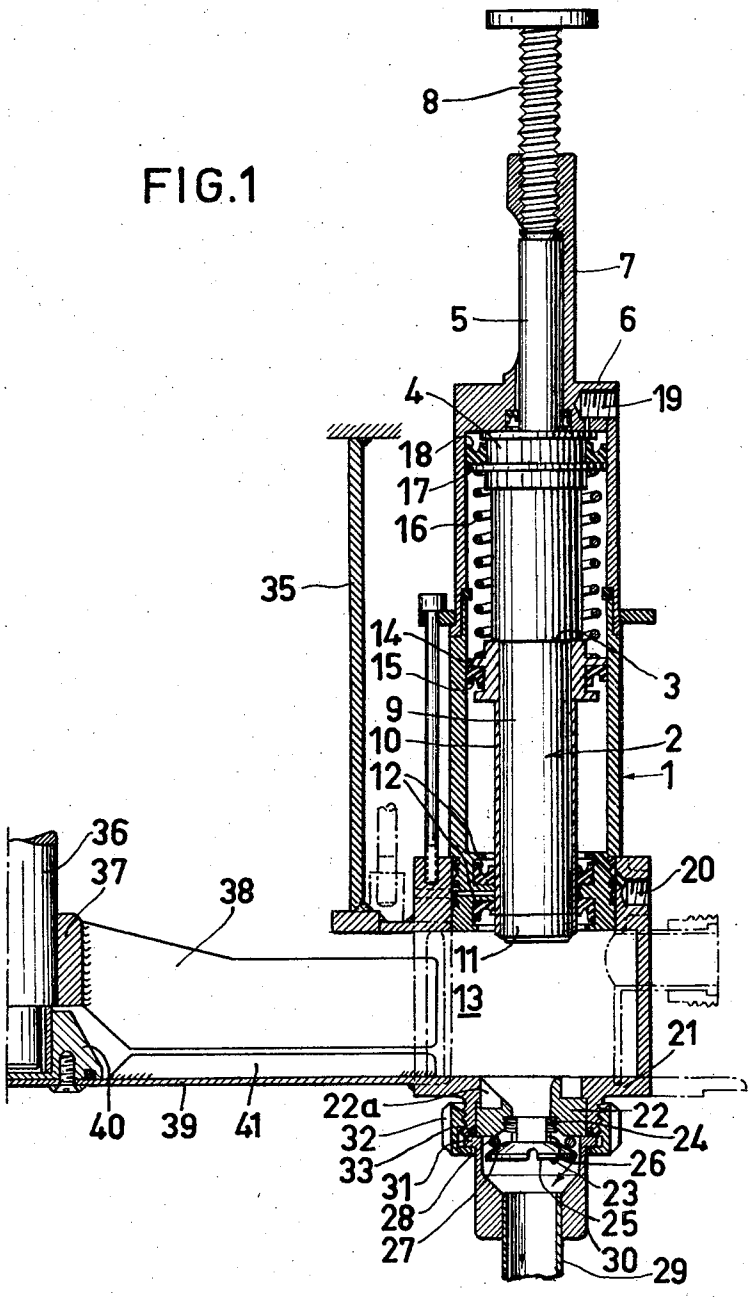
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BATCHING APPARATUS FOR LIQUID OR PLASTIC SUBSTANCES

