

Apparatus for the application of a non-solid product.

This invention relates to an apparatus for the application of a non-solid, in particular viscous product, from a storage cartridge for the product mounted on the apparatus. A cartridge of this kind may comprise an outer envelope provided on one side with an end piece intended to receive an applicator nozzle and on the other side with a base wall intended to slide towards the end piece and expel the product from the end piece and the nozzle.

Apparatus or guns of this kind are generally used for the application of sealants for thermal and/or sound insulation.

The base wall of a cartridge is intended to slide as a result of the feed of a piston actuated manually with the aid of a pump lever by way of a rack and pinion or friction feed mechanism.

One known mechanism with a friction feed rod (US-A-4 840 294) includes a front feed sprocket and a rear non-return sprocket mounted on the rod, each extending in a plane substantially perpendicular to the latter.

The feed sprocket is intended to engage the piston rod by tilting over the rod as a result of pumping of the lever in order to drive the piston towards the front in an elementary feed motion and to disengage the non-return sprocket already engaging the rod after pumping, thereby blocking the piston in order to prevent it from moving backwards.

The application of a predetermined quantity of the product from the cartridge requires a certain feed of the piston resulting from a plurality of successive pumping operations.

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In short, using an apparatus of this kind, an operator must tire himself out pumping a great many times in order to apply his product.

This invention proposes a new apparatus for the application of a non-solid product, aiming firstly to reduce the physical effort required by the operator in order to apply the product.

To this end, the invention relates to an apparatus for the application of a non-solid product, comprising means for receiving at least one storage cartridge for the product with a rear thrust wall for the product, a thrust piston, means for driving the piston and a control lever for the drive means, characterised in that the drive means are adapted to effect any desired application of the product by one single actuation of the control lever and comprise an intermediate feed rod adapted to be actuated in a reciprocating movement and to drive the thrust piston towards the front during the forward motion.

By virtue of the invention, the operator simply has to actuate the lever once and maintain his action in order to pump and apply the product.

In this case, the drive means may include:

- a front sprocket for driving the thrust piston by friction, actuated by the intermediate feed rod, and
- a rotating cam for driving the feed rod, driven by a motor started by the control lever.

Means are advantageously, and in this case always provided for stopping the motor only at the end of the return motion of the intermediate rod.

The feed rod also advantageously includes a flexion zone adapted to actuate an emergency stop switch for the motor by flexion.

Once again in the preferred embodiment, a rear non-return sprocket cooperating by friction with the thrust piston, an intermediate non-return rod is provided between the control lever and the non-return sprocket.

In this case, the non-return rod is very advantageously mounted to pivot at the front on a pin integral with the control lever and at the rear on the side of the non-return sprocket is mounted to move with two degrees of freedom about a rear guide pin.

In this case, the control lever being mounted to move about an axis of rotation, the rear guide pin of the non-return rod, its pivot pin on the lever and the axis of rotation of the lever are adapted to be aligned upon actuation of the lever.

The force applied to the thrust piston towards the rear is consequently no longer applied to the lever itself, i.e. the hand of the operator, but to its axis of rotation integral with the casing of the apparatus.

The non-return rod also preferably includes a rear port extended by a groove in which the rear guide pin is received and through which the non-return sprocket extends.

In this case, the rear port of the non-return rod and the non-return sprocket are adapted so that the cooperation of the non-return sprocket and the thrust piston is interrupted when the lever is not actuated.

The thrust piston can consequently be pulled towards the rear in a simple manner, e.g. in order to change the cartridge.

The invention will be more readily understood with the aid of the following description of the preferred embodiment of the apparatus of the invention for the application of a non-solid product with reference to the accompanying drawings, in which:

Figure 1 is a sectional top view of the preferred embodiment of the apparatus, and

Figure 2 is a sectional side view of the apparatus of Figure 1.

