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(51) INT CL:
B65D 47/34 (2006.01) ***A47K 5/14*** (2006.01)

(56) Documents Cited:
WO 2009/104992 A1 **CN 002772632 Y**
CN 002632010 Y **CN 001781824 A**
US 5192006 A

(58) Field of Search:
INT CL **B05B, B65D**
Other: **EPODOC, WPI, CNPAT, CNKI**

(54) Title of the Invention: **Method for producing terylene fibre using polyester waste**
Abstract Title: **Method for producing terylene fibre using polyester waste**

(57) A method for producing terylene fiber using polyester waste is disclosed. Firstly, dried polyester waste is sent into a screw extruder, then is melt and extruded to be polyester melt. Whereafter, the melt is filtrated twice to remove impurities. Then macromolecule polymerization reaction is taken place in the polyester melt to homogenize the molecular weight of macromoleclar polymer and to increase the viscosity of the polyester. Then the melt with increased viscosity is finely filtrated using melt precision filter. Whereafter, the melt is sent into a spinning box to execute metering spinning, then is cooled and solidified to be filaments. Finally, the filaments are wound according to various process requirements. The method can increase the quality of regenerated polyester spinning melt. The regenerated polyester melt has less impurities and homogenous viscosity after multiple filtrating. The fiber product has advantages of less end breakage rate, high full-bobbin rate, high finished product rate and less wastage.

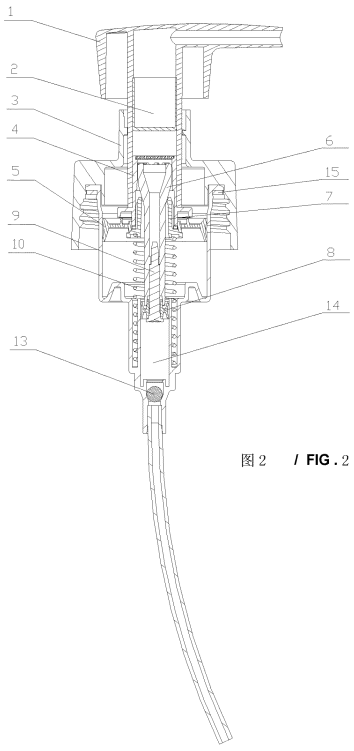

图 2 / FIG. 2

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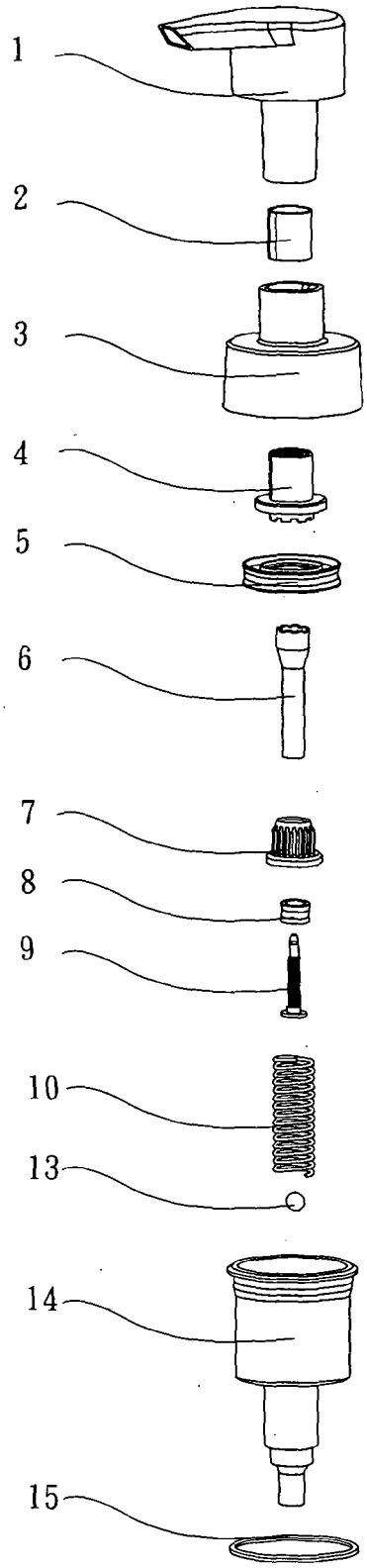