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FIG.1

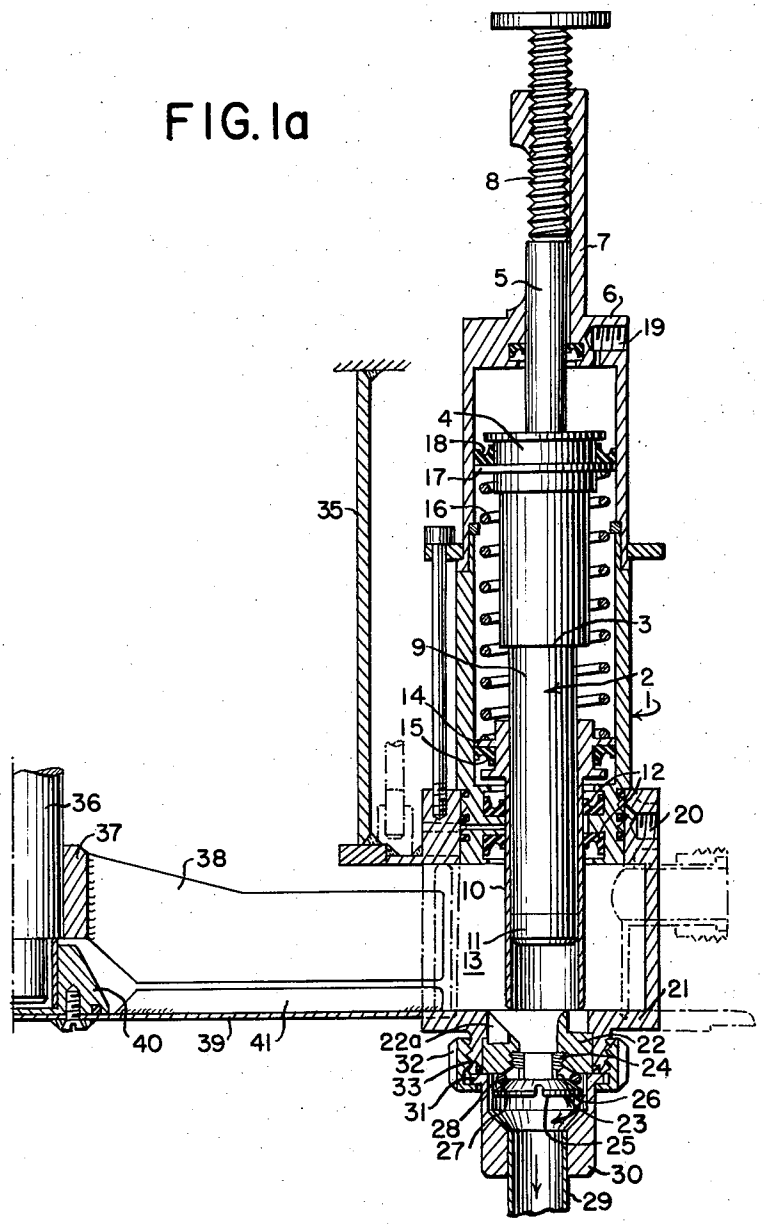


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BATCHING APPARATUS FOR LIQUID OR PLASTIC SUBSTANCES

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FIG. 1a



INVENTOR

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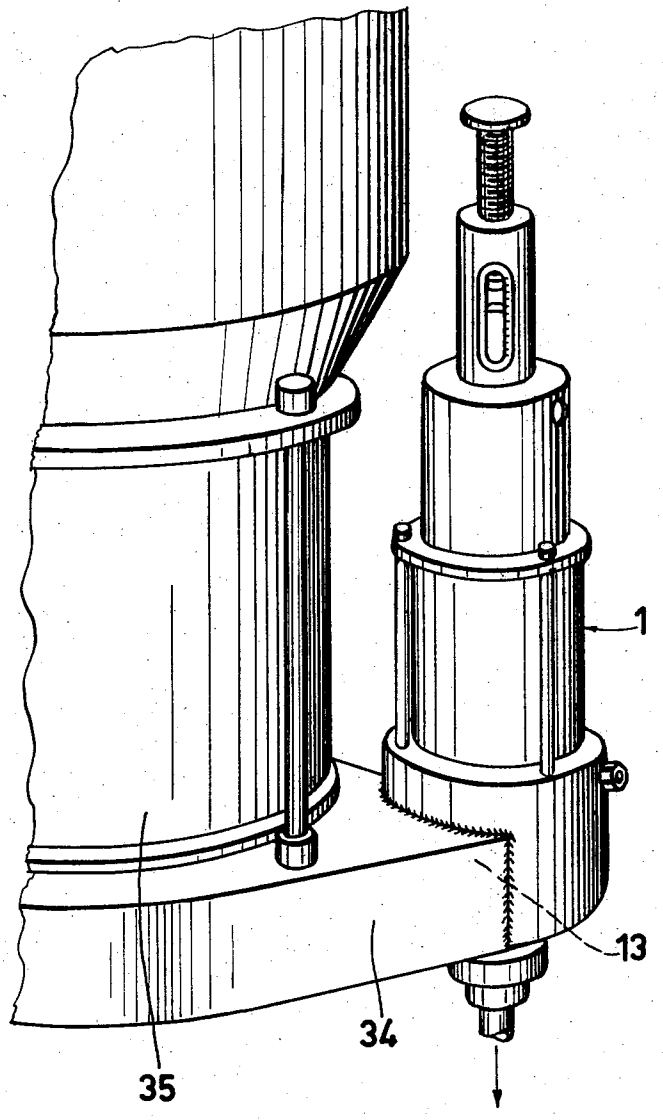
BY Glascock Downing & Seebold

