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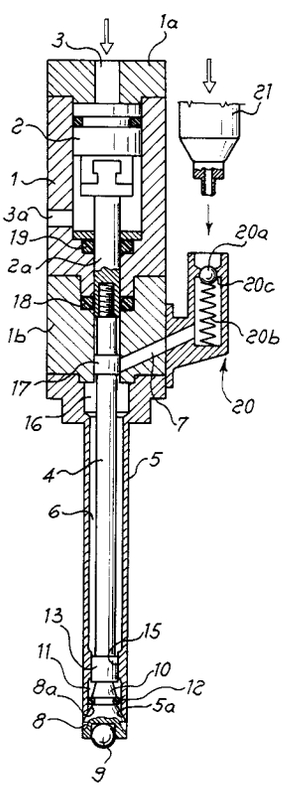
(54) Device for the continuous delivery of dense and/or viscous substances, with a coaxially sliding cylindrical rod.

(57) Device for the continuous delivery of dense and/or viscous substances, in particular adhesives of the polymerizable type, comprising a tubular delivery body (5) with a cylindrical rod (4) coaxially sliding, alternately, inside it by means of a double-acting piston (2), so as to create an annuler cavity (6) connected to a source supplying adhesive under pressure, said rod being provided with substantially conical obturator means (8a) at its free end which comprises, coaxially with the said conical obturator (8a) and in the vicinity thereof, at least two sealing members consisting of enlarged parts (10, 13), integral with said rod (4) and sliding inside chambers or countersunk zones (11, 14) formed in the internal surface of the tubular body (5), there also being provided at the opposite end of said annular cavity (6) at least one other sealing member consisting of a cylindrical body (17), coaxial with said rod (4) and sliding inside a chamber (16) of larger diameter formed inside the cylindrical body.

Fig. 1



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The present invention relates to a device for the continuous delivery of uniform quantities of dense and viscous fluid substances, in particular adhesives and similar paste-like substances.

As is known, in many sectors of the manufacturing industry and in particular in the shoe-manufacturing sector, use is made of various types of adhesives which are delivered continuously in the form of uniform strands, in order to perform bonding, for example, of the soles to the peripheral edge of the uppers, bonding of the heels and arch supports and also application of leather and plastic profiles for external finishing of the shoes.

In order to deliver a continuous strand of adhesive with a uniform cross-section, normally of the polymerizable type, use is currently made of delivery/metering devices which substantially consist of a tubular delivery body which has arranged inside it a coaxial rod displaceable in either direction by means of an actuating group in the form of a double-acting piston; an annular cavity is provided between said rod and the cylindrical internal surface of the tubular body, via which the adhesive, introduced under pressure, reaches the free end of the tubular body. The end of said displaceable rod also comprises an obturator with an enlarged, substantially frusto-conical head which alternately closes and opens the end of the tubular body.

These devices for delivering a continuous strand of adhesive have in practice some serious drawbacks which limit the possibilities and proper use thereof, especially as regards replacement of the type of adhesive and hermetic closure of the obturator each time delivery is stopped.

In fact, it has been possible to note that the sealing means of the end obturator are not always able to prevent dripping of the glue, when the delivery device is closed, owing to glue dust and/or particles which may collect between the obturator and its seat or also owing to wear of the contact surfaces, due to prolonged use of the delivery device. Furthermore, the sealing means between the line of the duct feeding glue into the cavity and the sealing member integral with the sliding rod which effects closure thereof, are not always able to prevent the glue, under pressure, from rising up along the rod itself and along the stem of the piston, stopping against the skirt of the double-acting cylinder, and from hardening with the passing of time.

Furthermore, the lack of an effective sealing action between the obturator and its closing seat may result, in addition to the dripping of glue when the delivery device is at rest, also in the infiltration of air into the annular cavity, thus causing hardening of the glue present in the said cavity and adversely affecting subsequent operation of the delivery device.