FIG. 1

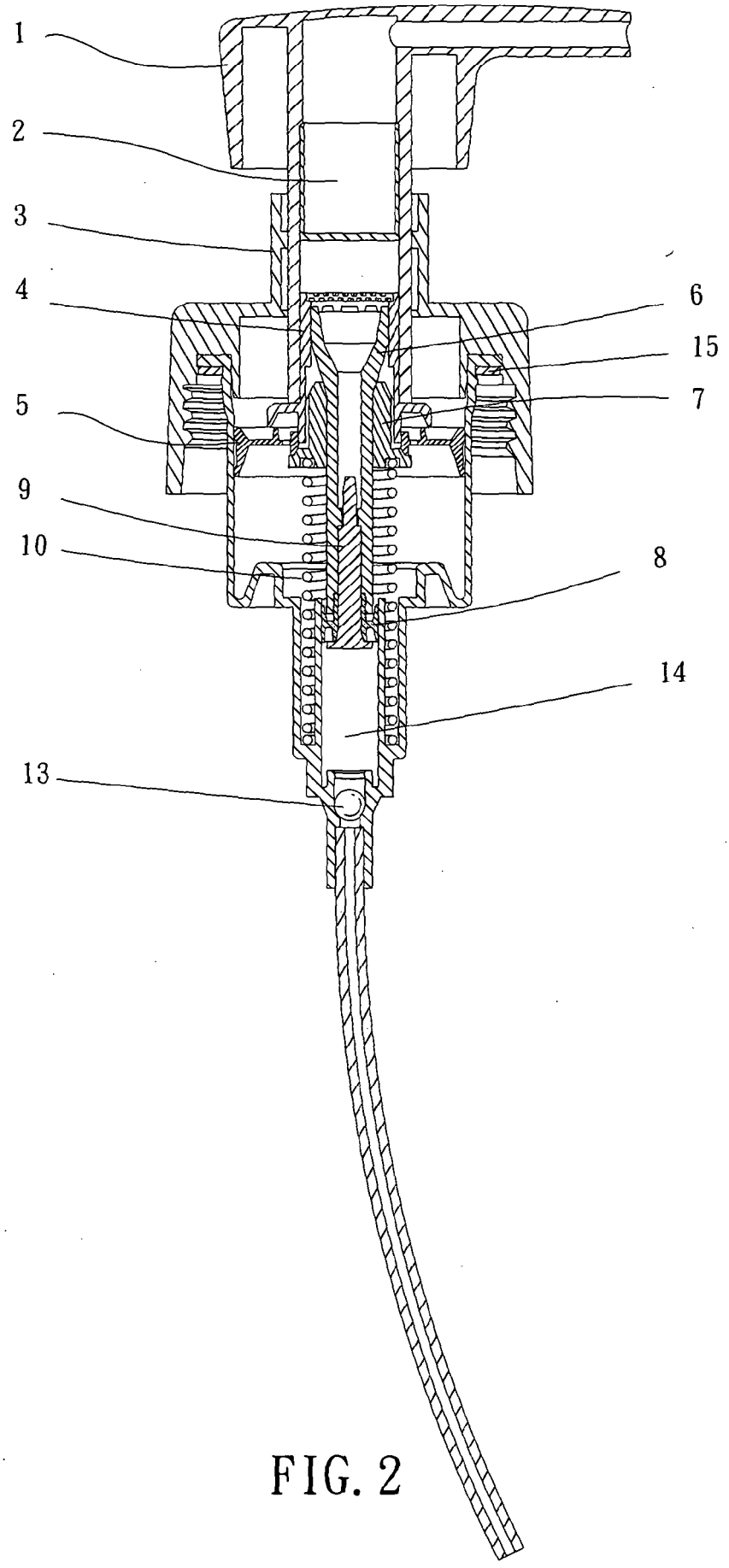

FIG. 2

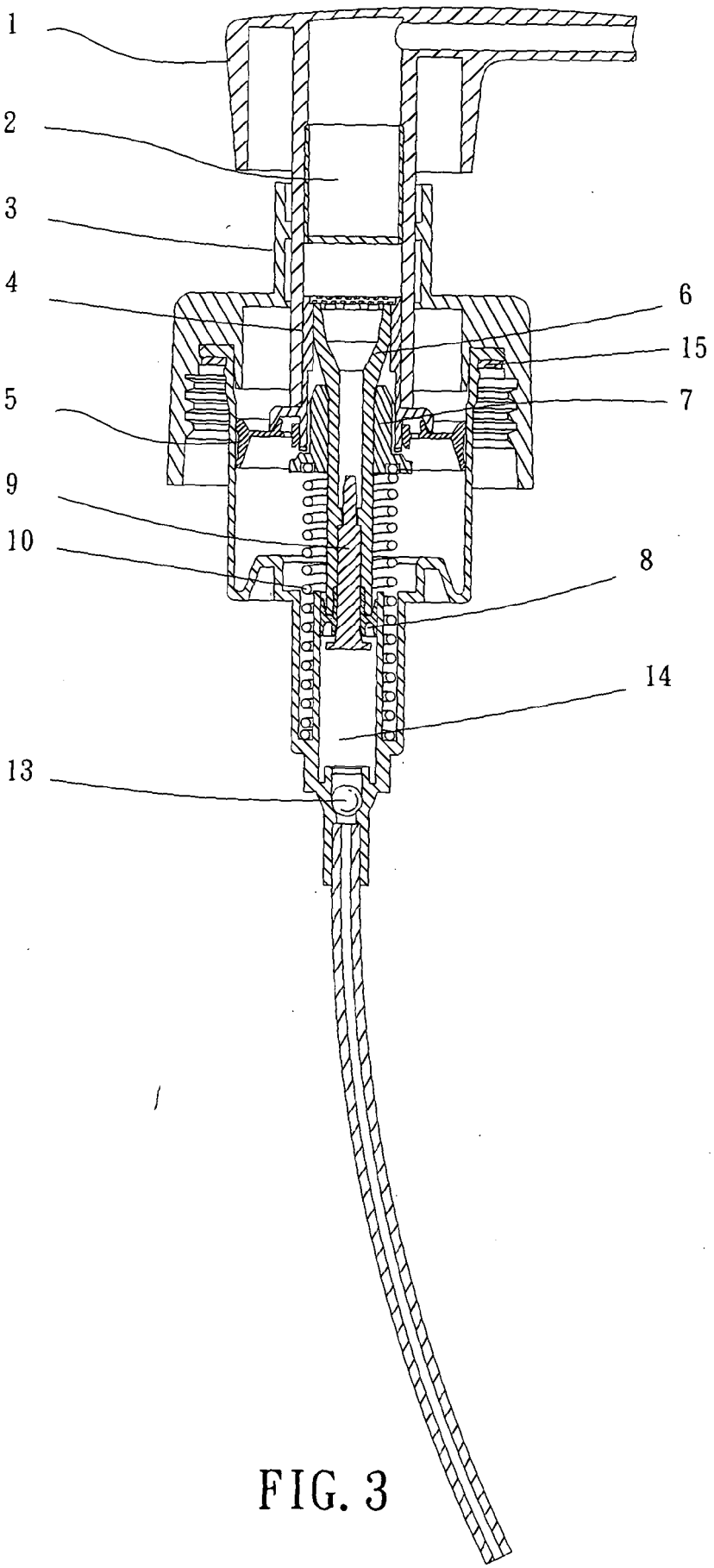

FIG. 3

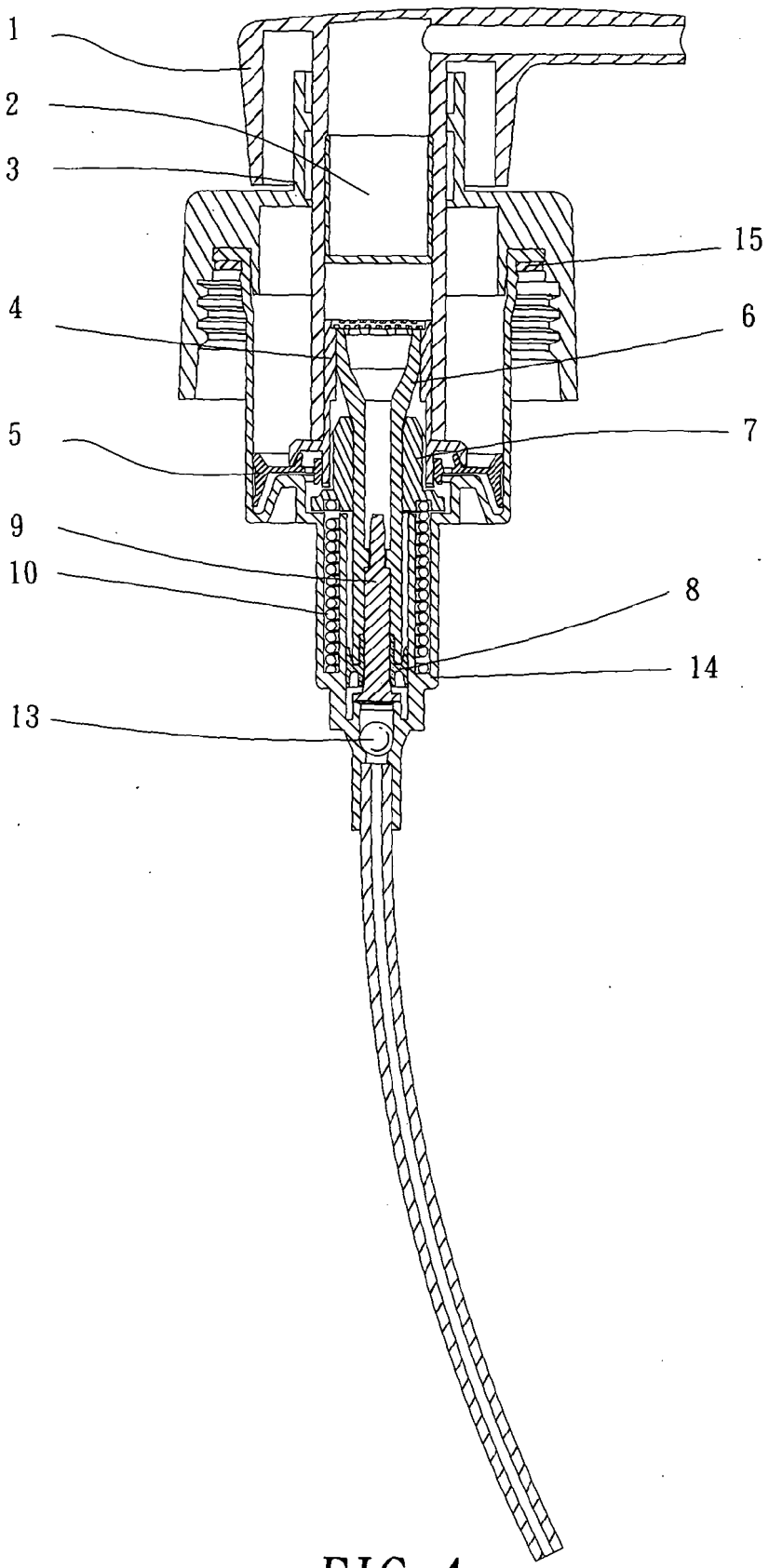

FIG. 4

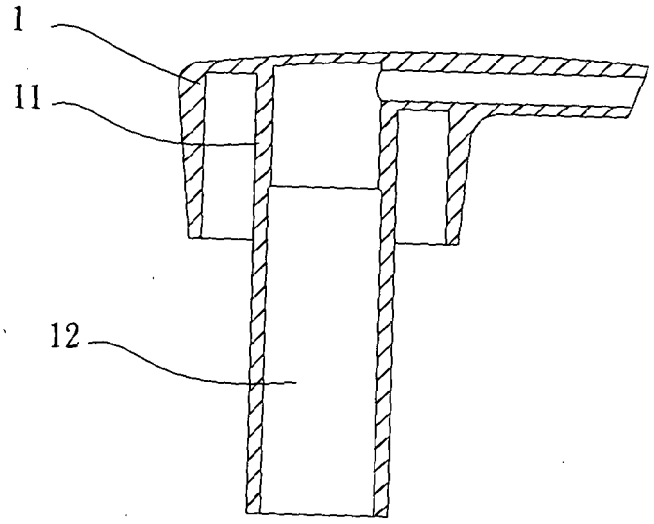

FIG. 5

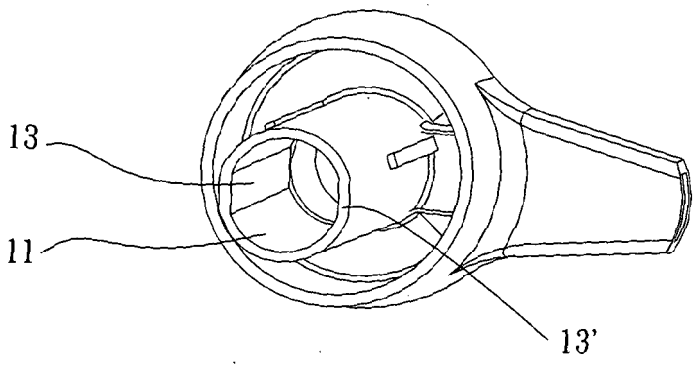

FIG. 6

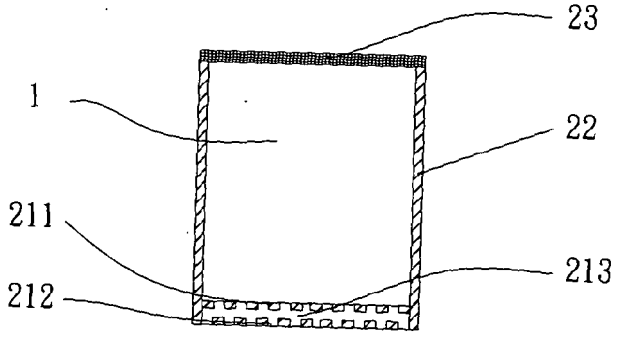

FIG. 7

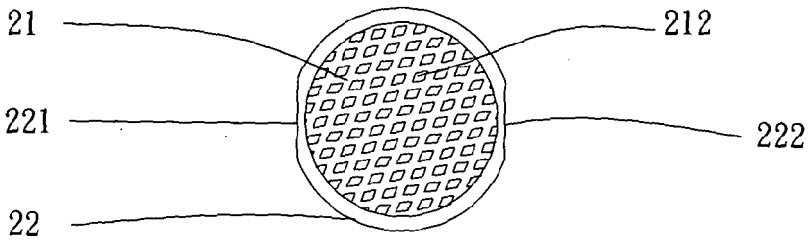

FIG. 8

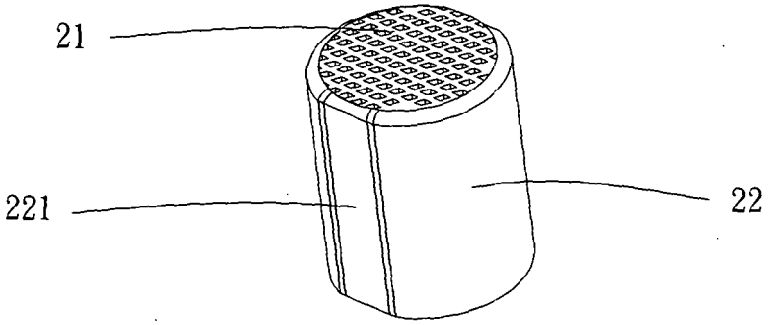

FIG. 9

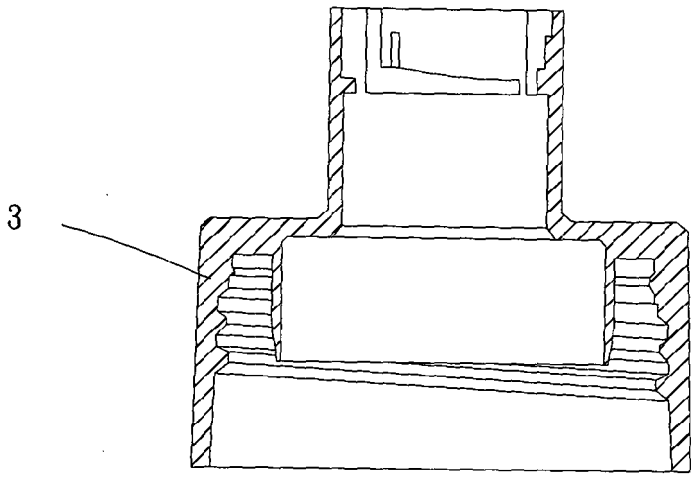

FIG. 10

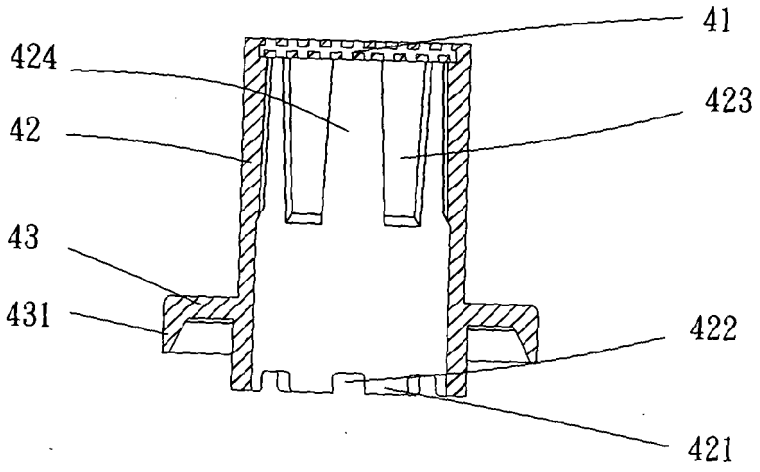

FIG. 11

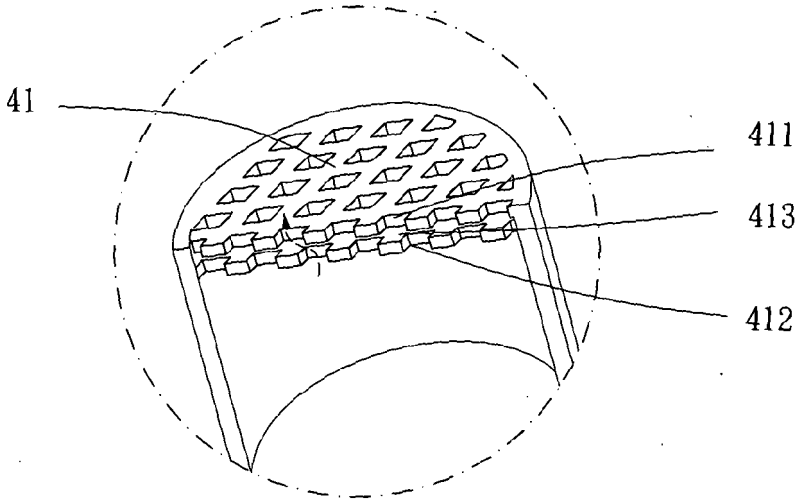

FIG. 12

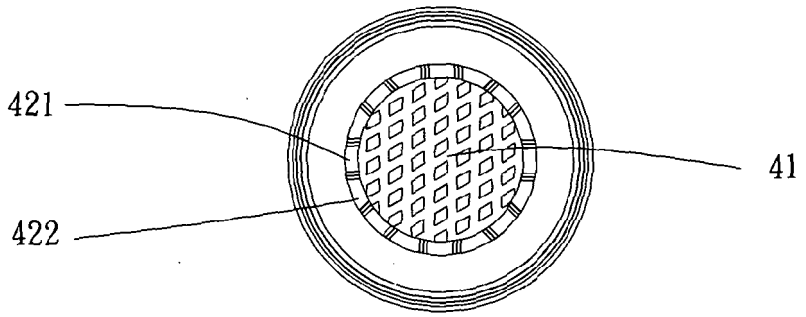

FIG. 13

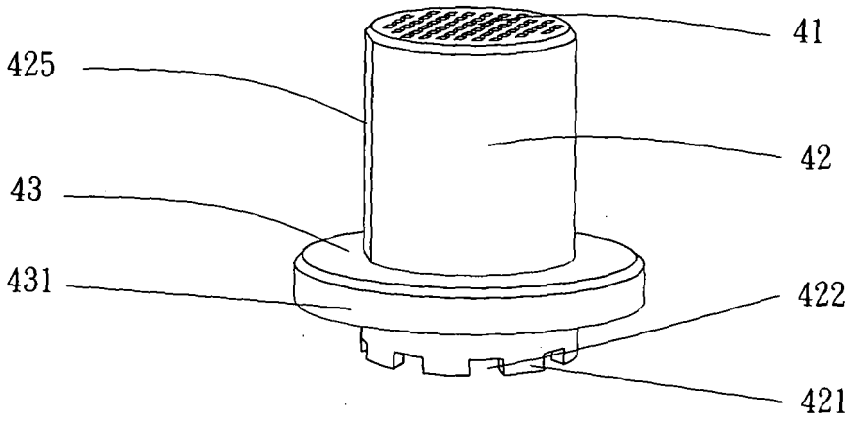

FIG. 14

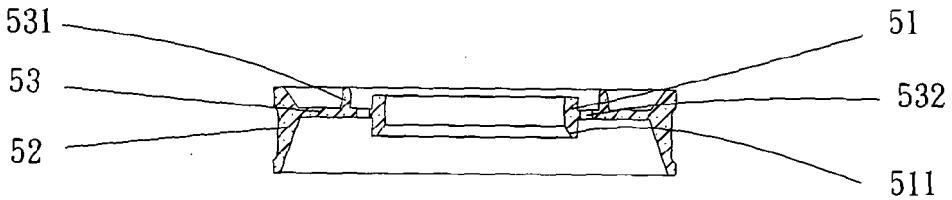

FIG. 15

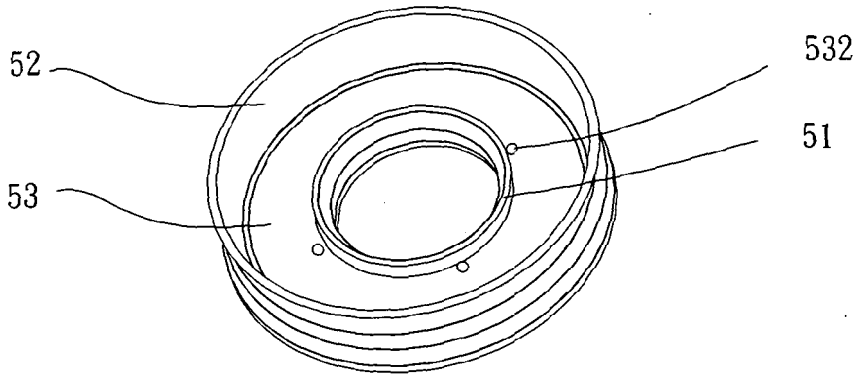

FIG. 16

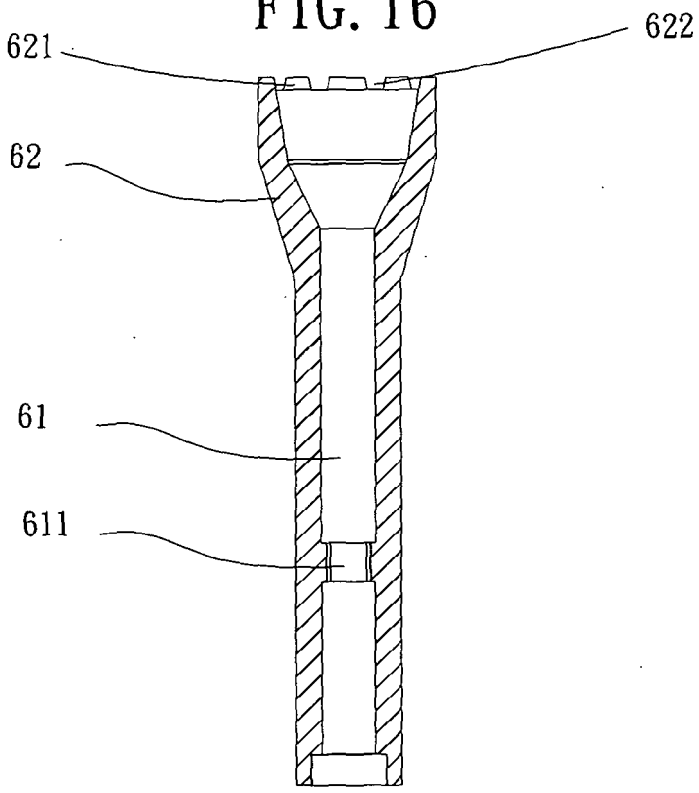

FIG. 17

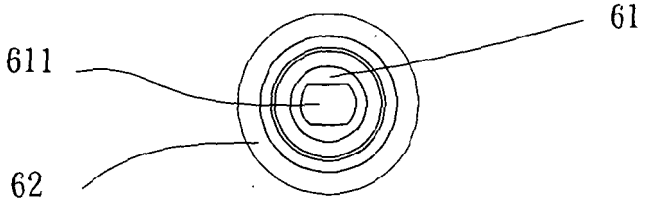

FIG. 18

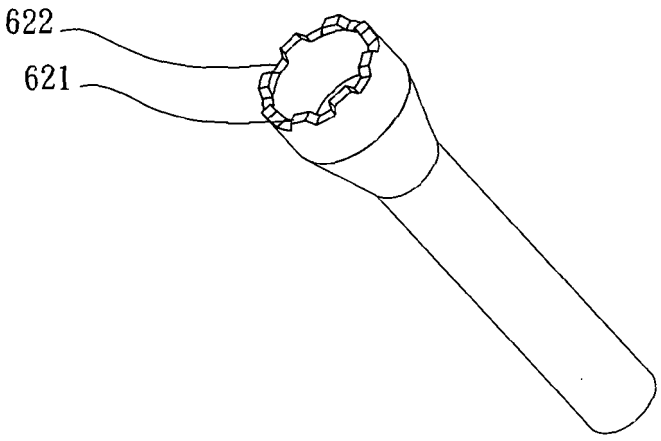

FIG. 19

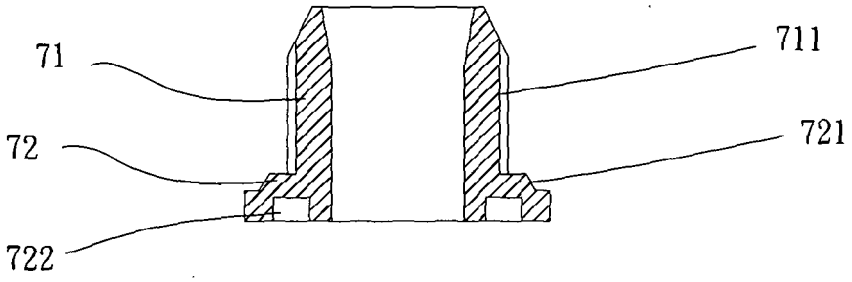

FIG. 20

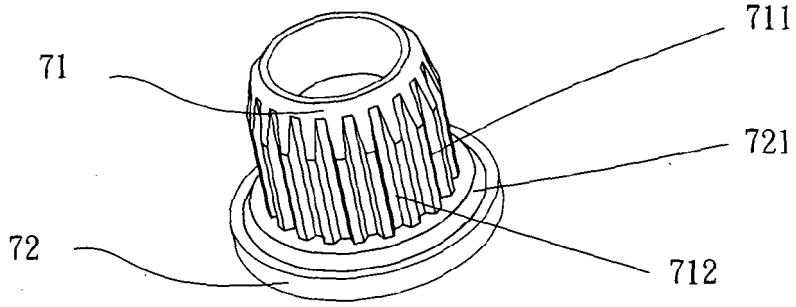

FIG. 21

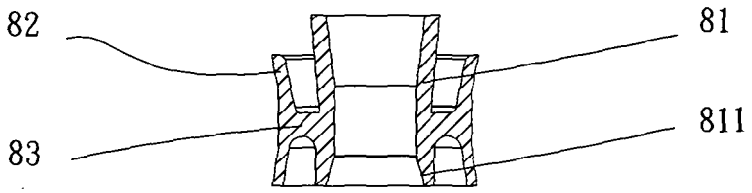

FIG. 22

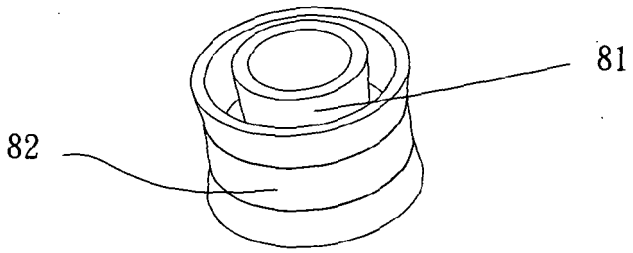

FIG. 23

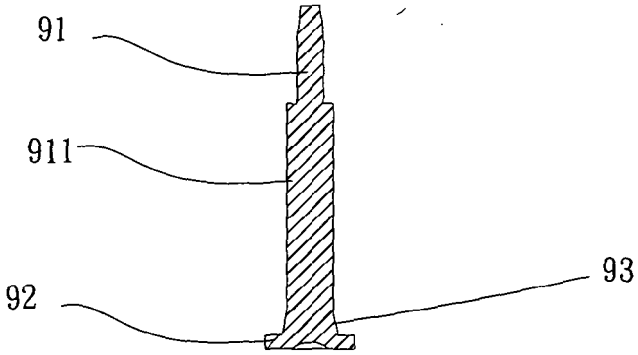

FIG. 24

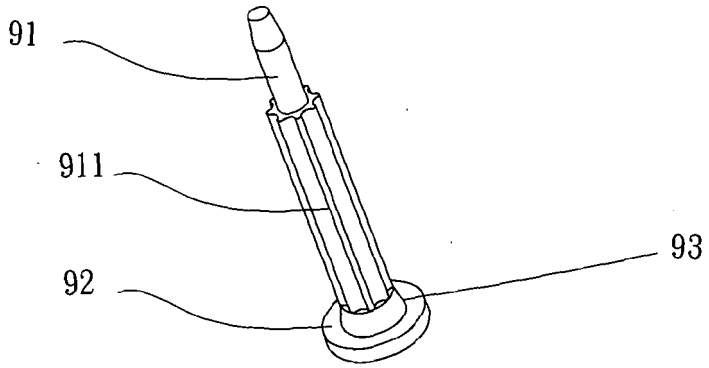

FIG. 25

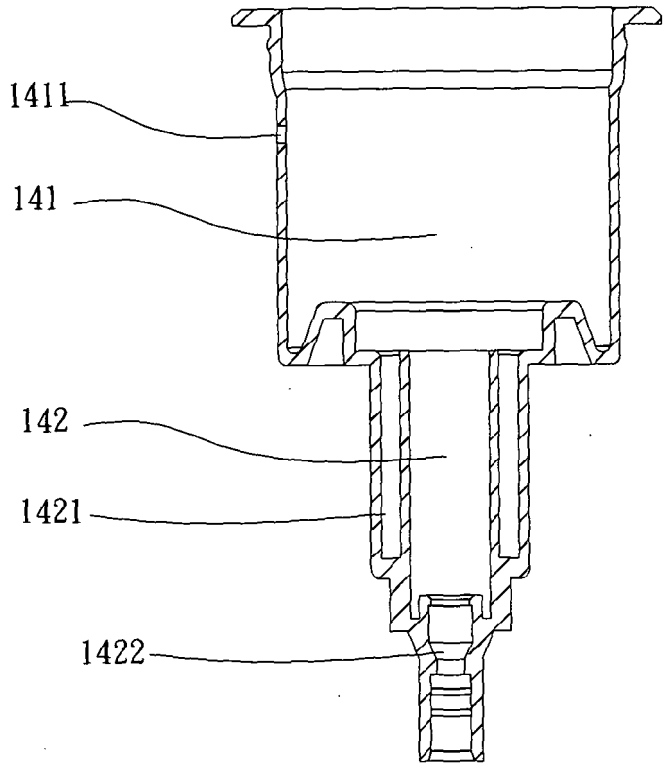

FIG. 26

METHOD FOR PRODUCING TERYLENE FIBER USING POLYESTER WASTE

1. Field of the Invention

The present invention relates to a method for producing foam from bottles with polyester waste, and more particularly to a method for producing terylene fiber using polyester waste.

2. Description of Related Art

A conventional nozzle for producing foam comprises a press cover, a revolving cover and a cylinder. The revolving cover is mounted on the opening of a bottle or a container. The press cover is able to move upwardly/downwardly relative to the revolving cover. The cylinder is extended into the bottle or the container.

