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L. DOYEN ET AL
MACHINE FOR PACKAGING FLUID PRODUCTS
IN BAGS OF PLASTIC MATERIAL

2,927,410

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2 Sheets-Sheet 1

Fig. 1

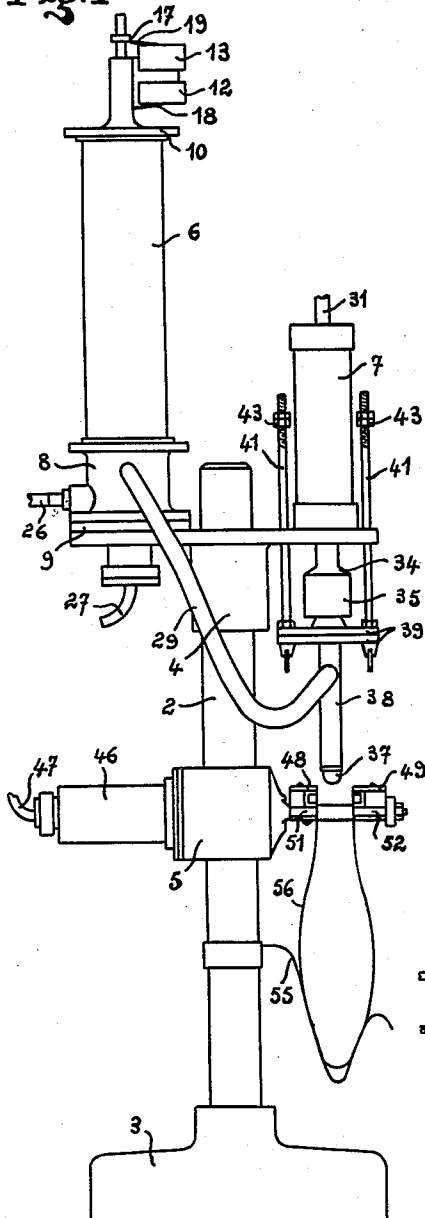
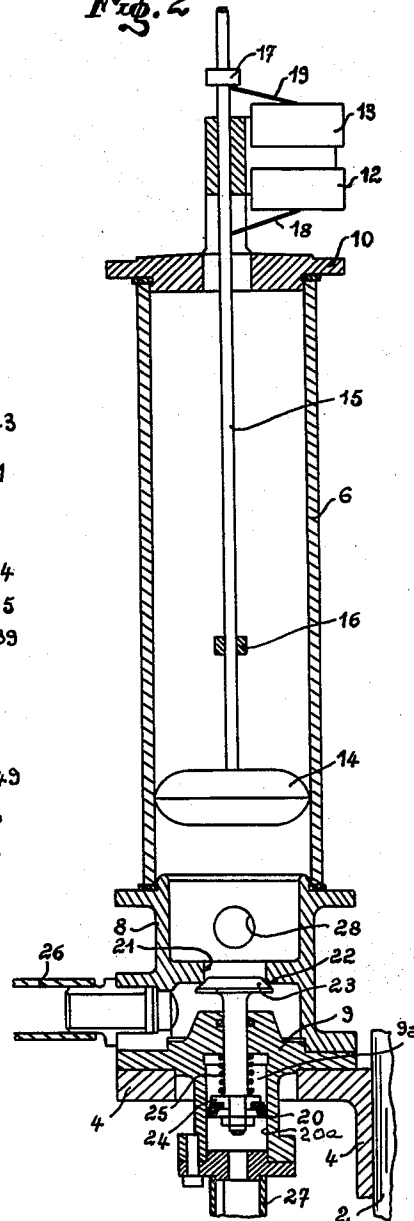