ATTORNEYS

BATCHING APPARATUS FOR LIQUID OR PLASTIC SUBSTANCES

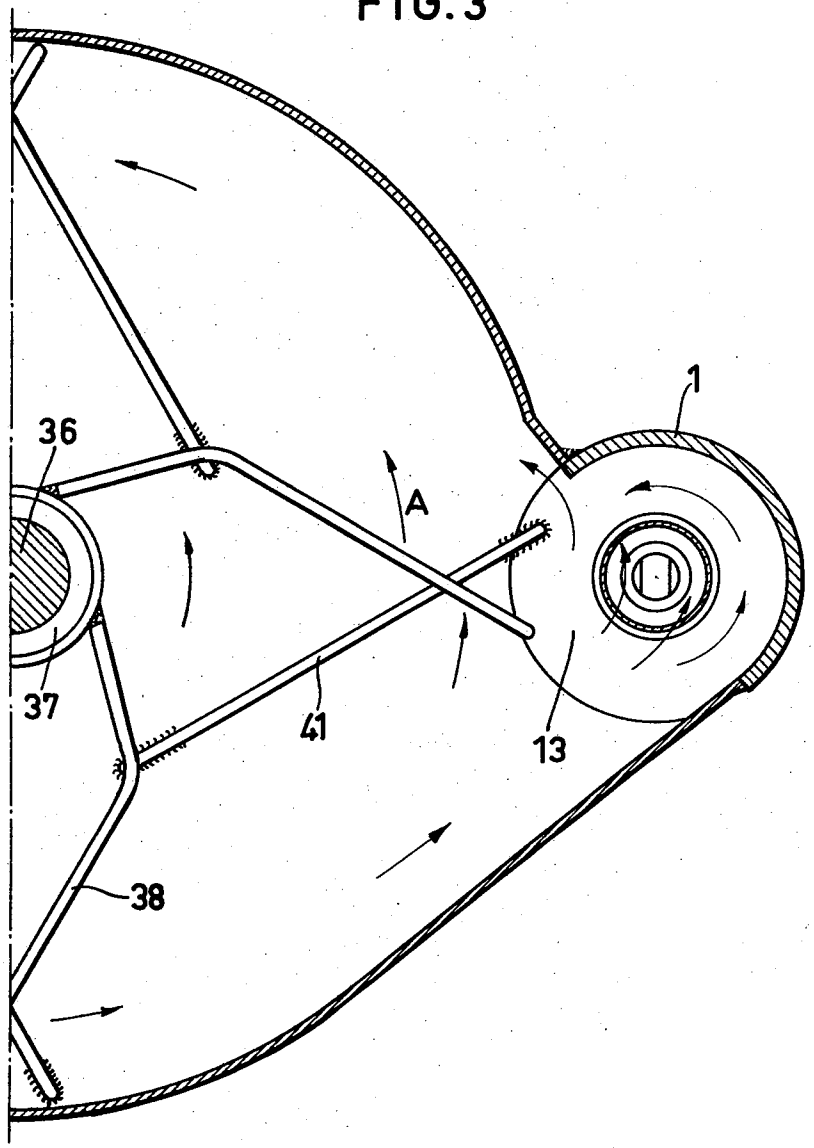
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FIG. 2