The cylinder has an unidirectional flow mechanism. The unidirectional flow mechanism comprises a connection tube, a needle valve, a piston, a spring, and a one-way valve... etc. The connecting tube has a channel for the piston to move downward when the piston is pressed. The one-way valve is placed on the bottom of the cylinder, in which the one-way valve allows the fluid to flow up from the container into the cylinder under the air pressure, and prevents the fluid to flow reversely.

When the cylinder is full of fluid and a user presses the press cover, the channel of the connecting tube is communicated with the cylinder. Thus, the fluid flows out of the press cover via connecting tube when the press cover is pressed by the user. In contrast, when the user releases the press cover, the connecting tube moves upward by the spring's recovering force. Simultaneously, the volume of the cylinder is expanded by the air, in which the air pushes the

fluid back into the bottle or container for recycling.

The publication CN2632010Y further discloses a nozzle for producing foam. The nozzle has a chamber to mix the liquid and the air together, and at least one filter is used to adjust the dimension of the foam, so that the foam is not too dense or too dilute. Unfortunately, there are two shortcomings in the publication CN2632010Y:

First of all, the metallic spring is often submerged in the liquid and it makes the spring get broken easily;

Secondly, between each connecting element has an unfilled space, in which the air can flow into or out. Thus, the unfilled space makes the airtight condition get worse.

The main objective of the present invention is to provide an improved a method for producing foam from bottles with polyester waste.

To achieve the objective, a method for producing terylene fiber using polyester waste is achieved by a nozzle assembled to a bottle, the nozzle comprises a press cover, a revolving cover, and a cylinder to construct the appearance of the nozzle, the press cover having a first tube extending therefrom, a first channel defined in the first tube for melting substances or liquid to flow through, the revolving cover being screwed on an opening of the bottle for sealing the bottle, the cylinder having