Fig. 2



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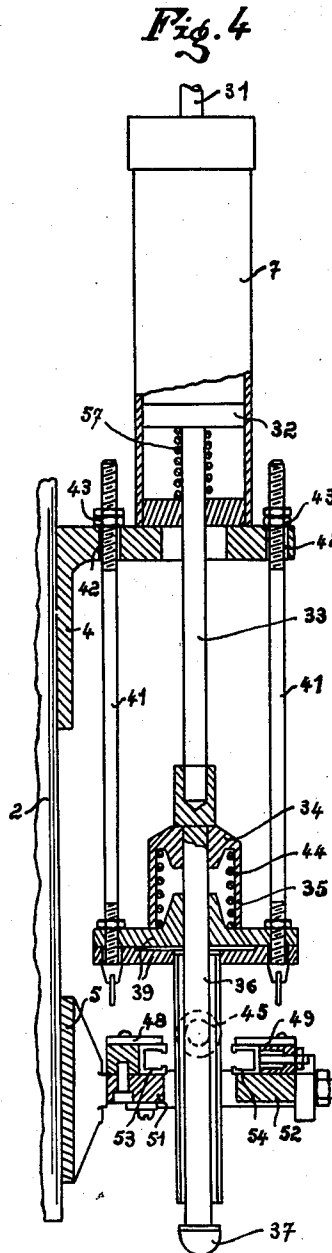
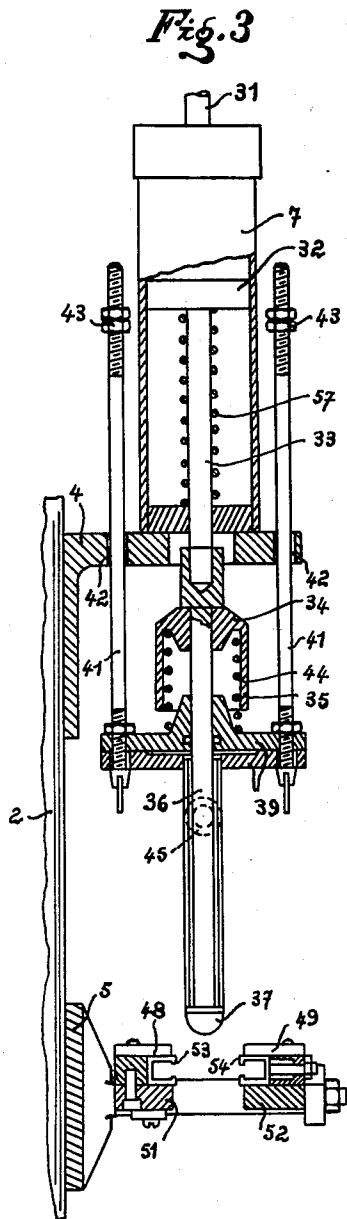
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MACHINE FOR PACKAGING FLUID PRODUCTS IN BAGS OF PLASTIC MATERIAL

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10 Claims. (Cl. 53—268)

It has been repeatedly attempted to reduce the time required for filling the containers used for packaging fluid products. Thus, in the case of a packaging inside glass bottles, vacuum is generally applied with a view to increasing the speed of filling. In the case of a packaging inside bags of plastic material, it is impossible to apply vacuum thereto by reason of their lack of rigidity. The increase in the filling speed is then obtained by giving the opening of the bag a cross-section which is equal to that of the actual bag, in other words by omitting the neck of the container.

Our invention has more particularly for its object a machine for the packaging of liquid, pasty or pulverulent substances inside such bags of plastic materials.

To this end, said machine includes in combination:

Two jaws which assume a movement towards and away from each other under the action of a system operating through compressed air or the like, said jaws carrying, on the one hand, suction means keeping each bag open before and during its filling and, on the other hand, electrodes for sealing the bag when filled.

Measuring means constituted by a chamber connected, on the one hand, with a container inside which are stored the substances to be packaged and, on the other hand, with a distributing system, a flap valve inserted between the chamber of the measuring means and the storing container and which closes as soon as said chamber contains the desired volume of the substance to be packaged and opens as soon as the distributing system is closed.

The distributing system mentioned hereinabove comprising a tube adapted to be shifted translationally so that it may engage the bottom of the bag and be drawn out of the latter, said tube being provided at its end with a valve opening automatically when the distributing system reaches the desired position inside the bag while it closes when the desired amount of substance has run out of the measuring means.

Further features and advantages of our invention will appear from the reading of the following description, reference being made to the accompanying diagrammatic drawings illustrating by way of example in a non-limiting sense a preferred embodiment of our machine. In said drawings:

Fig. 1 is an outer elevational front view of the machine.

Figs. 2 and 3 are longitudinal sectional views on an enlarged scale of two sections of the machine.

Fig. 4 is a sectional view similar to Fig. 3, the machine being shown during the bag-filling stage.

Over an upright 2 rigid for instance with a stand 3 are secured at adjustable heights two supports respectively designated by 4 and 5. The upper support 4 carries chiefly the measuring means 6 and a bag-filling cylinder 7.