The technical problem which is posed, therefore, is that of providing a device for the continuous delivery of uniform quantities of dense fluid substances with a constant cross-section, in particular adhesives of the polymerizable type, designed to eliminate the drawbacks and the limitations of use of known delivery devices, without substantial variations in the overall dimensions nor substantial additional costs compared to those of known delivery devices.

Within the scope of this problem, the main aim is that of providing a device for the delivery of adhesives and similar dense and/or viscous substances, structured so as to prevent both the dripping of glue through the obturator and the seat of the end of the end of the tubular supply body, and the infiltration of air into the cavity when the obturator is closed.

Another aim of the invention is to provide a delivery device of the type specified above, designed to allow easy and rapid replacement of the type of adhesive to be supplied under pressure and ensure efficient and regular operation with any type of adhesive or similar substance.

This technical problem is solved according to the present invention by a device for the continuous delivery of dense and/or viscous substances, in particular adhesives of the polymerizable type, comprising a tubular delivery body with a cylindrical rod coaxially sliding, alternately, inside it by means of a double-acting piston so as to create an annular cavity connected to a source supplying adhesive under pressure, said rod being provided with substantially conical obturator means at its free end, said device comprising, coaxially with said conical obturator and in the vicinity thereof, at least two sealing members consisting of enlarged parts, integral with said rod and sliding inside chambers or countersunk zones formed on the internal surface of the tubular body, so as to seal off the end of the cavity only when the delivery device is closed and prevent the entry of air into the cavity itself, there also being provided at the opposite end of said annular cavity at least another sealing member, consisting of a cylindrical body, coaxial with said rod and sliding inside a chamber of larger diameter formed in the cylindrical body, below the aperture for introducing the supply of adhesive inside said cavity, so as to seal off said supply aperture and prevent the supply of adhesive to the cavity. According to a preferred embodiment of the delivery device according to the invention, said two sealing members, integral with the conical obturator, consist respectively of a frusto-conical body or enlarged part coaxial with said rod and displaceable inside a chamber so as to ensure sealing by means of contact against a toroidal ring coaxially integral with the external surface of the

conical body, and of a cylindrical enlarged part, coaxial with the rod displaceable inside a chamber, designed to ensure sealing by insertion inside a cylindrical annular shoulder projecting coaxially from said cylindrical body, immediately above the displacement chamber of said enlarged part.

Further characteristic features and advantages of the present invention will emerge more clearly from the following detailed description, with reference to the accompanying drawings provided solely by way of example, in which:

Figure 1 is a cross-section along the diametral axis of the delivery device realized according to the present invention and shown in the rest position (with the obturator closed), and

Figure 2 is a cross-section of the same device according to Figure 1, shown instead in the delivery position.

With reference to the aforementioned figures, the delivery device forming the subject of the present invention substantially consists of a hollow cylindrical body 1 closed at the top by an end-piece 1a and, at the bottom, by a similar end-piece 1b. It has slidably mounted inside it a piston 2 of the double-acting type, which is displaceable with a predetermined and adjustable travel by means of air introduced under pressure, alternately, through the ducts 3 and 3a.

The stem 2a, passing through the bottom end-piece 1b, has axially connected to it, by means of screwing, a cylindrical rod 4 sliding inside a straight tubular body 5 connected to the bottom end-piece 1b of the cylinder 1.

Said rod 4 has a constant diameter less than the internal diameter of the tubular housing body 5, so as to create between rod and tubular body a cylindrical cavity 6 intended to convey the adhesive supplied to the top of said cavity by means of a duct 7 which in turn is connected to a source supplying the adhesive under a suitable pressure, said source being of the known type and not shown in the figures.

The bottom end of said rod 4, emerging partially from the end of the tubular body 5, is shaped substantially in the form of a truncated cone 8 and more precisely with the conical surface 8a towards the inside, so as to form a member closing off the end of the cavity 6 by sealingly fitting against the end of the mouth 5a of the tubular body 5, the annular edge of which is correspondingly countersunk.