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FIG. 3



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3,101,161

BATCHING APPARATUS FOR LIQUID OR PLASTIC SUBSTANCES

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3 Claims. (Cl. 222—235)

This invention relates to an apparatus for batching liquid or plastic substances, comprising a cylinder which encloses an axially dsposed piston for feeding out through one cylinder end in batches determined by the piston stroke length a substance which is fed in continuously via a side inlet at the said cylinder end.

Conventional batching apparatus of the said type operate with vacuum for filling the measuring chamber, i.e. the space below the piston, with the substance in such a manner, that at the reverse stroke of the piston the substance is sucked in via a valve through the side inlet. It appears unavoidable, however, that in connection with the said suction even air enters the measuring chamber, which proved to have an unfavourable effect on the operation and, above all, results in a non-uniform batching. This applies particularly to the batching of smaller doses. Furthermore, there are difficulties involved in the vacuum principle with respect to the sealing of the outlet valve.

It is the object of the invention to eliminate the aforesaid disadvantages and to render possible a faultless as well as accurate batching, even when small doses are concerned.

This object is achieved such, that the batching apparatus as regards its function is made independent of vacuum.

The apparatus according to the invention is substantially characterized in that it comprises a sleeve tightly enclosing the piston but axially displaceable relative the same, which sleeve at the beginning of the batching operation, with the sleeve end closest to the working end of the piston being substantially in level with the said working end when the piston is in its retracted position prior to the beginning of the power stroke, and with the cylinder space located between the piston end and a check valve disposed in the cylinder end filled with substance, is displaced from its starting position into a position of sealingly shielding the inlet, the piston being adapted in connection therewith to be displaced for pressing out the substance included in the said space through the check valve and thereafter to be returned together with the sleeve to the starting position for carrying out another batching operation.

An embodiment of the invention is described in the following, reference being had to the accompanying drawings, FIG. 1 of which shows a longitudinal section through the apparatus according to the invention, illustrating the position of the component parts at the beginning of the batching operation, FIGURE 1*a* is a view along the lines of FIGURE 1 illustrating the component parts close to the completion of the batching operation, FIG. 2 shows a perspective view of the apparatus with associated reservoir, and FIG. 3 shows a cross-section of a part of the lower portion of the reservoir.

FIG. 1 shows a cylinder, generally designated by **1**, for a piston **2** with a projection **3**, a piston rod **5** extending upwards from the piston head **4** through the upper end wall **6** of the cylinder and a tubular member **7** connected thereto. Into the upper end of the said tubular member **7** is threaded a control screw **8** for limiting the movement of the piston rod **5** and thereby to limit the stroke of the piston **2** to a desired length.

A stepped portion **9** of the piston **2** carries a sleeve **10** having a length substantially equal to that of the said portion **9** (see FIG. 1) and sealed by a packing **11** surrounding the working end of the piston. The said sleeve is further sealed to the interior of the cylinder **1** by means of annular packings **12** projecting from the cylinder wall above an aperture **13** disposed in the lower portion of the cylinder, which aperture defines a side inlet for the substance to be batched. The upper portion of the sleeve is provided with an annular flange **14** having on its lower surface an annular packing **15** in sealing cooperation with the cylinder wall. The upper surface of the said flange **14** forms a supporting surface for the lower end of a helical pressure spring **16**, the upper end of the said spring being supported by the lower surface of an annular flange **17** disposed at the piston head **4**. A further annular packing **18** on the upper surface of the said annular flange **17** is in sealing cooperation with the cylinder wall. In the embodiment shown, the upper end wall of the cylinder and the cylinder wall portion above the plane of the side inlet **13** are provided at **19** and **20** with connections for pressure lines (not shown) for operating the piston and the sleeve by means of pressure on the sealed annular flanges **17** and **14** respectively.