The preferred embodiment of the apparatus which will now be described can receive two storage cartridges respectively containing two non-solid products to be mixed prior to their application.

The applicator comprises, in a casing 10:

- a front housing 1 for receiving the two storage cartridges, each having a rear thrust wall for their contents;
- two thrust pistons 2 for the rear cartridge walls;
- a mechanism for driving the pistons 2 towards the front;
- a motor 3 for actuating the drive mechanism (represented by its output shaft);

- a non-return mechanism for the pistons 2, and
- a control lever 4 for controlling the motor 3 and actuating the non-return mechanism.

The two pistons 2 are parallel with one another and symmetrical relative to a longitudinal axis 9 of symmetry of the drive and non-return mechanisms.

The drive mechanism includes:

- two front sprockets 5 for friction feeding of the two thrust pistons 2 respectively,
- an intermediate feed rod 6 for actuating the front sprockets 5 extending along the axis 9,
- a rotating cam 7 for driving the feed rod 6 towards the front, mounted on the output shaft of the motor 3, and
- a thrust roller 8 mounted to rotate on the feed rod 6 and in contact with the cam 7 on its periphery at the rear.

The two front sprockets 5 mounted on their respective pistons 2 at the front extend in a plane substantially perpendicular to the axis 9.

Each front sprocket 5 bears on one side against the front end of the feed rod 6 by the action of a return spring 13 described hereinafter and on the opposite side against a rear stop 14 integral with the casing 10 by the action of a front sprocket spring 15 surrounding the piston 2 at the front of the front sprocket 5 and fixed in position in the casing 10 at its front end.

In the rest position of the front sprockets 5, the thrust

pistons 2 can slide across the front sprockets 5 adapted to tilt slightly towards their respective pistons from their rest position perpendicular to the axis 9 to an inclined blocking position in which the relative sliding of the front sprockets 5 and their respective pistons 2 is blocked.

The return spring 13 of the feed rod 6 extending along the axis 9 is held in the casing 10 by its front end and bears against the front of the rod 6 via its rear end, by way of the front sprockets 5.

The non-return mechanism comprises two rear non-return sprockets 21 mounted like the front sprockets 5, but on the rear parts of the two respective pistons 2 and intended to prevent the thrust pistons 2 from moving backwards between two elementary feed motions of the latter, as will be described in the description of the operation of the apparatus.

In the rest position of the applicator, each rear sprocket 21 bears against a ring 26 mounted around the piston 2 at the rear of the rear sprocket 21 by the action of a rear sprocket spring 27 fixed to the casing 10 and surrounding the piston 2 in front of the rear sprocket 21. The rear sprockets 21 extend in one common plane substantially perpendicular to the axis 9 and can pivot towards their respective pistons between a rest position perpendicular to the piston axis and a blocking position inclined relative to this axis and reached by actuating non-return rods described hereinafter. In the rest position of the rear sprockets 21, the pistons 2 can slide across their rear sprockets 21 and, in the blocking position, the pistons 2 are blocked in translation towards the rear by the rear sprockets 21.

Let P_2 be the plane of Figure 1 containing the axes of the pistons 2. The two intermediate non-return rods 22 for actuating the two rear sprockets 21 respectively extend in the vicinity of their respective pistons 2 in two lateral planes P_1 perpendicular to the plane P_2 . The rear part of each rod 22 forms a port 25 through which the rear sprocket 21 of the adjacent piston 2 extends.

The non-return rods 22 are mounted at the front to pivot about two respective pivot pins 23 integral with the control lever 4 and at the rear are movable with two degrees of freedom (in translation parallel to the axis 9 and pivoting) respectively about two guide pins 24 integral with the casing 10.

The control lever 4 is mounted to pivot about an axis of rotation 28 integral with the casing 10 and is held in the rest position by return springs 29 fixed to the casing 10.

