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(54) FILLING DEVICE AND METHOD FOR AN AUTOMATIC HORIZONTAL FLEXIBLE CONTAINER FORMING AND FILLING MACHINE

(57) The filling device comprises a filling valve (1), a supply conduit (2) connected to an inlet of the filling valve (1) for supplying a product, a filling nozzle (3) connected to an outlet of the filling valve (1) for guiding the product towards an opening (E1) of a flexible container (E), and a control device (10) configured for opening and closing the filling valve (1) according to a conveyor device that positions successive flexible containers (E) in relation to the filling nozzle (3). An auxiliary valve (4) is interposed in the supply conduit (2) upstream of the filling valve (1). The control device (10) closes the auxiliary valve (4) before closure of the filling valve (1) has been completed at the end of each filling cycle.

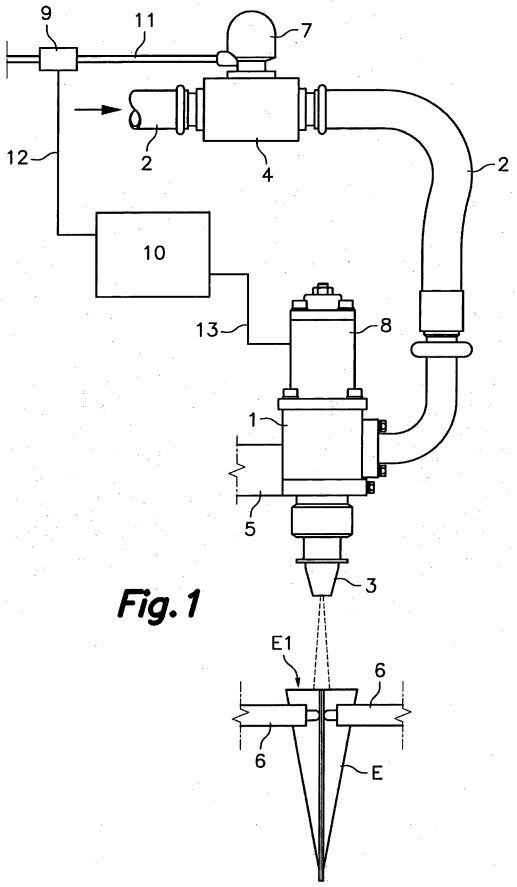

Fig. 1

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Description

Field of the Art

[0001] The present invention relates to a filling device for an automatic horizontal flexible container forming and filling machine, including means for preventing splashes from a filling nozzle when closing a filling valve that opens and closes a supply conduit for supplying a flowable product used to fill the containers. The present invention also relates to a filling method for an automatic horizontal flexible container forming and filling machine equipped with such filling device.

Background of the Invention

[0002] Automatic horizontal container forming and filling machines are known to essentially comprise a web feeding unit feeding a web of flexible heat-seal film from a reel, a container forming unit forming individual flexible containers from said web of flexible film, a filling unit filling the individual flexible containers with one or more products, and a closing unit closing the filled flexible containers and delivering them to an output conveyor.

[0003] The mentioned filling unit in such machines includes one or more filling devices, each of which comprises a supply conduit connected to an inlet of a filling valve for supplying a flowable product, and a filling nozzle connected to an outlet of the filling valve for guiding said flowable product towards an opening of a container, where a control device controls the opening and closing of the filling valve according to movements of a conveyor device that positions successive flexible containers in relation to said filling nozzle.

[0004] One drawback of the filling devices of the prior art is that during the action of closing the filling valve, the passage area of the valve is gradually reduced while the pressure in the supply conduit is kept constant, and this causes acceleration of the flowable product through the filling valve leading to splashes from the outlet of the filling nozzle right before the shut-off valve reaches a completely closed position. These splashes are a drawback given that they can foul the outer surfaces of the flexible containers and contaminate the environment of the filling device, making frequent cleaning necessary.

[0005] Patent document JP 2010222023 A describes a filling device comprising a four-way rotary valve, a supply conduit connected to an upper opening of the four-way valve for supplying a flowable product, a filling piston pump connected to a side opening of the four-way valve, a suction piston pump connected to another side opening of the four-way valve, and a filling nozzle connected to a lower opening of the four-way valve. The suction piston pump is used for sucking out the flowable product content remaining in the filling nozzle in order to prevent splashes and drips after the four-way valve has closed the passage towards the filling nozzle. Nevertheless, this device is mechanically complex and economically burdensome.