The measuring means 6 are constituted by a cylinder of transparent material positioned vertically over the

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hollow carrier 8 secured to the support 4 with the interposition of a valve-carrying member 9. The upper end of said cylinder 6 carries a cap 10 provided with two switches 12 and 13. Inside the measuring cylinder 6 is positioned a float 14 (Fig. 2) including an upwardly directed extension constituted by a rod 15 passing freely through the cap 10. On said rod are also fitted two rings shown respectively at 16 and 17 and forming at adjustable heights stops adapted to control the corresponding switches 12 and 13 through action of said stops on the corresponding contact-pieces 18 and 19 respectively.

The hollow carrier 8 for the measuring cylinder 6 is provided with a central opening 21 defining a seat 22 for the head of a valve 23 including a stem passing through the intermediate valve-carrying member 9 and carrying at its end a collar 24. The latter serves as a movable lower bearing for a helical spring 25 the upper end of which bears against the stationary underside of the intermediate member 9, said spring urging thus the valve 23 away from its seat.

Underneath said collar 24, the stem of the valve 23 carries an annular packing 20 acting as a piston inside a cylinder 20a formed in the lower section of the member 9. Said cylinder 20a is fed with compressed air through a pipe 27, said compressed air urging thus the valve 23 into its closed position.

The lower section of the hollow carrier 8 is provided furthermore with a tapped lateral port inside which is screwed a nozzle through which a pipe 26 feeds the substance to be packaged. Lastly, the upper section of the carrier 8 is provided with a lateral port 28 which allows connecting a yielding pipe 29 providing for the exhaust of the substance to be packaged out of the measuring cylinder 6 into which it has been previously urged.

The bag-filling cylinder 7 (Figs. 3 and 4) secured to the support 4 is fed with compressed air through the pipe 31. It encloses a piston 32 rigid with a piston rod 33 passing freely through an opening formed inside the support 4 and carrying a member 34 extending downwardly to form a skirt 35 (Fig. 4) and inside which is fitted a rod 36 extending downwardly over a somewhat considerable length in alignment with the piston rod 33. The lower end of said rod 36 carries a transversely elongated nose 37 secured thereto by screwing for instance and the upper flat annular surface of which provides a fluidtight bearing for a tube 38 having a corresponding elongated cross-section; said tube 38 is rigid with a supporting member 39 which is slidably fitted over the downwardly directed rod 36 and carries lateral vertical rods 41 extending freely through openings 42 in the support 4, said rods being provided with stops 43 of an adjustable type constituted for instance by nuts screwed over the rods and engaging the upper surface of the support 4. Between the supporting member 39 and the lower surface of the skirt-carrying member 34 is inserted a helical spring 44 surrounding coaxially the rod 36 and housed inside the skirt 35.

The tube 38 is provided with a lateral port 45 which allows its connection with the above-mentioned yielding pipe 29 fed by the measuring cylinder 6. It should however be remarked that the carrier 8 and the tube 38 may be provided each no longer with a single port but with a plurality of ports which allow their interconnection through a corresponding number of yielding pipes.

The lower support 5 on the upright 2 carries a cylinder 46 fed with compressed air by a pipe 47 and the piston of which is not illustrated; said piston controls the moving apart and towards each other alternately of the members 48 and 49 carrying jaws including not only the welding means 51 and 52, but also the pipes

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53 and 54 which are connected with a supply of vacuum and are provided with slots in their surfaces facing each other.

The machine described is provided also with a further support 55 carried at an adjustable height depending on the height of the bag to be filled and the outline of which depends also on the shape of the bag.

The operation and use of said packaging machine are as follows:

The bag 56 to be packaged is positioned over the support 55 and its upward section is held between the jaw-carriers 48 and 49. The cylinder 46 is fed with compressed air so as to ensure the closing of the jaws over the upper section of the bag. Vacuum is then produced inside the tubes 53 and 54 associated with the jaws while the feeding of the cylinder 46 with compressed air is switched off. A spring returns then the jaws into their open position while vacuum still prevails inside the tubes at 53 and 54. The bag is thus held in its open condition underneath the distributing means.

Assuming the measuring cylinder 6 has been previously filled with the substance to be packaged such as milk for instance, said milk occupies the volume including not only the measuring cylinder 6 and the upper section of the hollow carrier 8, but also the pipe 29 and the annular space extending between the rod 36 and the distributor tube 38.

