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R. ORSINI

2,928,216

METHOD AND MACHINE FOR FILLING BAGS OF THERMO-WELDABLE MATERIAL

Filed July 15, 1957

2 Sheets-Sheet 1

Fig. 1

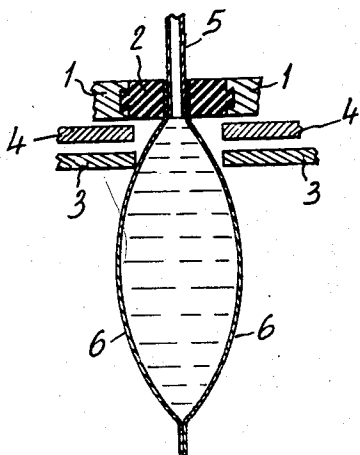


Fig. 2

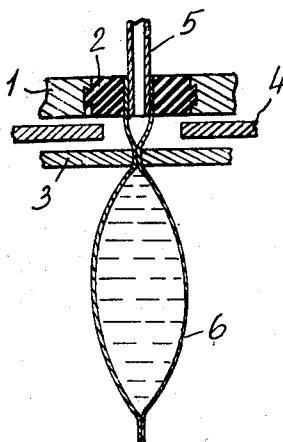


Fig. 3

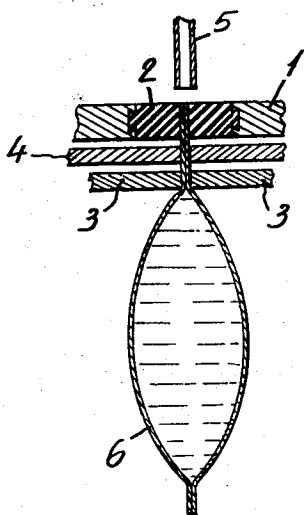


Fig. 4

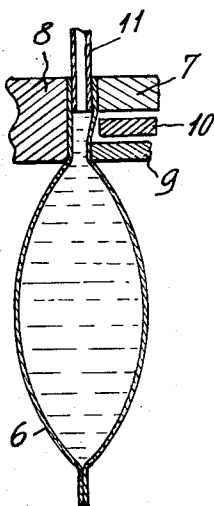
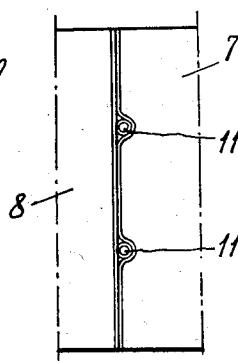