an upper chamber and a lower chamber, the upper chamber abutting against the inner wall of the opening of the bottle, a first melt precision filter, a spinning box, a connecting tube, a first piston, a spring, a second piston, a needle valve and an unidirectional valve being assembled into the nozzle, the first melt precision filer having a second tube defined therethrough, a first filtrated mesh being set on the bottom of the second

tube, a net being set on the top of the second tube, the spinning box formed by a fourth tube, an annular fringe extended from the fourth tube and around the fourth tube, a second filtrated mesh being set on the top of the fourth tube, the bottom of the fourth tube being opened for the melting substances or liquid to flow into, the annular fringe having an annular groove defined therein; when the press cover is pressed down, the bottom of the first tube is abutted against the annular fringe; the top of the connecting tube extending into the spinning box, the connecting tube having a second channel, the second channel communicating with the first channel of the press cover, a sealing member assembled between the spinning box and the connecting tube, the sealing member formed by a seventh tube, a sealing fringe extruded along the bottom periphery of the seventh tube, a plurality of ribs radially formed on the outer periphery of the seventh tube, a plurality of air paths defined between each of two neighbor ribs, the sealing fringe having a taper portion formed thereon; the first piston assembled into the upper chamber of the cylinder, the first piston comprising a first inner tube, a first outer tube, a first connecting portion formed between the first inner tube and the first outer tube for integrating the first piston, the first inner tube surrounding the middle of the connecting tube, an up-sealing groove defined on the top of the first connecting portion of the first piston, a plurality of air holes defined between the up-sealing groove and the first inner tube; when the spinning box is assembled to the first