Compressed air is sent at a predetermined moment through the pipe 31 into the cylinder 7. The piston 32 sinks consequently and compresses the spring 57 which results not only in a sinking of the rod 36, but also of the tube 38 since the supporting member 39 for said tube is urged downwardly by the spring 44 engaging the underside of the skirt-carrying member 34 rigid with the piston rod. The distributing system including the rod 36 and the tube 38 enters consequently the bag 56 and sinks thus down to a point near the bottom of the latter. At this moment, the stops 43 on the rods 41 engage the upper support 4; consequently, the downward movement of the piston 32 and of the central rod 36 is no longer associated with a downward movement of the rod 38, which produces a compression of the spring 44. Thus, the tube 38 engages no longer through its lower end the nose 37 on the rod 36, so that the milk contained in the measuring cylinder 6 is emptied speedily under the action of gravity and fills the bag after passing in succession through the pipe 29 and the annular space separating the rod 36 from the surrounding tube 38 of the distributing system.

As the milk level sinks inside the measuring cylinder 6, the float 14 sinks inside the latter until the upper ring 17 on its rod 15 engages the contact-piece 19 of the switch 13. At this moment, the amount of milk which has been poured into the bag 56 corresponds strictly to the desired amount; the above-mentioned switch 13 is then operative and cuts off the feeding of the cylinder 7 with compressed air; the spring 57 urges then the piston 32 upwardly together with the entire distributing system and the spring 44 expands in its turn, starting at the very beginning of the upward movement of said distributing system and this returns the tube 38 into engagement with the nose 37 on the rod 36, i.e. the distributing system is closed.

The feeding with compressed air of the cylinder 20a located underneath the measuring cylinder is then switched off in its turn and this leads under the action of the spring 25 to an opening of the valve 23. The milk contained in a container positioned with a sufficient head above the measuring cylinder 6 enters consequently through the pipe 26 and the port 21 in succession into the upper chamber of the hollow carrier 8 of the measuring cylinder 6 and inside the latter. As the milk level rises inside said cylinder, the float 14 rises until the lower ring 16 carried by the rod 15 engages the contact-piece 18 of the lower switch 12. The latter provides then for an opening of the admission of compressed air into the

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small lower cylinder 20a so that the valve 23 closes and the feeding of milk is stopped. While the measuring means are being filled, the bag 56 which has been previously filled with milk is closed. This closing has required a resumed feeding of the cylinder 46 with compressed air and the energization of the welding elements 51—52 on the jaws.

When the feeding of said cylinder 46 is switched off in its turn, the jaws move again apart and the filled closed bag is removed. A further empty bag is now positioned, the machine being ready to distribute a further volume of milk of an equal amount.

The packaging machine described shows the following main advantages:

It allows distributing accurately defined, predetermined amounts of the substance to be packaged, since it is sufficient for adjusting purposes to modify the location of the rings 16 and 17 on the rod 15 carried by the float 14 of the distributing system.

The measuring cylinder 6 being made of transparent material allows an optic checking of the proper operation of the machine.

The liquid being distributed merely through gravity without the application of an auxiliary pressure, no frothing effect is obtained, which is of particular advantage in the case of certain products, such as milk for instance.

The parts carrying the substance to be packaged are readily disconnectable, which simplifies the upkeep of the machine.

Obviously, our invention is not limited to the sole embodiment of said packaging machine which has been disclosed hereinabove by way of a mere exemplification and it covers in contradistinction all the modifications thereof falling within the scope of the accompanying claims.

In particular, all the control means for said machine being of a pneumatic type, the synchronization of said control means may be obtained in any desired manner, for instance through electric means incorporating a relay operating according to a predetermined schedule through the agency of an electrically controlled valve.

Similarly, the welding intended for the closing of the bag may be performed through pulses, through high frequency currents, thermically or in any other suitable manner.

Lastly, it should be remarked that our improved packaging machine need not form an independent machine and may, if desired, form the terminal component of an entirely automatic packaging system.