Fig. 5



March 15, 1960

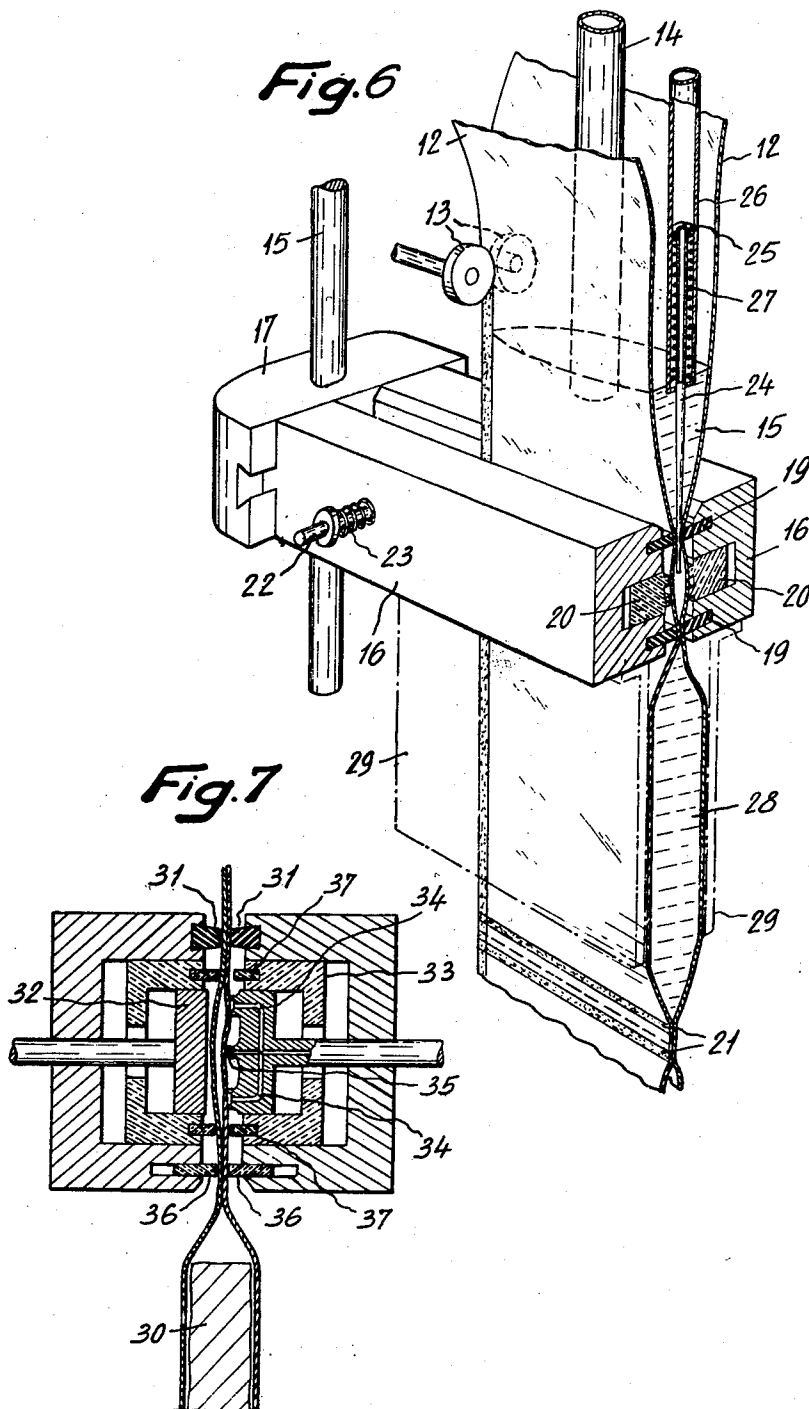
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1

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METHOD AND MACHINE FOR FILLING BAGS OF THERMO-WELDABLE MATERIAL

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Claims priority, application Morocco July 20, 1956

7 Claims. (Cl. 53—22)

My invention has for its object a method for filling bags made of thermo-weldable material. In known methods, the filling of the bags is accomplished by means of nozzles of a large cross-section which are fitted between the edges of the openings of the bags. It has also been proposed to use hollow needles of a small cross-sectional area to be set in position between said edges, while yielding presser members prevent leakage from the bags between the edges of said openings, the bags being finally closed through thermo-welding along a line or in a zone of welding which is at small distance from the line of operation of the presser members.

This line of welding may be located inside or outside the line of operation of presser members that are used to prevent leakage. However, when the bag is welded along a line on the inside of said line of operation of the presser members, it is essential to weld through the liquid or other filling material in the bags. In many cases this cannot be done. If the line of welding is outside the line of operation of presser members, there are also difficulties. It is necessary, for instance, to proceed with a preliminary removal of the hollow needles which removal is a difficult operation and there is the danger of causing leakage.

My invention has for its object to remove the above drawbacks and to improve the filling of the bags which must contain a fluid such as a liquid or a solid or pulverulent material in an inert gas. According to my invention, the upper part of the bag is closed by two spaced fluidtight lines, the fluid between these two fluidtight lines is sucked out and the welding is performed between these two fluidtight lines. The outer fluidtight line may be the fluidtight line provided to prevent leakage between the nozzle or hollow needle and the opening of the bag to be filled already known in the old processes, but it may be also a fluidtight line separating the liquid filling a tubular sheath, which must be welded to form unitary doses, from the unitary dose to be welded.

The embodiment consisting in producing two fluidtight lines or applying pressure along two spaced linear zones, whether in parallelism or otherwise, in exhausting the liquid or the like filling material; and in providing a line of weld between said fluidtight lines, permits of obtaining a continuous filling without resorting to hollow needles, the rate of flow through which is necessarily low in the case of liquids as well as in the case of solid or pasty materials.