piston, the annular groove of the spinning box is received in the up-sealing groove of the first piston and sealing with each other; a taper recess defined on the bottom periphery of the first inner tube; when the sealing member is assembled to the first piston, the taper portion is engaged with the taper recess for sealing, the

second piston assembled into the lower chamber of the cylinder, the second piston comprising a second inner tube, a second outer tube, a second connecting portion formed between the second inner tube and the second outer tube for integrating the second piston, a tapered section defined on the bottom periphery of the second inner tube of the second piston; when the connecting tube is moving downward, the bottom of the connecting tube is abutted against the second connecting portion of the second piston; one end of the spring abutted against the sealing member, another end of the spring abutted against the lower chamber of the cylinder, the needle valve formed by a rod, the rod having a disk at the bottom, a sealing section extended from the disk and surrounding the bottom of the rod; when the needle valve is upwardly passing through the second inner tube of the second piston and entering into the second channel of the connecting tube, the top of the needle valve is received in a necking portion and positioned by the necking portion, a fluid channel formed between the needle valve and the second inner tube of the second piston for the melting substances or liquid to flow into, the tapered section of the second piston engaged with the sealing section of the needle valve for sealing, the unidirectional valve placed in the lower chamber of the cylinder and near an entrance of the cylinder.

The first filtrated mesh and the second filtrated mesh both have a top layer and a bottom layer, a plurality of diamond holes alternately defined on the top layer and bottom layer, a middle space formed between the top layer and the bottom layer, the diamond holes on the top layer and bottom layer communicated with the middle space.