The lower end wall **21** of the cylinder **1** carries in an insert member **22** a check valve, generally designated by **23**, comprising a washer **25** with chamfered periphery, which is firmly screwed into the insert member **22** by means of a nipple member **24** which, as appears from the figure, is provided with apertures **26** through its neck wall, the upper surface of the said washer **25** being apart from the lower surface of the insert member **22**. In the annular space formed between this horizontal surface and the chamfered surface **27** of the washer **25** is inserted a pre-stressed packing ring **28** extensible in peripheral direction. Thus, the substance can be pressed downwards through the nipple **24** of the washer **25** and pressed out in lateral direction through the apertures **26** whilst the elastic ring **28** expands temporarily, as shown in the lower portion of FIG. 1*a* whereafter the substance is directed downwards through an outlet tube **29**. The said outlet tube **29** is secured in a coupling muff **30** having its coupling flange **31** by means of an internally threaded clamping sleeve **32** via an annular packing **33** sealingly screwed on a correspondingly threaded connection piece of the cylinder end wall **21**. By this arrangement, the check valve and particularly its packing ring **28** are easily accessible for inspection or replacement.

The embodiment shown is intended for batching semi-plastic substances, for example margarine. For this purpose, the feed to the side inlet or aperture **13** occurs in a special manner which is described in detail in the following. FIG. 2 shows in perspective how the side inlet **13** of the cylinder **1** is connected to a casing or housing **34** forming the lower portion of a reservoir **35** for the said substance. FIG. 3 shows a cross-section through the portion or the half of the housing **34**, which is located closest to the cylinder. Coaxially with the reservoir **35** extends a shaft **36** (see also FIG. 1) carrying a hub with flanged blades **38** to form a stirrer rotating in the direction shown by the arrow A. The bottom **39** of the housing **34** carries both a fastening **40** for the bearing of the stirrer shaft **36** and fixed guide bars **41**, the upper edges of the said bars having a certain clearance to the lower edges of the blades **38**. The substance in the reservoir, for example margarine, is plasticized by rotation of the stirrer blades **38** in cooperation with the fixed guide bars **41**, whereby the plasticized substance is moved according to the arrows having no designations. With increasing plasticity the substance is forced increasingly towards the aperture **13** in the lower portion of

the cylinder 1 which in stationary condition is supplied continuously with plastic substance.

The above-described batching apparatus operates in the following manner.

When the batching operation is being commenced, the piston 2 and the sleeve 10 occupy the position shown in FIG. 1. In this position, the piston head 4 abuts, as seen, against the lower surface of the end wall 6, the end portion of the piston rod 5 abutting at the same time against the control screw 8, i.e. the apparatus is set for maximum doses. By screwing the control screw 8 down to desired length, the apparatus is set for batching smaller doses.

The starting position shown, wherein the piston 2 is pressed back entirely and the sleeve 10 is pressed against the piston projection 3, is maintained by pressure medium supplied via the lower connection 20. As described above, the plastic substance is forced continuously through the now exposed side inlet 13 into the lower portion of the cylinder and fills the space below the piston 2 to its entirety. The upper pressure medium connection 19 being closed, the lower connection 20 is then opened whereby the sleeve 10 by action of the compressed pressure spring 16 is forced downwards into contact with the sealing ring 22*a* of the insert member 22, as indicated in FIG. 1*a*, thereby cutting the substance supply from the side inlet 13.