Therefore, with each displacement of the rod 4 towards the piston body 1, the obturator 8 closes the cavity 6, stopping adhesive introduced inside the cavity itself from emerging, while with each displacement of the obturator 8 towards the outside of the tubular body 5, the adhesive is able to emerge (in the direction of the arrows F in Figure 2) in the form of a cylindrical layer which then, after flowing round the external surface of the obturator, is united in the form of a continuous thread or strand.

Finally the bottom end of the obturator 8 has inserted inside it a freely rotating ball 9 designed to facilitate sliding of the end of the tubular body 5 on the surface onto which the strand of adhesive is to be applied.

In a delivery device of the type described above, the present invention envisages the application of a plurality of sealing members to prevent any dripping of glue in the event of a poor sealing action of the obturator 8 and the entry of air inside the cavity 6 when the obturator is closed, as well as additional sealing members inside the delivery device, designed to shut off securely the aperture of the duct 7 which introduces the adhesive into the cavity 6.

Said bottom sealing members substantially consist of a first frusto-conical enlarged part 10, coaxially integral with the rod 4 and sliding inside a chamber 11 formed by means of a countersunk zone in the cylindrical wall of the tubular body 5; the seal preventing adhesive and air entering the cavity is provided by means of insertion of the larger-diameter zone of the conical enlarged part 10 within a toroidal ring 12, integral with the external surface of the conical body 10. Therefore, with each opening travel movement of the obturator 8, the enlarged part 10 is also displaced, returning inside the chamber 11 and thus allowing the adhesive to continue towards the exit point.

An additional sealing member, consisting of a small cylinder 13 coaxially integral with the rod 4, is provided above and coaxial with said frusto-conical seal 10, said sealing member also being displaceable inside a cylindrical chamber 14 and forming the seal by means of insertion inside an annular shoulder 15 emerging radially from the internal cylindrical surface of the tubular body 5.

The simultaneous displacement of the three sealing members, i.e. the obturator 8, the frusto-conical enlarged part 10 and the cylindrical body 14, ensures a sealing action preventing any dripping of adhesive when the obturator is closed and infiltration of air into the cavity 6; consequently, the cavity of the delivery device may be kept filled with adhesive without the danger of hardening and/or alteration.

Still according to the invention, the inlet aperture of the supply pipe 7 into the cavity 6 is provided with an additional cylindrical chamber 16 formed in the internal surface of the cylindrical body 5 and having a greater diameter than the cavity 6, inside which a small cylinder 17 is displaceable, said cylinder being intended to shut off the aperture of the duct 7 (Figure 1) at the same

time as closure of the bottom sealing members 8a, 10 and 14. Furthermore, the stem 2a of the piston is provided with a toroidal seal 18 designed to prevent the adhesive under pressure from rising up along the stem, as well as a toroidal seal 19 providing a sealing action preventing the air actuating the piston from escaping.

The improved delivery device according to the invention comprises moreover a tubular block 20 associated with the supply duct 7, which block comprises conventional unidirectional valve means consisting of a ball 20a biased by a spring 20b against a seat 20c for rapid engagement with the tube 21 connected to the source supplying adhesive under pressure, so as to allow easy and rapid changing of the type of adhesive, whenever required.

In practice, it has been possible to establish that all of said sealing members associated with the rod actuating the end obturator ensure, in all conditions of use and with every type of adhesive or other dense and/or viscous substance, a perfect sealing action preventing dripping of glue through the obturator and infiltration of air inside the cavity.

Obviously, in its practical realization, the invention as described in accordance with any one of its possible embodiments may be subject to modifications as regards the materials used, the number of additional sealing members, the dimensions of the various constructional parts and its dimensions, without departing from the protective scope of the said invention.