The first tube has two rectangular edges defined in the left and right sides

of the inner wall of the first tube, two cutting edges respectively defined at the left and right sides of the outer periphery of the second tube of the first melt precision filter, the cutting edges engaged with the rectangular edges for stably connecting the first melt precision filter into the first tube of the press cover, a curved recess defined on the outer periphery of the fourth tube of the spinning box, the spinning box positioned in the first tube by an engagement between the rectangular edge and the curved recess.

A plurality of fourth teeth is formed on the bottom peripheral of the fourth tube, a plurality of fourth gaps defined between each of two neighbor fourth teeth, the fourth tube having a plurality of fourth ribs formed on the inner wall of the fourth tube, a plurality of air channel defined between each of two neighbor fourth ribs.

The top of the connecting tube has an enlarging portion, a plurality of sixth teeth formed on the top periphery of the enlarging portion, a plurality of sixth gaps defined between each of two neighbor sixth teeth, the spinning box communicated with the second channel of the connecting tube via the sixth gaps.

The middle of the second channel is necked to form the necking portion, the top of the needle valve received in the necking portion and positioned by the necking portion, a plurality of protrusions axially formed on the periphery of the rod, a plurality of unfilled space defined between each of two neighbor protrusions.

An annular recess is defined at the bottom of the sealing fringe of the sealing member, one end of the spring fixing in the annular recess of the sealing member.

The lower chamber has a spring room for receiving the spring, the lower

chamber and the upper chamber separated by the second piston, another end of the spring receiving into the spring room of the cylinder.

The upper chamber has a vent defined thereon, the first piston assembled into the upper chamber of the cylinder and near the vent, the inner space of the cylinder isolated by the first piston.

An annular pad is assembled between the top of the upper chamber of the cylinder and the opening of the bottle for further sealing the bottle.

In the drawings:

Fig. 1 an exploded view of a nozzle in accordance with the present invention;

Fig. 2 is a cross-sectional view for showing the nozzle in the initial state;

Fig. 3 is a cross-sectional view for showing the nozzle to be slightly pressed;

Fig. 4 is a cross-sectional view for showing the nozzle to be completely pressed;

Fig. 5 is a cross-sectional view of a press cover in accordance with the present invention;

Fig. 6 is a perspective view of the press cover in accordance with the present invention;

Fig. 7 is a cross-sectional view of a first melt precision filter in accordance with the present invention;

Fig. 8 is a top side view of the first melt precision filter in accordance with the present invention;

Fig. 9 is a perspective view of the first melt precision filter in accordance with the present invention;

Fig. 10 is a cross-sectional view of a revolving cover in accordance with the present invention;

Fig. 11 is a cross-sectional view of a spinning box in accordance with the present invention;

Fig. 12 is a partial enlarged view of the spinning box for showing a second filtrated mesh;

Fig. 13 is a top side view of the spinning box in accordance with the present invention;

Fig. 14 is a perspective view of the spinning box in accordance with the present invention;

Fig. 15 is a cross-sectional view of a first piston in accordance with the present invention;

Fig. 16 is a perspective view of the first piston in accordance with the present invention;

Fig. 17 is a cross-sectional view of a connecting tube in accordance with the present invention;

Fig. 18 is a top side view of the connecting tube in accordance with the present invention;

Fig. 19 is a perspective of the connecting tube in accordance with the present invention;

Fig. 20 is a cross-sectional view of a sealing member in accordance with the present invention;

Fig. 21 is a perspective view of the sealing member in accordance with the present invention;

Fig. 22 is a cross-sectional view of a second piston in accordance with the present invention;

Fig. 23 is a perspective view of the second piston in accordance with the present invention;

Fig. 24 is a cross-sectional view of a needle valve in accordance with the present invention; and

Fig. 25 is a perspective view of the needle valve in accordance with the present invention.

Referring to Fig. 1, a method for producing terylene fiber using polyester waste is achieved by a nozzle assembled to a bottle (not shown), wherein the nozzle comprises a press cover (1), a revolving cover (3), and a cylinder (14) to construct the appearance of the nozzle. A first melt precision filter (2), a spinning box (4), a connecting tube (6), a first piston (5), a spring (10), a second piston (8), a needle valve (9) and a unidirectional valve (13) are assembled into the nozzle.

Referring to Figs. 5-6, the press cover (1) has a first tube (11) extended therefrom. A first channel (12) is defined in the first tube (11) for melting substances or liquid to flow through. The first tube (11) has two rectangular edges (13, 13') defined in the left and right sides of the inner wall.

Referring to Fig. 10, the revolving cover (3) is screwed on an opening of the bottle for sealing the bottle.

Referring to Fig. 26, the cylinder (14) has an upper chamber (141) and a lower chamber (142). The upper chamber (141) is abutted against the inner wall of the opening of the bottle. The upper chamber (141) has a vent (1411) defined thereon. The lower chamber (142) has a spring room (1421) for receiving the spring (10) and an entrance (1422) for the melting substances or liquid to flow

into.

Referring to Fig. 2-4, an annular pad (15) is assembled between the top of the upper chamber (141) of the cylinder (14) and the opening of the bottle for further sealing the bottle. Thus, the air cannot flow into or out of the bottle.

Referring to Figs. 7-9, the first melt precision filer (2) has a second tube (22) defined therethrough. A first filtrated mesh (21) is set on the bottom of the second tube (22). A net (23) is set on the top of the second tube (22). Two cutting edges (221, 222) are respectively defined at the left and right sides of the outer periphery of the second tube (22). The cutting edges (221, 222) are engaged with the rectangular edges (13, 13') for stably connecting the first melt precision filter (2) into the first tube (11) of the press cover (1).

The first filtrated mesh (21) has a first top layer (211) and a first bottom layer (212). A plurality of diamond holes is alternately defined on the first top layer (211) and first bottom layer (212) (as shown in Fig. 7). A first middle space (213) is formed between the first top layer (211) and the first bottom layer (212). The diamond holes on the first top layer (211) and first bottom layer (212) are communicated with the first middle space (213) so that the melting substances or liquid can pass through the first filtrated mesh (21).

Referring to Figs. 11-14, the spinning box (4) is formed by a fourth tube (42). An annular fringe (43) is extended from the fourth tube (42) and around the fourth tube (42). A second filtrated mesh (41) is set on the top of the fourth tube (42). The bottom of the fourth tube (42) is opened for the melting substances or liquid to flow into. A curved recess (425) is defined on the outer periphery of the fourth tube (42). The diameter of the fourth tube (42) and the diameter of the first channel (12) of the press cover (1) are the same. The spinning box (4) is

positioned in the first tube (11) by an engagement between the rectangular edge (13 or 13') and the curved recess (425).

The fourth tube (42) has a plurality of fourth ribs (423) formed on the inner wall of the fourth tube (42). A plurality of air channel (424) is defined between each of two neighbor fourth ribs (423).

A plurality of fourth teeth (421) is formed on the bottom peripheral of the fourth tube (42). A plurality of fourth gaps (422) is defined between each of two neighbor fourth teeth (421).

When the press cover (1) is pressed down, the bottom of the first tube (11) is abutted against the annular fringe (43). The annular fringe (43) has an annular groove (431) defined therein.

The second filtrated mesh (41) has a second top layer (411) and a second bottom layer (412). A plurality of diamond holes is alternately defined on the second top layer (411) and second bottom layer (412). A second middle space (413) is formed between the second top layer (411) and the second bottom layer (412). The diamond holes on the second top layer (411) and second bottom layer (412) are communicated with the second middle space (413) so that the melting substances or liquid can pass through the second filtrated mesh (41).

Referring to Figs. 17-19, the connecting tube 6 has a second channel (61). The second channel (61) is communicated with the first channel (12) of the press cover (1). The middle of the second channel (61) is necked to form a necking portion (611). The top of the connecting tube (6) is selectively connected to the spinning box (4). The top of the connecting tube (6) has an enlarging portion (62). A plurality of sixth teeth (621) is formed on the top periphery of the enlarging portion (62). A plurality of sixth gaps (622) is defined between each of

two neighbor sixth teeth (621). The spinning box (4) is communicated with the second channel (61) of the connecting tube (6) via the sixth gaps (622), so that the liquid and the air are mixed here to form foam.

Referring to Figs. 20-21, a sealing member (7) is assembled between the spinning box (4) and the connecting tube (6). The sealing member (7) is formed by a seventh tube (71). A sealing fringe (72) is extruded along the bottom periphery of the seventh tube (71). A plurality of ribs (711) is radially formed on the outer periphery of the seventh tube (71). A plurality of air paths (712) is defined between each of two neighbor ribs (711). The sealing fringe (72) has a taper portion (721) formed thereon. An annular recess (722) is defined at the bottom of the sealing fringe (72).