In a preferred continuous operation, there is first formed in a continuous manner immediately to the front of the welding station, a tubular sheath, said sheath engaging said welding station extending transversely of the sheath and including two jaws forming two fluidtight lines between which are executed the transverse weld or welds, while suitable means are provided for exhausting the gas or the liquid which is enclosed inside the sheath between said two fluidtight lines.

In the case of a liquid, the tubular sheath is filled continuously with liquid ahead of the welding station

2

and it is then caused to sink by a length corresponding to the length of a single bag, after which lower and upper jaws are urged against the sheath so as to separate, underneath the lower jaw, the volume of liquid to be packed in the bag from the volume of liquid enclosed in the upper part of the tubular sheath; this being done, the small amount of liquid lying between the two fluidtight lines is exhausted by means of a hollow needle extending through the upper fluidtight line or in any other suitable manner, the weld is executed between said fluidtight lines and finally the sheath is caused to progress by a further unitary length.

In the case of pulverulent or solid products to be packed in vacuo or inside an inert atmosphere, a measured amount is preferably introduced into the sheath only after an elementary progression of the latter; the upper jaw is then closed to form a fluidtight line while vacuum is applied and thereafter the inert gas is allowed to enter, the lower jaw is closed to produce a lower fluidtight line, vacuum is provided between the two jaws, and the weld is produced between the latter.

My invention has also for its object a machine for the execution of the above disclosed method.

Further features of my improved method and of the machine for executing same will appear in the reading of the following description of a number of embodiments, reference being made to the accompanying drawings illustrating said embodiments and wherein:

Fig. 1 is a sectional view illustrating a simple embodiment of the invention.

Fig. 2 is a view corresponding to Fig. 1, after application of the pressure members forming the second fluidtight line across a bag.

Fig. 3 illustrates the same embodiment during the welding step.

Fig. 4 is a cross-section through a modification of Fig. 1.

Fig. 5 is a plan view of the arrangement according to Fig. 4.

Fig. 6 is a perspective, partly sectional view of a first embodiment of a machine for the continuous filling with liquid of a string of bags.

Fig. 7 is a sectional view of a modified embodiment of the welding means incorporated with Fig. 6.

Turning to the embodiment illustrated in Figs. 1 to 3, I use two presser members 1 provided with elastic fillings 2 made of sponge rubber, for instance, in association with two further presser members 3 located nearer the main part of the bag to be filled than the first presser members 1, said presser members 3 being made of metal for instance. On the other hand, heating electrodes 4 are inserted between the presser members 1 and the presser members 3. The arrangement includes, furthermore, hollow needles 5 illustrated in Fig. 1. The bag 6 open along its upper edge is first filled or its filling is brought to a finish and then, as shown in Fig. 2, the presser members 3 are brought into engagement with the bag, so as to produce a fluid-tight line. At this moment, the liquid which was originally enclosed in the bag between the locations of the presser members 1 and of the presser members 3 is sucked out through the hollow needles 5. The needles are removed or held in position as desired (Fig. 3) and the heating electrodes 4 are brought into engagement with the interposition of the bag, so as to provide for the welding of the fourth, open side of the bag.

Instead of using presser members provided with an elastic filling, it is also possible to resort to rigid presser members provided along their surfaces in contact with the bag recesses for housing the needles. In the embodiment illustrated in Figs. 4 and 5, such presser members are used, as shown at 7,

3

Movable presser members 7 and 9 may be provided only on one side of the location of the bag, while a single stationary presser member 8 is positioned on the other side of said location, for cooperation with the movable presser members 7 and 9 and with the heating electrode 10. A hollow needle is again used as shown at 11. The modus operandi of this arrangement is similar to that described with reference to Figs. 1 to 3.

The presser member 9 may, according to a modification, assume a movement in a direction parallel with the axis of the needles, in which case the presser member 9 is first shifted against the bag at the level of the location of the presser member 7 and it is thereafter shifted downwardly so as to drive out the liquid enclosed inside the outer end of the bag and the electrode 10 is then caused to weld a line across the space thus provided between the locations of the presser members 7 and 9.