Claims

1. Device for the continuous delivery of dense and/or viscous substances, in particular adhesives of the polymerizable type, comprising a tubular delivery body (5) with a cylindrical rod (4) coaxially sliding, alternately, inside it by means of a double-acting piston (2) so as to create an annular cavity connected to a source supplying adhesive under pressure, said rod being provided with substantially conical obturator means (8a) at its free end, characterized in that it comprises, coaxially with said conical obturator (8a) and in the vicinity thereof, at least two sealing members consisting of enlarged parts (10, 13), integral with said rod (4) and sliding inside chambers or countersunk zones (11, 14) formed on the internal surface of the tubular body (5), so as to seal off the end of the cavity only when the delivery device is closed and prevent the entry of air into the cavity itself, there also being provided at the opposite end of said annular cavity (6) at least another sealing member, consisting of a cylindrical body (17), coaxial with said rod (4) and sliding inside a chamber (16) of larger diameter (16) formed in the cylindrical body, below the aperture (7) for introducing the supply of adhesive inside said cavity, so as to seal off said supply aperture (7) and prevent the supply of adhesive to the cavity (6).

2. Delivery device according to Claim 1, characterized in that said two sealing members, integral with the conical obturator, consist respectively of a frusto-conical body or enlarged part (10) coaxial with said rod (4) and displaceable inside a chamber (11) so as to ensure sealing by means of contact against a toroidal ring (12) coaxially integral with the external surface of the conical body (12), and of a cylindrical enlarged part (13), coaxial with the rod (4), displaceable inside a chamber (14), designed to ensure sealing by means of insertion inside a cylindrical annular shoulder (15) projecting coaxially from said cylindrical body (5), immediately above the displacement chamber (14) of said enlarged part (13).

3. Delivery device according to Claim 1, characterized in that at least one toroidal seal (18) is positioned at the end of said cylindrical rod, opposite to the metering end, being designed to cooperate with the rod (2a) in order to prevent adhesive rising up along the rod itself.

4. Delivery device according to Claim 1, characterized in that can be removably connected to a source supplying adhesive under pressure via rapid-engagement connecting means (20, 21) for facilitating a change in the type of adhesive.