Referring to Figs. 15-16, the first piston (5) is assembled into the upper chamber (141) of the cylinder (14) and near the vent (1411). The inner space of the cylinder (14) is isolated by the first piston (5). The first piston (5) comprises a first inner tube (51), a first outer tube (52). A first connecting portion (53) is formed between the first inner tube (51) and the first outer tube (52) for integrating the first piston (5). The first inner tube (51) is surrounding the middle of the connecting tube (6). An up-sealing groove (531) is defined on the top of the first connecting portion (53) of the first piston (5). A plurality of air holes (532) is defined between the up-sealing groove (531) and the first inner tube (51). When the spinning box (4) is assembled to the first piston (5), the annular groove (431) of the spinning box (4) is received in the up-sealing groove (531) of the first piston (5) and sealing with each other. A taper recess (511) is defined on the bottom periphery of the first inner tube (51). When the sealing member (7) is assembled to the first piston (5), the taper portion (721) is engaged with the taper

recess (511) for sealing.

Referring to Figs. 22-23, the second piston (8) is assembled into the lower chamber (142) of the cylinder (14). The second piston (8) comprises a second inner tube (81), a second outer tube (82). A second connecting portion (83) is formed between the second inner tube (81) and the second outer tube (82) for integrating the second piston (8). When the connecting tube (6) is moving downward, the bottom of the connecting tube (6) is abutted against the second connecting portion (83) of the second piston (8). A tapered section (811) is defined on the bottom periphery of the second inner tube (81) of the second piston (8).

Referring to Figs. 24-25, the needle valve (9) is formed by a rod (91). The rod (91) has a disk (92) at the bottom. A sealing section (93) is extended from the disk (92) and surrounding the bottom of the rod (91). The tapered section (811) of the second piston 8 is engaged with the sealing section (93) of the needle valve (9) for sealing.

The needle valve (9) is upwardly passing through the second inner tube (81) of the second piston (8) and entering into the second channel (61) of the connecting tube (6). The top of the needle valve (9) is received in the necking portion (611) and positioned by the necking portion (611). A plurality of protrusions (911) is axially formed on the periphery of the rod (91). A plurality of unfilled space is defined between each of two neighbor protrusions (911). A fluid channel formed between the needle valve (9) and the second inner tube (81) of the second piston (8) for the melting substances or liquid to flow into. One end of the spring (10) is fixed in the annular recess (722) of the sealing member (7). Another end of the spring (10) is received into the spring room (1421) of the

cylinder (14). The spring room (1421), the lower chamber (142) and the upper chamber (141) are separated by the second piston (8), so that the melting substances or liquid in the lower chamber (142) cannot flow to the spring (10).

The unidirectional valve (13) is placed in the lower chamber (142) of the cylinder (14) and near the entrance (1422).

To use the nozzle assembled to a bottle for producing terylene fiber using polyester waste is illustrated as following:

In the beginning, the lower chamber (142) of the cylinder (14) is filled with the melting substances or liquid, such as the polyester waste; and the upper chamber (141) of the cylinder (14) is filled with the air. The vent (1411) of the upper chamber (141) is closed by the first piston (5) so that the inner side of the cylinder (14) is isolated.

Specifically, the annular groove (431) of the spinning box (4) is separated from the up-sealing groove (531) of the first piston (5) and the upper chamber (141) is divided into two parts by the first piston (5). The two parts of the upper chamber (141) are communicated with each other by the air holes (532). In contrast, the taper portion (721) of the sealing member (7) is tightly engaged with the taper recess (511) of the first piston (5). Thus, the air in the upper chamber (141) cannot flow into the spinning box (4). Furthermore, the sealing section (93) of the needle valve (9) is tightly engaged with the tapered section (811) of the second piston (8). Thus, the melting substances or the liquid in the lower chamber (142) cannot flow into the second channel (61) of the connecting tube (6).

Referring to Fig. 3, when the user slightly presses the press cover (1) (said press cover moves around 2 mm downward), the bottom of the first tube

(11) of the press cover (1) is abutted against the annular fringe (43) of the spinning box (4) and the press cover (1) presses the spinning box (4) down. At the same time, the first piston (5) and the second piston (8) stay at the original locations. The annular groove (431) of the spinning box (4) is received into the up-sealing groove (531) of the first piston (5) and the two parts are isolated by the first piston (5). The spinning box (4) pushes the sealing member (7) to move downward and the taper portion (721) of the sealing member (7) is disconnected with the taper recess (511) of the first piston (5). Simultaneously, the air in the upper chamber (141) and under the first piston (5) is flowing into the spinning box (4). The second filtrated mesh (41) of the spinning box (4) pushes the connecting tube (6) and the needle valve (9) to move down. Consequently, the sealing section (93) of the needle valve (9) is disconnected to the tapered section (811) of the second piston (8), and the melting substances or liquid in the lower chamber (142) can flow into the second channel (61) of the connecting tube (6).

When one part above the first piston (5) is expanded in the upper chamber (141), the first piston (5) leaves from the vent (1411), so that the air flows into the upper chamber (141). In addition, the up-sealing groove (531) of the first piston (5) is sealed by the annular groove (431) of the spinning box (4). Thus, the air form the vent (1411) cannot flow into another part below the first piston (5). The original air below the first piston (5) is pushed into the spinning box (4) to mix with the melting substances or liquid when the press cover (1) is gradually pressed down.

Referring to Fig. 4, when the user keeps pressing the press cover (1), the annular groove (431) of the spinning box (4) is abutted against the first connecting portion (53) of the first piston (5) and the spinning box (4) presses

the first piston (5) down. The bottom of the connecting tube (6) is abutted against the second connecting portion (83) of the second piston (8) and the connecting tube (6) presses the second piston (8) down. The another part below the first piston (5) in the upper chamber (141) is compressed gradually, and the air is flowing into the spinning box (4) via the air channel (424) of the spinning box (4) and the sealing member (7). In addition, the space of the lower chamber (142) of the cylinder (14) is also compressed gradually, and the melting substances or the liquid are flowing into the second channel (61) of the connecting tube (6) and the spinning box (4) via the needle valve (9) and the second inner tube (81) of the second piston (8). The melting substances or liquid are mixed with the air in the spinning box (4) and in the second channel (61). Thereafter, the mixtures pass through the second filtrated mesh (41) of the spinning box (4) and the first filtrated mesh (21) of the first melt precision filter (2) to form a plurality of uniform foam, and the foam is expelled out from the first channel (12) of the press cover (1).

After the user sprays enough foam, the user releases the press cover (1). The sealing member (7) and the spinning box (4) are moved up by the recovering force form the spring (10). The taper portion (721) of the sealing member (7) is engaged with the taper recess (511) of the first piston (5) again, and the annular groove (431) of the spinning box (4) is separated from the up-sealing groove (531) of the first piston (5) again. The air holes (532) are opened again and the air is flowing into another part which is below the first piston (5) via the air holes (532). Thus, the first piston (5) moves back to the original position. In addition, the sealing member (7) pushes the enlarging portion (62) of the connecting tube (6) to make the connecting tube (6) and the

needle valve (9) moving up. The sealing section (93) of the needle valve (9) is engaged with the tapered section (811) of the second piston (8) again. The disk (92) of the needle valve (9) moves the second piston (8) back to the original position.

Furthermore, the annular groove (431) of the spinning box (4) is separated from the up-sealing groove (531) of the first piston (5) to make the air flow downward via the air holes (532). Consequently, the space of the part which is above the first piston (5) is decreasing and the space of another part which is below the first piston (5) is increasing. Finally, the first piston (5) moves back to close the vent (1411). The user can press the nozzle again to spray the foam.