What we claim is:

1. A machine for packaging liquid, pasty and pulverulent material inside bags of plastic material, provided with an opening at their upper ends, comprising in combination a carrier for the successive bags to be filled with said material, hollow jaws adapted to close over the upper end of the bag carried by said support, means controlling the reciprocation of the jaws with reference to each other and to the bag, suction means operating through the jaws to open the bag before and during operation, means carried by the jaws for welding and closing the opening of the bag after filling of the latter, measuring means provided with an admission port through which said means are adapted to be filled with the material to be packaged and with an exhaust port for said material, a distributing system for said material including a vertical tube extending above the location of the bags and connected with the exhaust port of the measuring means, means adapted to urge said tube along its axis down to a point near the bottom of the bag and to raise said tube out of the latter, a valve closing the lower end of said tube and opening automatically for a predetermined lower position of the tube inside the bag at the end of its downward movement and means returning last-mentioned valve into its closed inoperative position when a predetermined amount of material has passed out the measuring means

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into the tube to feed the bag, a valve controlling the passage of the material to be packaged through the admission port into the measuring means, means closing said valve as soon as the measuring means have received a predetermined volume of said material and means adapted to open said valve as soon as the distributing valve is set in its closed inoperative condition.

2. A machine for packaging liquid, pasty and pulverulent material inside bags of plastic material, provided with an opening at their upper ends, comprising in combination a carrier for the successive bags to be filled with said material, hollow jaws adapted to close over the upper end of the bag carried by said support, means controlling the reciprocation of the jaws with reference to each other and to the bag, suction means operating through the jaws to open the bag before and during operation, to reduce the pressure thereon, means carried by the jaws for welding and closing the opening of the bag after filling of the latter, a cylindrical measuring container, an intermediate chamber opening into the lower end of the measuring container and provided with an admission port and with an exhaust port and adapted to be filled under head with the material to be packaged through said admission port, a valve cooperating with said admission port, means urging elastically said valve into its closed position, means adapted to urge said valve away from its seat to allow the passage of the material to be packaged into the measuring container, a distributing system for said material including a vertical tube extending above the location of the bags and connected with the exhaust port of the measuring container, means adapted to urge said tube along its axis down to a point near the bottom of the bag and to raise said tube out of the latter, means whereby the amount of material fed into the measuring container controls, when reaching its upper and its lower level, the operation of the means closing the valve on the measuring container and the closing of the distributor tube valve respectively and means opening the valve on the measuring container upon closing of the distributor valve.

3. A machine for packaging liquid, pasty and pulverulent material inside bags of plastic material provided with an opening at their upper ends, comprising in combination a carrier for the successive bags to be filled with said material, hollow jaws adapted to close over the upper end of the bag carried by said support, means controlling the reciprocation of the jaws with reference to each other and to the bag, suction means operating through the jaws to open the bag before and during operation, means carried by the jaws for welding and closing the opening of the bag after filling of the latter, a transparent cylindrical measuring container, an intermediate chamber opening into the lower end of the measuring container and provided with an admission port and with an exhaust port and adapted to be filled under head with the material to be packaged through said admission port, a valve cooperating with said admission port, means urging elastically said valve into its closed position, means adapted to urge said valve away from its seat to allow the passage of the material to be packaged into the measuring container, a distributing system for said material including a vertical tube extending above the location of the bags and connected with the exhaust port of the measuring container, means adapted to urge said tube along its axis down to a point near the bottom of the bag and to raise said tube out of the latter, a float carried inside said cylindrical measuring container by the level of the substance entering the latter, a rod carried by the upper end of said float, two stops carried by said rod at adjustable heights, switches controlled by the corresponding stops when the float reaches predetermined upper and lower limit levels respectively, means whereby said switches when operated control the closing means for the measuring valve and the distributor valve respectively and means opening the

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valve on the measuring container upon closing of the distributor valve.

4. A machine for packaging liquid, pasty and pulverulent material inside bags of plastic material, provided with an opening at their upper ends, comprising in combination a carrier for the successive bags to be filled with said material, hollow jaws adapted to close over the upper end of the bag carried by said support, means controlling the reciprocation of the jaws with reference to each other and to the bag, suction means operating through the jaws to open the bag before and during operation, means carried by the jaws for welding and closing the opening of the bags after filling of the latter, measuring means provided with an admission port through which said means are adapted to be filled with the substance to be packaged and with an exhaust port for said substance, a distribution system for said material including a vertical tube extending above the location of the bags and provided with a lateral port, a yielding pipe connecting the exhaust port of the measuring means with said lateral port of the distributor tube, means adapted to urge said tube along its axis down to a point near the bottom of the bag and to raise said tube out of the latter, a valve closing the lower end of said tube and opening automatically for a predetermined lower position of the tube inside the bag at the end of its downward movement and means returning last-mentioned valve into its closed inoperative position when a predetermined amount of material has passed out of the measuring means into the tube to feed the bag, a valve controlling the passage of the material to be packaged through the admission port into the measuring means, means closing said valve as soon as the measuring means have received a predetermined volume of said material and means adapted to open said valve as soon as the distributing valve is set in its closed inoperative condition.