The guide pins 24 and the axes of rotation 28 extend in the plane P_2 . The pivot pins 23 are movable between a rest position and an operating position reached by actuating the lever 4. In the rest position, the pivot pin 23 of each of the rear sprockets 21 is outside the plane P_2 on the side not containing the control lever 4 and, in the operating position, is contained in the plane P_2 , the pivot pins 23 and guide pins 24 of each non-return rod 22 and the axis of rotation 28 of the lever 4 then being aligned in the extension plane P_1 of this rod 22.

The applicator moreover comprises a switch 11 for starting the motor 3 situated in the vicinity of the axis 9 and the control lever 4, a final stop switch 16 for the motor 3 carried by the

feed rod 6 close to the thrust wheel 8, and an emergency stop switch 17 for the motor 3 disposed in the interior of a slot 18 formed in the front part of the feed rod 6.

The slot 18 has two inner faces 19 opposite one another perpendicular to the axis 9 and connected together by one single side forming a flexion zone 20 provided so that the two faces 19 can swing towards one another and actuate the emergency stop switch 17.

A forcing pin 12 integral with the feed rod 6 is disposed in the rear vicinity of the cam 7 in order to force back the rod 6 by the action of the cam 7 in the descending phase, as will be described hereinafter.

The applicator finally includes a rear lever 30 for driving the thrust pistons 2 manually towards the rear, mounted on the rear ends of the pistons 2.

Following the description of the structure of the applicator, its operation will now be described.

In order to apply a desired quantity of the mixture of the products contained in the storage cartridges received in their housing 1, the control lever 4 is actuated by pivoting it, in this case, towards the rear about its axis of rotation 28.

The pivoting of the control lever 4 results in pivoting and feeding of the two non-return rods 22 against the action of the return springs 29 until the pivot pins 23, the axes of rotation 28 and the guide pins 24 are aligned with one another. The displacement resulting from that of the ports 25 leads to

pivoting and slight feeding of the rear non-return sprockets 21 to their blocking position, backward movement by the pistons 2 then being impossible.

Moreover, when the control lever 4 pivots, it actuates the switch 11 for starting the motor 3. When moving, the motor 3 drives the rotating cam 7, which pushes the intermediate feed rod 6 towards the front in a forward motion during an ascending phase by means of the thrust roller 8 rotating and advancing along the axis 9 simultaneously, the feed of the rod 6 being effected against the action of the return spring 13.

During the feed of the rod 6, the front sprockets 5 pivot from their rest position to their blocking position and drive their respective pistons 2 in an elementary feed motion, the feed of the thrust pistons 2 pivoting the rear sprockets 21 slightly so that they leave their blocking position.

During their elementary feed motion, the pistons 2 push the rear walls of the cartridges towards the front, an elementary quantity of the mixture of products thus being ejected from the cartridges.

The cam 7 then begins a descending phase during which it stops driving the feed rod 6 towards the front.

As a result of the action of the rear sprocket springs 27, the rear sprockets 21 pivot once again until they reach a new position for blocking the pistons 2, thereby prevented from moving backwards.

As a result of the action of the return spring 13, the feed rod

6 begins a return motion until it reaches its initial position and the front sprockets 5 simultaneously pivot once again until they reach their rest position.

After the descending phase, the cam 7 begins a new ascending phase resulting in another elementary feed motion of the thrust pistons 2.

During normal operation of the apparatus, and as long as the control lever 4 remains actuated, the ascending and descending phases of the cam 7 are followed by driving of the motor 3, the feed rod 6 being actuated in a reciprocating motion and driving the thrust pistons 2 towards the front during the forward motion. The application of the desired quantity of the mixture therefore results from a series of elementary applications.

After the total desired application of the products, actuation of the control lever 4 is stopped. The action of the return springs 29 drives the non-return rods 22 and the control lever 4 into their respective initial rest positions, the displacement of the rods freeing the rear sprockets 21, which pivot until they reach their initial rest positions.