Disclosure of the Invention

[0006] The object of the present invention is to solve or mitigate the foregoing and other drawbacks by providing a filling device for an automatic horizontal flexible container forming and filling machine, comprising a filling valve, a supply conduit connected to an inlet of said filling valve for supplying a flowable product, a filling nozzle connected to an outlet of the filling valve for guiding said flowable product towards an opening of a flexible container, and a control device configured for opening and closing the filling valve according to a conveyor device that positions successive flexible containers in relation to said filling nozzle to perform successive filling cycles.

[0007] The filling device further comprises an auxiliary valve interposed in said supply conduit upstream of the filling valve. This auxiliary valve is controlled by said control device for closing passage of the flowable product in the supply conduit upstream of the filling valve before closure of the filling valve has been completed at the end of a filling cycle.

[0008] Therefore, from the moment the auxiliary valve has closed the passage of the flowable product in the supply conduit upstream of the filling valve, pressure decreases or ceases in the section of the supply conduit comprised between the auxiliary valve and the filling valve, and accordingly, acceleration of the flowable product through the filling valve does not occur and splashes from the outlet of the filling nozzle are prevented during closure of the filling valve from a completely or partially open position to a completely closed position.

[0009] The control device is also configured for opening the auxiliary valve and allowing passage of the flowable product therethrough, and thereby restoring a predetermined working pressure in the mentioned section of the supply conduit comprised between the auxiliary valve and the filling valve, before opening of the filling valve for filling a new container has been started.

[0010] Opening and closing movements of the filling valve and the auxiliary valve are driven by respective drive devices controlled by the control device. The drive device of the auxiliary valve preferably provides a closure time from a completely open position to a completely closed position that is shorter than a closure time from a completely open position to a completely closed position provided by the drive device of the filling valve. This offers the possibility for the control device to simultaneously emit opening and closing orders for the filling valve and for the auxiliary valve.

[0011] A diaphragm valve, such as for example a pneumatically driven diaphragm valve, can be suitable as the auxiliary valve and a globe valve, such as a motor driven globe valve, driven for example by an electric motor, can be suitable as the filling valve.

[0012] The method of the present invention comprises performing the following steps for each filling cycle using the filling device described above. First, by means of the control device, the filling valve is opened, at the inlet of

which the supply conduit supplying the flowable product is connected and at the outlet of which the filling nozzle guiding the flowable product towards the opening of a flexible container is connected. Then, and after a predetermined time, closing by means of the control device the filling valve at the end of the filling cycle, with the foresight of closing by means of the control device the auxiliary valve interposed in the supply conduit upstream of the filling valve for interrupting passage of the flowable product in the supply conduit upstream of the filling valve before the closure of the filling valve has been completed at the end of the filling cycle.

Brief Description of the Drawings

[0013] The foregoing and other features and advantages will be better understood based on the following detailed description of a merely illustrative and non-limiting embodiment with reference to the accompanying drawings, in which:

Figure 1 (only figure) is a schematic side view of a filling device for an automatic horizontal flexible container forming and filling machine according to one embodiment of the present invention.

Detailed Description of an Embodiment

[0014] Figure 1 shows a filling valve 1 supported in a structural element 5 of an automatic horizontal flexible container forming and filling machine. This filling valve 1 has an upper inlet to which a supply conduit 2 is connected and a lower outlet to which a filling nozzle 3 is connected. A flowable product, typically a liquid or paste, is supplied through the supply conduit 2 at a predetermined working pressure. An auxiliary valve 4 interposed in the supply conduit 2 is arranged upstream of the filling valve 1.

[0015] The automatic horizontal flexible container forming and filling machine comprises a conveyor device, which can be of any known type and does not form part of the present invention, having pairs of clamps 6, for example, configured for supporting a plurality of flexible containers E and step-by-step translation means for successively positioning each of the flexible containers E supported by the clamps 6 with an upper opening E1 thereof open below the filling nozzle 3. The filling nozzle 3 is configured for guiding the flowable product towards said opening EI of the flexible container E.