5. A machine for packaging liquid, pasty and pulverulent material inside bags of plastic material, provided with an opening at their upper ends, comprising in combination a carrier for the successive bags to be filled with said material, hollow jaws adapted to close over the upper end of the bag carried by said support, means controlling the reciprocation of the jaws with reference to each other and to the bag, suction means operating through the jaws to open the bag before and during operation, means carried by the jaws for the welding and closing of the opening of the bags after filling of the latter, measuring means provided with an admission port through which said means are adapted to be filled with the substance to be packaged and with an exhaust port for said substance, a distributing system for said material including a stationary cylinder fed with compressed air, a piston adapted to slidably sink and rise inside said cylinder, a vertical piston rod rigid with said piston, a tube of elongated cross-section surrounding coaxially said piston rod and defining therewith an annular distributing space, a carrier slidably fitted on the piston rod and moving bodily with the piston rod, the lower surface of which is rigid with said tube to make the lower end of the latter move bodily with the piston between an upper inoperative position and a lower operative position just above the location of the lower end of the bag, a spring holding the carrier in a predetermined position with reference to the piston rod in a vertical direction, a valve-forming enlargement rigid with the lower end of the piston rod and cooperating with the seat-forming lower end of the tube to engage same under the action of the spring, a stop holding the tube against downward movement in antagonism with the spring just before the end of the downward movement of the piston rod to release the lower end of the tube and to allow a filling of the bag through the distributing space, a yielding pipe connecting the exhaust port of the measuring means with the distributing space to feed the bag, a valve controlling the passage of the substance to be packaged

through the admission port into the measuring means, means closing last-mentioned valve as soon as the measuring means have received a predetermined volume of the material to be packaged and means adapted to open said measuring valve as soon as the valve enlargement on the piston rod has returned into contact with the distributor tube to close the distributing space.

6. A machine for packaging liquid, pasty and pulverulent material inside open bags of plastic material, comprising a bag carrier including means for closing and sealing the openings in the bags, a measuring chamber provided with means feeding the material to be packaged into its lower end and with an exhaust port for the measured amounts of material at a level slightly above said feeding means, a valve adapted to control the feeding means and a distributor including a vertical tube, means for urging said tube into the successive bags to be filled down to a point just above their lower ends, a valve closing the lower end of said tube, means operatively connecting the exhaust port of the measuring means with the distributor tube and means controlling in sequence the two valves and controlled by the rising of the material in the measuring means up to a predetermined upper level and its sinking down to a predetermined lower level, to obtain in sequence the lowering of the distributor pipe into the bag, the opening of the distributor valve, the withdrawal of the tube and closing of its valve and the sealing of the bag, the opening of the measuring valve and the closing of the latter.

7. A machine for packaging liquid, pasty and pulverulent material inside bags of plastic material, provided with an opening at their upper ends, comprising in combination a carrier for the successive bags to be filled with said material, hollow jaws adapted to close over the upper end of the bag carried by said support, means controlling the reciprocation of the jaws with reference to each other and to the bag, suction means operating through the jaws to open the bag before and during operation, means carried by the jaws for the welding and closing of the opening of the bags after filling of the latter, measuring means provided with an admission port through which said means are adapted to be filled with the substance to be packaged and with an exhaust port for said substance, a distributing system for said material including a stationary cylinder fed with compressed air, a piston adapted to slidably sink and rise inside said cylinder, a vertical piston rod rigid with said piston, a tube of elongated cross-section surrounding coaxially said piston rod and defining therewith an annular distributing space, a carrier slidably fitted on the piston rod and moving bodily with the piston rod, the lower surface of which is rigid with said tube to make the lower end of the latter move bodily with the piston between an upper inoperative position and a lower operative position just above the location of the lower end of the bag, a spring holding the carrier in a predetermined position with reference to the piston rod in a vertical direction, a valve-forming enlargement rigid with the lower end of the piston rod and cooperating with the seat-forming lower end of the tube to engage same under the action of the spring, vertical rods rigid with the carrier, a member rigid with the cylinder and through which said vertical rods are slidably carried, stops adjustably secured to the rod above said member rigid with the cylinder and adapted, when the downwardly moving piston has reached a position for which the lower end of the tube is near the bottom of the bag carried by the carrier, to engage last-mentioned member to allow the piston rod to continue its downward travel and to shift the valve-forming enlargement away from the tube against the action of the spring to release the lower end of the tube and to allow a filling of the bag through the distributing space, a yielding pipe connecting the exhaust port of the measuring means with the distributing space to feed the bag, a valve controlling the passage of the