Thereafter, the upper connection 19 is supplied with pressure medium which presses the piston 2 downwards (an intermediate position is shown in FIG. 1*a* and thereby, in the manner described above, presses the substance included in the sleeve 10 out through the outlet valve 23 in proportion with the piston stroke length.

In order to prevent the check valve 23 at the return movement of the piston 2 from being subjected to vacuum, pressure medium is now permitted to enter through the lower connection 20, while maintaining the over-pressure on the upper surface of the piston head 4, whereby the sleeve 10 is pressed upwards against the action of the spring 16 into contact with the piston projection 3, for which position the lower edge of the sleeve 10 is substantially in level with the lower end portion of the piston 2.

As the final phase of the said operation, the pressure above the piston head 4 is now diminished via the upper connection 19, while maintaining the pressure medium supply through the lower connection 20, so that both the piston and the sleeve as one unit are moved slowly upwards into the starting position shown in the left-hand part of the figure. During the return movement of the said unit, substance was fed in again from the side inlet rendering the apparatus immediately ready for another batching operation.

As appears from the description, the apparatus operates without any inlet valve and thus without vacuum, so that the disadvantages connected therewith, such as air admixture, non-uniform batching and difficulties with respect to smaller doses are entirely eliminated.

The invention is not limited to the embodiment shown. The piston and the sleeve may be operated in a manner other than by pressure medium, for example by cam steering or other mechanical arrangements. Furthermore, the pressure spring for controlling the relative movement of the piston and the sleeve may be arranged in a different manner or be replaced by some mechanical equivalent. As regards the check valve, the edge of the insert member 22 may be chamfered instead of the washer 25, or also both may be chamfered. When the substance to be batched is of liquid state, it is, of course, not necessary to provide the shown arrangement of stirrer and guide bars, but the substance may be led via a tube directly from the lower portion of the reservoir in question to a side inlet in the batching cylinder, as appears from the dash-dotted lines in FIG. 1.

What I claim is:

1. An apparatus for batching liquid or plastic substances of the type comprising a cylinder which encloses an axially disposed piston for portioning out through one cylinder end a substance which is fed in continuously via a side inlet at said cylinder end, a sleeve tightly enclosing the piston but axially displaceable relative the same, which sleeve upon the beginning of the batching operation, with the sleeve end adjacent the working end of the piston being substantially in level with said working end when the piston is in its retracted position prior to the beginning of the power stroke, and with the cylinder space between the piston end and a check valve disposed in the cylinder end being filled with substance, is displaced from its starting position into a position of sealingly shielding the inlet, the piston being adapted in connection therewith to be displaced for pressing out the substance included in said space through the check valve and thereafter to be returned together with the sleeve to the starting position for carrying out another batching operation, a helical spring enclosing the piston abuts with one end against a stop on the piston and with its other end against a stop on the sleeve, so that when the spring is free from tension the sleeve projects beyond the piston by a distance sufficient for said shielding, said sleeve being adapted by compression of the spring to be pressed from its shielding position back against an intermediate stop on the piston for preparing another batching operation, said piston then being separately fixed in its end position wherein the outer end of the sleeve is substantially in level with the piston end, and during the continued back-pressing movement to take the piston then separately released along into its starting position.

2. An apparatus according to claim 1, wherein the check valve comprises a stationary circular washer spaced from an annular surface constituting the cylinder end, the opposed edge portions of the cylinder end and of the washer forming a radially outwardly widening angle with one another, the annular space between said opposed edge portions being bridged by an intermediate annular packing elastically extensible in peripherical direction and having a pre-stress sufficiently to seal said space when no pressure is applied to the substance.

3. An apparatus according to claim 1, wherein the side inlet of the cylinder is in connection with an outlet in the lower portion of a cylindric reservoir containing the substance, a rotatable shaft being vertically and concentrically mounted in said lower portion, vanes extending from said shaft and deviating from the radial direction in a direction opposite to that of rotation, and guiding ribs being provided in the bottom of said lower portion for directing the circulated substance towards the side inlet of the cylinder.

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