At the end of the return motion of the feed rod 6 following the end of the actuation of the lever 4, the final stop switch 16 carried by the rod 6 is actuated during the movement of the rod 6 and the motor 3 stops.

During operation and above all in the case of non-return of the feed rod 6, e.g. as a result of abnormal operation of the return spring 13, the cam 7 in the descending phase drives the forcing pin 12 towards the rear, thereby forcing back the feed

rod 6.

Finally, if the feed rod 6 is prevented from feeding at the front, e.g. as a result of a cartridge whose contents have solidified, the flexion zone 20 of the rod 6 yields and the two inner faces 19 of the slot 18 move towards one another, optionally until the emergency stop switch 17 for the motor 3 is actuated.

In the preceding description, the drive means comprise a single front sprocket-for driving each thrust piston by friction.

A plurality of front sprockets for driving each thrust piston mounted side by side on the piston could also be provided for increasing the surface of friction between the front sprockets and the piston.



CLAIMS

- 5 1. Apparatus for the application of a non-solid product, comprising means (1) for receiving at least one storage cartridge for the product with a rear thrust wall for the product, a thrust piston (2), means (5, 3, 6) for driving the piston (2) and a control lever (4) for the drive means, characterised in that the drive means are adapted to effect any desired application of the product by one
10 single actuation of the control lever (4) and comprise an intermediate feed rod (6) adapted to be actuated in a reciprocating motion and to drive the thrust piston (2) towards the front during the forward motion.
- 15 2. Apparatus according to claim 1, in which the drive means include a front sprocket (5) for driving the thrust piston (2) by friction, actuated by the intermediate feed rod (6).
- 20 3. Apparatus according to one of claims 1 and 2, in which a rotating cam (7) is provided for driving the feed rod (6), driven by a motor (3) started by the control lever (4).
- 25 4. Apparatus according to claim 3, in which means (6, 16) are provided for stopping the motor (3) only at the end of the return motion of the intermediate feed rod (6).
- 30 5. Apparatus according to one of claims 3 and 4, in which the feed rod (6) includes a flexion zone (20) adapted to actuate an emergency stop switch (18) for the motor (3) by flexion.
- 35 6. Apparatus according to one of claims 1 to 5, in which, a non-return sprocket (21) cooperating by friction with the thrust piston (2), an intermediate non-return rod (22) is provided between the control lever (4) and the non-return sprocket (21).
7. Apparatus according to claim 6, in which the non-return rod (22) is mounted to pivot at the front on a pin (23) integral with the control lever (4) and



at the rear on the side of the non-return sprocket (21) is mounted to move with two degrees of freedom about a rear guide pin (24).

5 8. Apparatus according to claim 7, in which, the control lever (4) being mounted to move about an axis of rotation (28), the rear guide pin (24) of the non-return rod (22), its pivot pin (23) on the lever (24) and the axis of rotation (28) of the lever (4) are adapted to be aligned upon actuation of the control lever (4).

10 9. Apparatus according to one of claims 7 and 8, in which the non-return rod (22) includes a rear port (25) extended by a groove (26) in which the rear guide pin (24) is received and through which the non-return sprocket (21) extends.

15 10. Apparatus according to claim 9, in which the port (25) of the non-return rod (22) and the non-return sprocket (21) are adapted so that the cooperation of the non-return sprocket (21) and the thrust piston (2) is interrupted when the lever (4) is not actuated.

20 11. Apparatus according to one of claims 6 to 10, in which means (1) are provided for receiving a plurality of storage cartridges, as well as a plurality of thrust pistons (2) associated respectively with a plurality of drive sprockets (5) which can be actuated by means of an intermediate feed rod (6) and with a plurality of non-return sprockets (21) which can be actuated respectively by a
25 plurality of non-return rods (22).

12. Apparatus according to one of claims 1 to 11, in which the drive means comprise a plurality of front sprockets for driving the thrust piston by friction, actuated by the intermediate feed rod.



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