[0016] The filling device is controlled by a control device 10 configured for opening and closing the filling valve 1 according to the movements of the conveyor device. The control device 10 also controls the auxiliary valve 4 such that when filling of each flexible container E is done, the auxiliary valve 4 closes the passage of the flowable product in the supply conduit 2 upstream of the filling valve 1 before closure of the filling valve 1 has been completed. This substantially reduces or eliminates pressure of the flowable product in the section of the supply conduit 2 comprised between the auxiliary valve 4 and the filling valve 1 and prevents splashes from the filling nozzle 3 when closing the filling valve 1.

[0017] In the embodiment shown in Figure 1, the auxiliary valve 4 is a diaphragm valve provided with a pneumatic drive 7 and the filling valve 1 is a globe valve driven by an electric motor 8. A pneumatic supply tube 11 provides energy to the pneumatic drive 7 of the auxiliary valve 4. The control device 10 is connected by a signal line 12 to a control valve 9 interposed in said pneumatic supply tube 11 and by another control line 13 to the electric motor 8 of the filling valve 1.

[0018] Typically, the pneumatic drive 7 of the auxiliary valve 4 provides a closure time from a completely open position to a completely closed position of the auxiliary valve 4 that is shorter than a closure time from a completely open position to a completely closed position of the filling valve 1 provided by the electric motor 8 of the filling valve 1.

[0019] The scope of the present invention is defined in the attached claims.

Claims

1. A filling device for an automatic horizontal flexible container forming and filling machine, comprising a filling valve (1), a supply conduit (2) connected to an inlet of said filling valve (1) for supplying a flowable product, a filling nozzle (3) connected to an outlet of the filling valve (1) for guiding said flowable product towards an opening (E1) of a flexible container (E), and a control device (10) configured for opening and closing the filling valve (1) according to a conveyor device that positions successive flexible containers (E) in relation to said filling nozzle (3), **characterized in that** it further comprises an auxiliary valve (4) interposed in said supply conduit (2) upstream of the filling valve (1), said auxiliary valve (4) being controlled by said control device (10) for closing passage of the flowable product in the supply conduit (2) upstream of the filling valve (1) before closure of the filling valve (1) has been completed at the end of a filling cycle.

2. The filling device according to claim 1, **characterized in that** the auxiliary valve (4) has a drive device providing a closure time from a completely open position to a completely closed position that is shorter than a closure time from a completely open position to a completely closed position provided by a drive device of the filling valve (1).

3. The filling device according to claim 1 or 2, **characterized in that** the auxiliary valve (4) is a diaphragm valve.

4. The filling device according to claim 1 or 2, **characterized in that** the auxiliary valve (4) is a pneumatically driven diaphragm valve.

5. The filling device according to claim 1 or 2, **characterized in that** the filling valve (1) is a globe valve.

6. The filling device according to claim 1 or 2, **characterized in that** the filling valve (1) is a motor driven globe valve.

7. The filling device according to claim 1 or 2, **characterized in that** said control device (10) is configured for opening the auxiliary valve (4) and allowing passage of the flowable product therethrough before opening of the filling valve (1) has been started.

8. A filling method for an automatic horizontal flexible container forming and filling machine comprising the steps of: opening, by means of a control device (10), a filling valve (1) at the inlet of which there is connected a supply conduit (2) supplying a flowable product and at the outlet of which there is connected a filling nozzle (3) guiding said flowable product towards an opening (E1) of a flexible container (E); and closing, by means of said control device (10), said filling valve (1) at the end of a filling cycle, **characterized in that** it comprises the additional step of closing, by means of the control device (10), an auxiliary valve (4) interposed in said supply conduit (2) upstream of the filling valve (1) for interrupting passage of the flowable product in the supply conduit (2) upstream of the filling valve (1) before closure of the filling valve (1) has been completed at the end of said filling cycle.