In the embodiment illustrated in Fig. 6, two sheets of plastic material are welded along their vertical cooperating edges by means of friction wheels 13 so as to form a tubular sheath. The sheath may also be constituted by a sheet which is rolled and welded along its longitudinal edges or else it may be extruded round the filling nozzle. As a matter of fact, this sheath is filled through the nozzle 14 with the liquid 15 to be packed in the successive bags to be formed in the sheath. The machine includes chiefly a pair of blocks 16 adapted to move apart or towards each other in a horizontal plane along two terminal guiding members 17 which latter are adapted in their turn to receive a reciprocatory vertical movement along the guiding uprights 18.

The blocks 16 include each a body to which are secured, near their upper and lower edges, elements 19a and 19b respectively, forming jaws that provide fluid-tight lines of contact between opposing wall surfaces in a bag. Inside said body 16 and between the jaws 19a and 19b is fitted a welding jaw 20 adapted to cooperate with an exactly similar jaw facing it on the other block so as to produce on the sheath at least one, but preferably, as illustrated, two transverse welds 21 spaced by a few millimeters whereby two filled bags may be separated from one another between said two lines of weld. The blocks are subjected to pressure by a cam or the like control system acting on the push rods 22. A return spring 23 associated with said push rods returns said blocks into their relatively spaced position.

Lastly, a hollow needle 24 is fitted inside the tubular sheath between the upper jaws 19a. This needle has for its object to remove the liquid enclosed inside the sheath between the jaws 19a and 19b. It may be connected with a pump. According to a preferred arrangement, the needle may form itself the hollow rod or pipe for a suction pump and to this end, it terminates at its upper end as a piston 25 slidably engaging the inside of a tubular body 26 against the action of a spring 27. The sheath being produced in a continuous manner and being filled with liquid up to a substantially constant height, the jaw-carrying blocks 16 are caused to move nearer each other in their upper position, so as to produce through the agency of the jaws 19a and 19b two transverse fluidtight lines closing the sheath. The upper fluidtight line 19a provides simultaneously a clamping of the needle 24. The liquid contained in the section 28 of the sheath lying underneath said fluidtight lines is thus separated from the liquid in the upper section of the sheath or from that held between the two jaws 19a and 19b. The jaws begin then executing a downward movement over the guiding uprights 18 and they carry along with them the needle 24 through which the liquid contained in the intermediate section of the sheath between the jaws is sucked out under the action of the shifting of the piston 25 inside the stationary pump body 26.

When all the liquid contained in said intermediate section of the sheath between the jaws 19 has been

4

sucked out into the pump body 26, the welding jaws 20 are subjected to pressure and provide for transverse welding. After cooling of the welds, the jaw blocks 16 move apart and rise into their original position while simultaneously the needle 24 is returned into its upper position by the spring 27, the liquid which has entered the body of the pump 26 returning then into the sheath above the finished bag.

In order that the tubular sheath may not assume a dangerous deformation under the pressure of the liquid column, and with a view to checking the volume of liquid contained in each closed welded element or bag, there is provided preferably underneath and also if required above the welding jaws, vertical abutment plates 29 which limit the lateral deformation of the sheath, said abutment plates being illustrated in dotted lines in Fig. 6.

The progression of the sheath may be produced under the action of the jaws 19a which act on a cold section of the thermo-plastic material forming the sheath or, preferably, through the agency of independent driving members, which allows making the reciprocation of the members producing the transverse welds on the sheath independent of the friction rollers producing the longitudinal welded seam of the sheath.

According to a further embodiment suiting more particularly the packing of solid material, the jaw blocks 16 are modified as illustrated cross-sectionally in Fig. 7. The sheath progresses then by a distance corresponding to the length of one bag and the product 30 to be packed is introduced into said sheath. The jaws close and apply under pressure over the sheath the elastic packings 31 to form a transverse fluidtight line. A push member 32 brings then the section of the sheath lying underneath said fluid-tight line and extending throughout the height of the jaws into contact with the suction grip 33. The latter is provided with a peripheral channel connected through auxiliary channels 34 with a source of vacuum while a central needle 35 is connected also with the source of vacuum and if required with a supply of inert gas. When the sheath is urged against the suction grip, the source of vacuum is connected with the channel leading to said suction grip. The wall of the sheath is urged laterally with some considerable energy against said suction grip; it is perforated through the needle 35 in registry with the latter; the air contained in the tubular sheath underneath the fluidtight line formed by the packings 31 is then sucked out.