Fig. 1

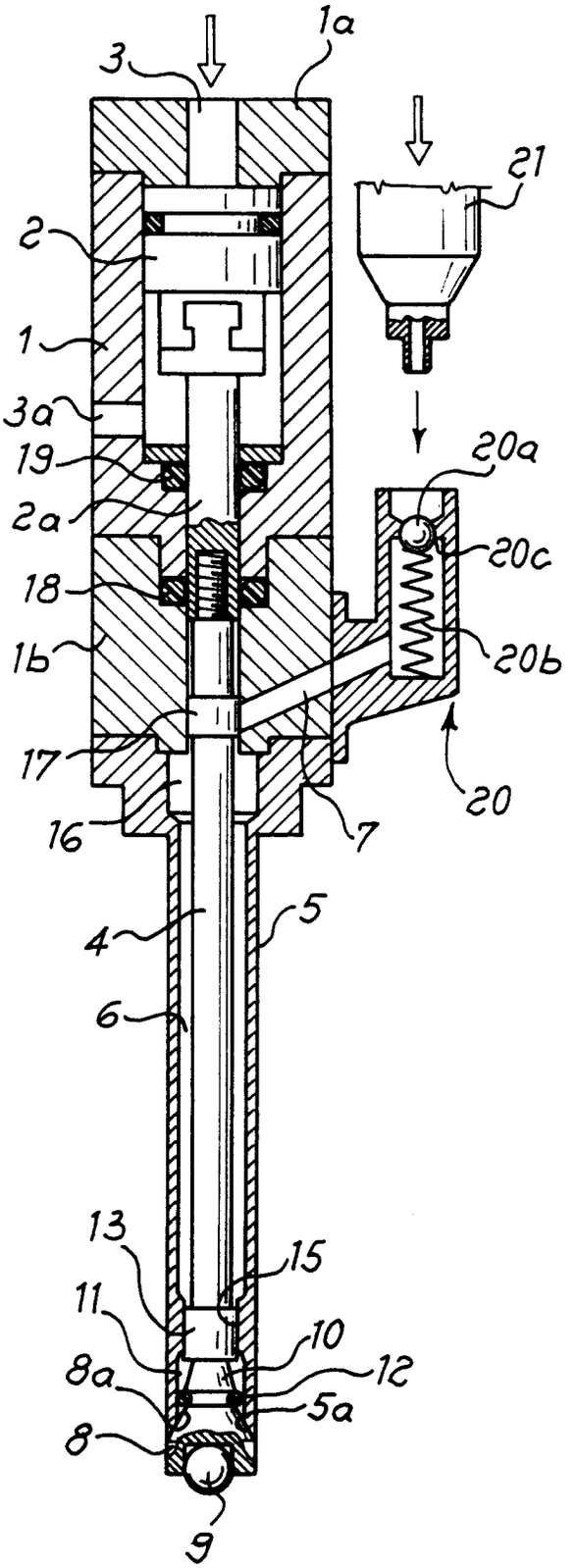
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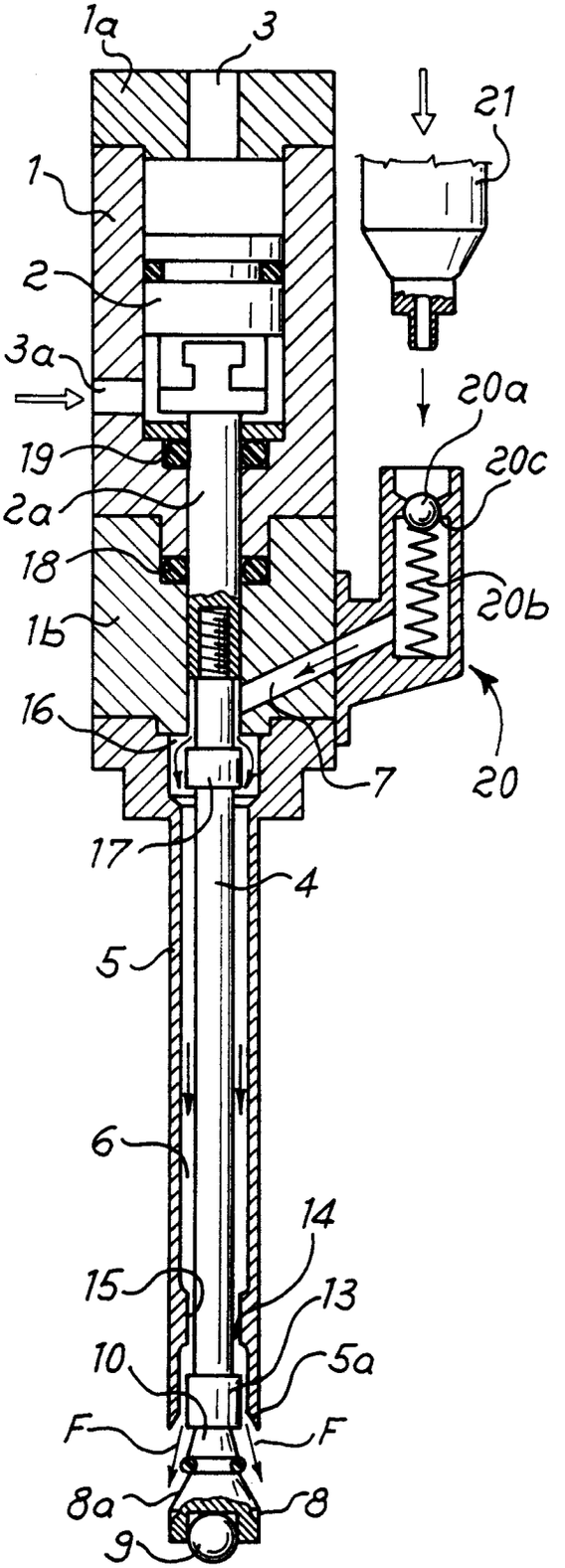
Fig. 2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