at least one of the bags contained in said distributor, means disposed laterally and beneath said distributor for supporting overpacking bags and holding said overpacking bags by one of their edges, means for gripping the other edge of said overpacking bags and moving said other edge away from said one edge so as to open said overpacking bag beneath said bottom aperture, and means for discharging each overpack ing bag when one or more primary filled bags has or have been dropped into it from said distributor and said thus loaded overpacking bag has been released from its supporting means by the weight of said primary bag or bags.

2. Machine as set forth in claim 1, wherein said means for imparting a vertical downward movement to said sheath comprise pairs of diametrically opposite rollers disposed on either side of said sheath, between said vertical jaws and said horizontal jaws, the rollers of each pair having parallel axes and registering with each other so as to pinch the corresponding edges of the sheath, at least one of said rollers being operatively connected to means adapted to rotate same cyclically in the direction of feed of said sheath.

3. Machine as set forth in claim 2, wherein said distributor of said overpacking assembly on the one hand consists of a pair of coaxial cylindrical walls separated by vertical radial partitions forming equal compartments therebetween, said compartments being alternatively odd and even the number of compartments being odd and the same in each type of compartments, and on the other hand is mounted for free rotation about a vertical axis underlying the two filling units arranged to correspond the one to the odd compartments and the other to the even compartments, said distributor being furthermore connected to means adapted to cause same to pivot through an angular distance corresponding to a multiple of the angle formed by the radial walls of a compartment, means being also provided for releasably locking said distributor against rotation.

4. Machine as set forth in claim 3, wherein said means for rotatably driving the distributor comprise a lever having one end mounted for free rotation on a vertical shaft coaxial to the shaft supporting said distributor and the other end connected to means capable of pivoting said other end in a horizontal plane, said lever comprising a vertical stud adapted to engage one of a plurality of spaced perforations formed in an annular flange rigid with said distributor in order to transmit the rotational movement of said lever to said distributor when the locking means associated with said distributor are in their released condition.

5. Machine as set forth in claim 4, wherein said trap door mounted beneath said fixed bottom is operatively connected to the rod of a substantially horizontal pneumatic actuator having a fixed body, said rod carrying a gripping head formed with perforations registering with said overpacking bags and connected to a source of pneumatic vacuum.

6. Machine as set forth in claim 5, wherein said means supporting the overpacking bags having one lip higher than the other consist of parallel rods engaging perforations formed through the uppermost lip of each bag, close to the edge thereof, said bags being so disposed that their lowermost lip registers with said gripping head.