Vacuum being applied, it is possible to send into the sheath an inert gas through connection between the channel feeding the needle and a supply of such a gas; the lower jaws 36 are then set in position so as to form a further fluid-tight line after which the needle 35 is caused to suck out the inert gas which may have been sent into the sheath and remains between the fluid-tight lines at 31 and 36; this being done, the heating jaws 37 are applied and the transverse welds are provided to either side of the needle 35.

The embodiments described hereinabove are capable of many modifications without this unduly widening the scope of the invention as defined in the accompanying claims.

What I claim is:

1. A method of filling thermo-weldable bags, which method comprises filling at least partly with a fluid a bag open at its upper end, applying pressure to bring opposite inner surfaces of the bag wall into fluid-tight contact with each other along two spaced lines adjacent said upper end; removing from the space between said lines, fluid with which the bag is filled; and welding together opposite surfaces of the bag between said spaced lines to form a leakproof seal for the bag.

2. A method of producing filled bags of thermo-weldable material, which method comprises pouring liquid into a bag open at its upper end, producing two spaced fluid-tight lines of contact between opposite inner sur-

faces of the bag wall across the bag adjacent said upper end, sucking out the liquid remaining in the space between the said two fluidtight lines, and welding together the opposite surfaces of the bag across a further line extending between said two fluidtight lines.

3. A method of producing filled bags of thermo-weldable material, which method comprises forming a tubular sheath of said material in a continuous manner, filling a vertical section of the sheath up to a predetermined level, subjecting said sheath to pressure along two transverse lines underneath said level to form two spaced fluidtight lines across the bag at predetermined intervals removing the liquid filling the section of the sheath contained between said two fluidtight lines thus formed and, welding the sheath along a line of weld lying between the said two fluidtight lines.

4. A method of producing filled bags of thermo-weldable material, which method comprises forming a tubular sheath of said material, in a continuous manner with a measure of solid material, moving the sheath by one bag-length, closing the sheath over said measure along a fluid-tight line of contact at an unvarying level, producing vacuum underneath said line, introducing an inert gas underneath said line, subjecting the sheath to pressure along a line extending underneath the said fluid-tight line to form a second lower fluid-tight line at a short distance from the first line, producing vacuum between the two fluid-tight lines of contact, and welding the sheath along a line extending between the said two fluid-tight lines.

5. A machine for producing a string of bags of thermo-weldable material filled with a product, comprising means for welding along their lateral edges two sheets of thermo-weldable material so as to form a sheath of thermo-weldable material along a vertical path, means for filling this sheath with liquid up to a predetermined level, blocks located on either side of the sheath at a predetermined point under the above filling predetermined level, jaws in superposed relationship carried by at least one

block in register with the sheath and means for urging said blocks towards each other to make said jaws produce fluid-tight lines of contact across the sheath, a further jaw carried by at least one block and facing the sheath and means wherethrough the last-mentioned jaw produces the transverse welding of the sheath between the said fluidtight lines of contact.

6. A method of producing filled bags of thermo-weldable material, which method comprises pouring solid material into a bag open at its upper end, producing an upper fluidtight line across the opening of the bag, applying vacuum to the bag underneath said upper fluidtight line, feeding an inert gas into said bag, producing a lower fluidtight line spaced of the upper one, applying vacuum to the part of the bag between both said fluidtight lines and welding together opposite surfaces of the bag across a further line extending between said fluidtight lines.

7. A method of filling thermo-weldable bags which method comprises fitting at least one hollow tube between the edges of the opening of the bag, applying pressure to bring opposite inner surfaces of the bag wall into fluidtight contact with each other and with the filling tube along a first line adjacent said upper end, filling the bag underneath said first line with a fluid, applying pressure to bring opposite inner surfaces of the bag wall into fluidtight contact with each other along a second line spaced from and under said first line, removing the fluid in the space between said lines and welding together opposite surfaces of the bag between said spaced lines to form a leakproof seal for the bag.

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