substance to be packaged through the admission port into the measuring means, means closing last-mentioned valve as soon as the measuring means have received a predetermined volume of the material to be packaged and means adapted to open said measuring valve as soon as the valve enlargement on the piston rod has returned into contact with the distributor tube to close the distributing space.

8. A machine for packaging liquid, pasty and pulverulent material inside bags of plastic material, provided with an opening at their upper ends, comprising in combination a carrier for the successive bags to be filled with said material, hollow jaws adapted to close over the upper end of the bag carried by said support, means operating by compressed air and controlling the reciprocation of the jaws with reference to each other and to the bag, suction means operating through the jaws to open the bag before and during operation, means carried by the jaws for welding and closing of the opening of the bags after filling of the latter, measuring means provided with an admission port through which said means are adapted to be filled with the substance to be packaged and with an exhaust port for said substance, a distributing system for said material including a vertical tube extending above the location of the bags and connected with the exhaust port of the measuring means, means operating by compressed air and adapted to urge said tube along its axis down to a point near the bottom of the bag and to raise said tube out of the latter, a valve closing the lower end of said tube and opening automatically for a predetermined lower position of the tube inside the bag at the end of its downward movement and means returning last-mentioned valve into its closed inoperative position when a predetermined amount of material has passed out of the measuring means into the tube to feed the bag, a valve controlling the passage of the material to be packaged through the admission port into the measuring means, means operating by compressed air and closing said valve as soon as the measuring means have received a predetermined volume of said material and means adapted to open said valve as soon as the distributing valve is set in its closed inoperative condition.

9. A machine for packaging liquid, pasty and pulverulent material, inside bags of plastic material, provided with an opening at their upper ends, comprising in combination a carrier for the successive bags to be filled with said material, hollow jaws adapted to close over the upper end of the bag carried by said support, means controlling the reciprocation of the jaws with reference to each other and to the bag, suction means operating through the jaws to open the bag before and during operation and including tubes provided with slits in their surfaces registering with each other and a supply of vacuum adapted to feed said tubular suction means, to reduce the pressure therein, means carried by the jaws for welding and closing the opening of the bag after filling of the latter, measuring means provided with an admission port through which said means are adapted to be filled with the material to be packaged and with an exhaust port for said material, a distributing system for said material including a vertical tube extending above the location of the bags and connected with the exhaust port of the measuring means, means adapted to urge said tube along its axis down to a point near the bottom of the bag and to raise said tube out of the latter, a valve closing the lower end of said tube and opening automatically for a predetermined lower position of the tube inside the bag at the end of its downward movement and means returning last-mentioned valve into its closed inoperative position when a predetermined amount of material has passed out of the measuring means into the tube to feed the bag, a valve controlling the passage of the material to be packaged through the admission port into the measuring means, means closing said valve as soon

as the measuring means have received a predetermined volume of said material and means adapted to open said valve as soon as the distributing valve is set in its closed inoperative condition.

10. A machine for packaging liquid, pasty and pulverulent material inside open bags of plastic material, comprising a bag carrier including bag-closing jaws and welding electrodes for sealing the openings in the bags, a measuring chamber provided with means feeding the material to be packaged into its lower end and with an exhaust port for the measured amounts of material at a level slightly above said feeding means, a valve adapted to control the feeding means and a distributor including a vertical tube, means for urging said tube into the suc-

cessive bags to be filled down to a point just above their lower ends, a valve closing the lower end of said tube, means operatively connecting the exhaust port of the measuring means with the distributor tube and means controlling in sequence the two valves and controlled by the rising of the material in the measuring means up to a predetermined upper level and its sinking down to a predetermined lower level, to obtain in sequence the lowering of the distributor pipe into the bag, the opening of the distributor valve, the withdrawal of the tube and the closing of its valve and the sealing of the bag, the opening of the measuring valve and the closing of the latter.

No references cited.