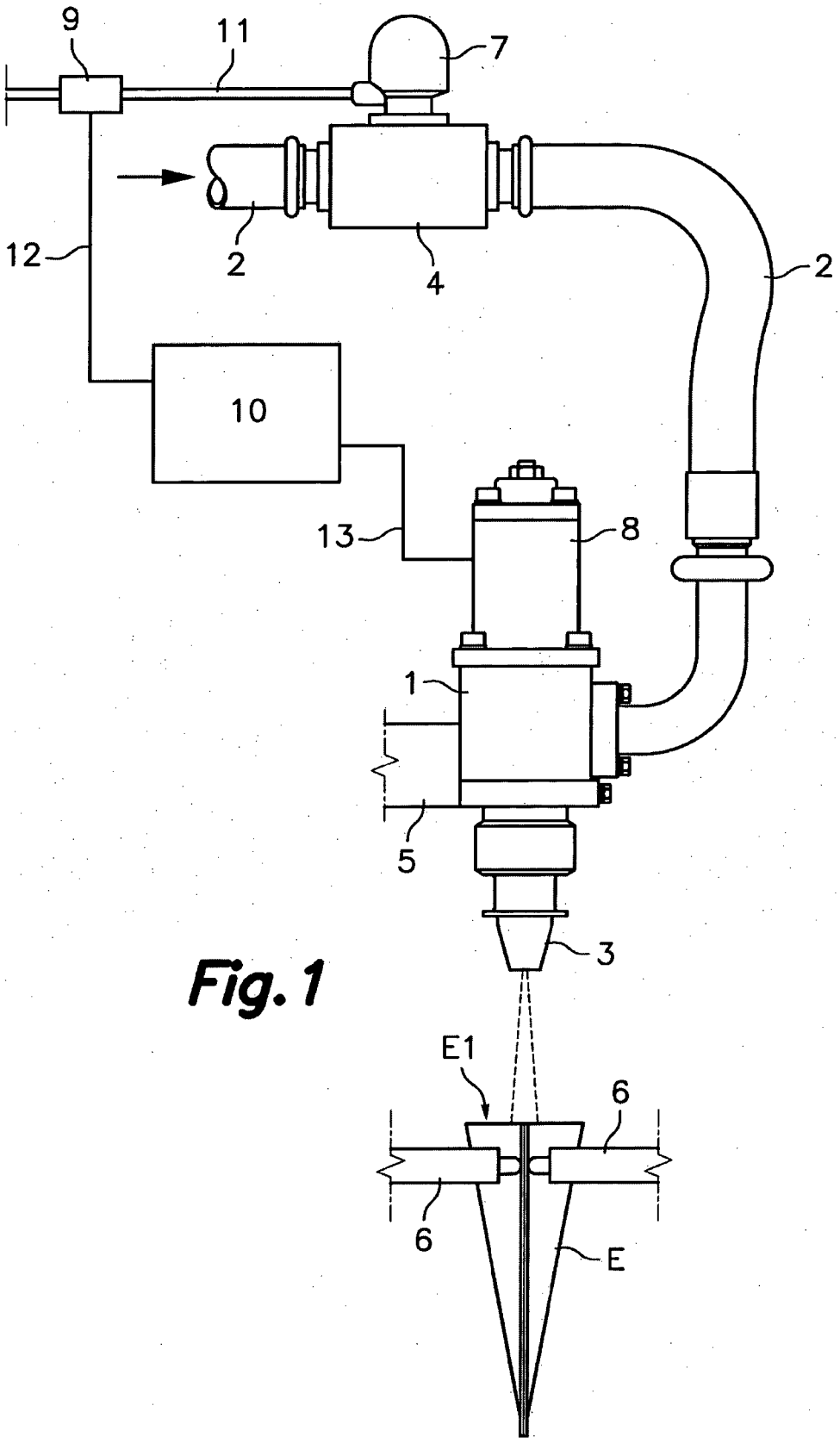

Fig. 1

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EUROPEAN SEARCH REPORT

Application Number
EP 15 38 0014

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 2 214 612 A (OCME SPA [IT]) 6 September 1989 (1989-09-06) * page 6, line 4 - page 7, line 5; figures 1-3 * -----	1-8	INV. B65B3/26 B65B37/00 B65B39/00 B65B57/00 B65B55/24 B65B57/14 B65B3/36 B67C3/26
			TECHNICAL FIELDS SEARCHED (IPC) B65B B67C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	21 July 2015	Paetzke, Uwe

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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 15 38 0014

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21-07-2015

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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