Claim(s)

1. A method for producing terylene fiber using polyester waste is achieved by a nozzle assembled to a bottle, the nozzle comprising:

a press cover (1), a revolving cover (3), and a cylinder (14) to construct the appearance of the nozzle;

the press cover (1) having a first tube (11) extending therefrom, a first channel (12) defined in the first tube (11) for melting substances or liquid to flow through;

the revolving cover (3) being screwed on an opening of the bottle for sealing the bottle;

the cylinder (14) having an upper chamber (141) and a lower chamber (142), the upper chamber (141) abutting against the inner wall of the opening of the bottle;

a first melt precision filter (2), a spinning box (4), a connecting tube (6), a first piston (5), a spring (10), a second piston (8), a needle valve (9) and an unidirectional valve (13) being assembled into the nozzle;

the first melt precision filer (2) having a second tube (22) defined therethrough, a first filtrated mesh (21) being set on the bottom of the second tube (22), a net (23) being set on the top of the second tube (22);

the spinning box (4) formed by a fourth tube (42), an annular fringe (43) extended from the fourth tube (42) and around the fourth tube (42), a second filtrated mesh (41) being set on the top of the fourth tube (42), the bottom of the fourth tube (42) being opened for the melting substances or liquid to flow into, the annular fringe (43) having an annular groove (431) defined therein; when the press cover (1) is pressed down, the bottom of the first tube (11) is abutted

against the annular fringe (43);

the top of the connecting tube (6) extending into the spinning box (4), the connecting tube (6) having a second channel (61), the second channel (61) communicating with the first channel (12) of the press cover (1), a sealing member (7) assembled between the spinning box (4) and the connecting tube (6), the sealing member (7) formed by a seventh tube (71), a sealing fringe (72) extruded along the bottom periphery of the seventh tube (71), a plurality of ribs (711) radially formed on the outer periphery of the seventh tube (71), a plurality of air paths defined between each of two neighbor ribs (711), the sealing fringe (72) having a taper portion (721) formed thereon;

the first piston (5) assembled into the upper chamber (141) of the cylinder (14), the first piston (5) comprising a first inner tube (51), a first outer tube (52), a first connecting portion (53) formed between the first inner tube (51) and the first outer tube (52) for integrating the first piston (5), the first inner tube (51) surrounding the middle of the connecting tube (6), an up-sealing groove (531) defined on the top of the first connecting portion (53) of the first piston (5), a plurality of air holes (532) defined between the up-sealing groove (531) and the first inner tube (51); when the spinning box (4) is assembled to the first piston (5), the annular groove (431) of the spinning box (4) is received in the up-sealing groove (531) of the first piston (5) and sealing with each other; a taper recess (511) defined on the bottom periphery of the first inner tube (51); when the sealing member (7) is assembled to the first piston (5), the taper portion (721) is engaged with the taper recess (511) for sealing;

the second piston (8) assembled into the lower chamber (142) of the cylinder (14), the second piston (8) comprising a second inner tube (81), a

second outer tube (82), a second connecting portion (83) formed between the second inner tube (81) and the second outer tube (82) for integrating the second piston (8), a tapered section (811) defined on the bottom periphery of the second inner tube (81) of the second piston (8); when the connecting tube (6) is moving downward, the bottom of the connecting tube (6) is abutted against the second connecting portion (83) of the second piston (8);

one end of the spring (10) abutted against the sealing member (7), another end of the spring (10) abutted against the lower chamber (142) of the cylinder (14);

the needle valve (9) formed by a rod (91), the rod (91) having a disk (92) at the bottom, a sealing section (93) extended from the disk (92) and surrounding the bottom of the rod (91); when the needle valve (9) is upwardly passing through the second inner tube (81) of the second piston (8) and entering into the second channel (61) of the connecting tube (6), the top of the needle valve (9) is received in a necking portion (611) and positioned by the necking portion (611); a fluid channel formed between the needle valve (9) and the second inner tube (81) of the second piston (8) for the melting substances or liquid to flow into, the tapered section (811) of the second piston (8) engaged with the sealing section (93) of the needle valve (9) for sealing; and

the unidirectional valve (13) placed in the lower chamber (142) of the cylinder (14) and near an entrance (1422) of the cylinder (14).

2. A method as claimed in claim 1, wherein the first filtrated mesh (21) and the second filtrated mesh (41) both have a top layer (211, 411) and a bottom layer (212, 412), a plurality of diamond holes alternately defined on the top layer (211, 411) and bottom layer (212, 412), a middle space (213, 413) formed

between the top layer (211, 411) and the bottom layer (212, 412), the diamond holes on the top layer (211, 411) and bottom layer (212, 412) communicated with the middle space (213, 413).

3. A method as claimed in claim 1, wherein the first tube (11) has two rectangular edges (13, 13') defined in the left and right sides of the inner wall of the first tube (11), two cutting edges (221, 222) respectively defined at the left and right sides of the outer periphery of the second tube (22) of the first melt precision filter (2), the cutting edges (221, 222) engaged with the rectangular edges (13, 13') for stably connecting the first melt precision filter (2) into the first tube (11) of the press cover (1), a curved recess (425) defined on the outer periphery of the fourth tube (42) of the spinning box (4), the spinning box (4) positioned in the first tube (11) by an engagement between the rectangular edge (13, 13') and the curved recess (425).

4. A method as claimed in claim 1 or 3, wherein a plurality of fourth teeth (421) is formed on the bottom peripheral of the fourth tube (42), a plurality of fourth gaps (422) defined between each of two neighbor fourth teeth (421), the fourth tube (42) having a plurality of fourth ribs (423) formed on the inner wall of the fourth tube (42), a plurality of air channel (424) defined between each of two neighbor fourth ribs (423).

5. A method as claimed in claim 1, wherein the top of the connecting tube (6) has an enlarging portion (62), a plurality of sixth teeth (621) formed on the top periphery of the enlarging portion (62), a plurality of sixth gaps (622) defined between each of two neighbor sixth teeth (621), the spinning box (4) communicated with the second channel (61) of the connecting tube (6) via the sixth gaps (622).

6. A method as claimed in claim 1, wherein the middle of the second channel (61) is necked to form the necking portion (611), the top of the needle valve (9) received in the necking portion (611) and positioned by the necking portion (611), a plurality of protrusions (911) axially formed on the periphery of the rod (91), a plurality of unfilled space defined between each of two neighbor protrusions (911).

7. A method as claimed in claim 1, wherein an annular recess (722) is defined at the bottom of the sealing fringe (72) of the sealing member (7), one end of the spring (10) fixing in the annular recess (722) of the sealing member (7).

8. A method as claimed in claim 1, wherein the lower chamber (142) has a spring room (1421) for receiving the spring (10), the lower chamber (142) and the upper chamber (141) separated by the second piston (8), another end of the spring (10) receiving into the spring room (1421) of the cylinder (14).

9. A method as claimed in claim 1, wherein the upper chamber (141) has a vent (1411) defined thereon, the first piston (5) assembled into the upper chamber (141) of the cylinder (14) and near the vent (1411), the inner space of the cylinder (14) isolated by the first piston (5).

10. A method as claimed in claim 1 or 9, wherein an annular pad (15) is assembled between the top of the upper chamber (141) of the cylinder (14) and the opening of the bottle for further sealing the bottle.

11. A nozzle substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

12. A method that includes the use of the nozzle claimed in claim 11.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2010/077437

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: B65D，A47K 5/+，B05B11/+

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC,WPI, CNPAT,CNKI: sprayer spray head nozzle foam seal screen mesh valve

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN2632010Y（CAI, Yinlong）11 Aug. 2004（11.08.2004） embodiment, figures 1-2	1-10
A	CN1781824A（XIANSI PLASTIC PROD CO LTD）07 Jun. 2006（07.06.2006）the whole document	1-10
A	CN2772632Y（SU, Zhengyuan）19 Apr. 2006（19.04.2006）the whole document	1-10
A	US5192006A（RISDON CORP）09 Mar. 1993（09.03.1993）the whole document	1-10
A	WO2009104992A1（SCA HYGIENE PROD AB）27 Aug. 2009（27.08.2009）the whole document	1-10

☐ Further documents are listed in the continuation of Box C.　　☒ See patent family annex.

* Special categories of cited documents:

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"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim (S) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
08 Apr. 2011（08.04.2011）	**19 May 2011 (19.05.2011)**
Name and mailing address of the ISA/CN The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China 100088 Facsimile No. 86-10-62019451	Authorized officer ZENG, Hao Telephone No. (86-10)62085476

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2010/077437

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN2632010Y	11.08.2004	None	
CN1781824A	07.06.2006	CN100355636C	19.12.2007
CN2772632Y	19.04.2006	None	
US5192006A	09.03.1993	None	
WO2009104992A1	27.08.2009	AU2008350973A1	27.08.2009
		MXPA10009008A	30.09.2010
		EP2259982A1	15.12.2010

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2010/077437

A. CLASSIFICATION OF SUBJECT MATTER

B65D47/34（2006.01）i
A47K5/14（2006.01）i
A47K5/12（2006.01）i