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(54) **CANNABIS JOINTS FILLING APPARATUS**

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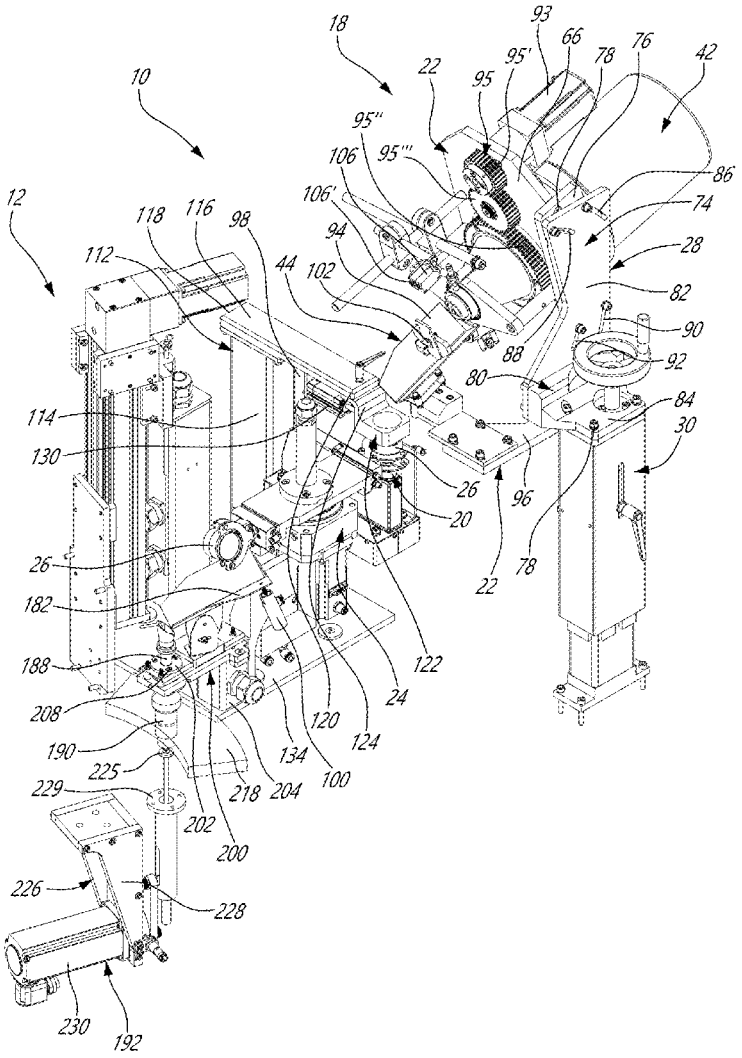
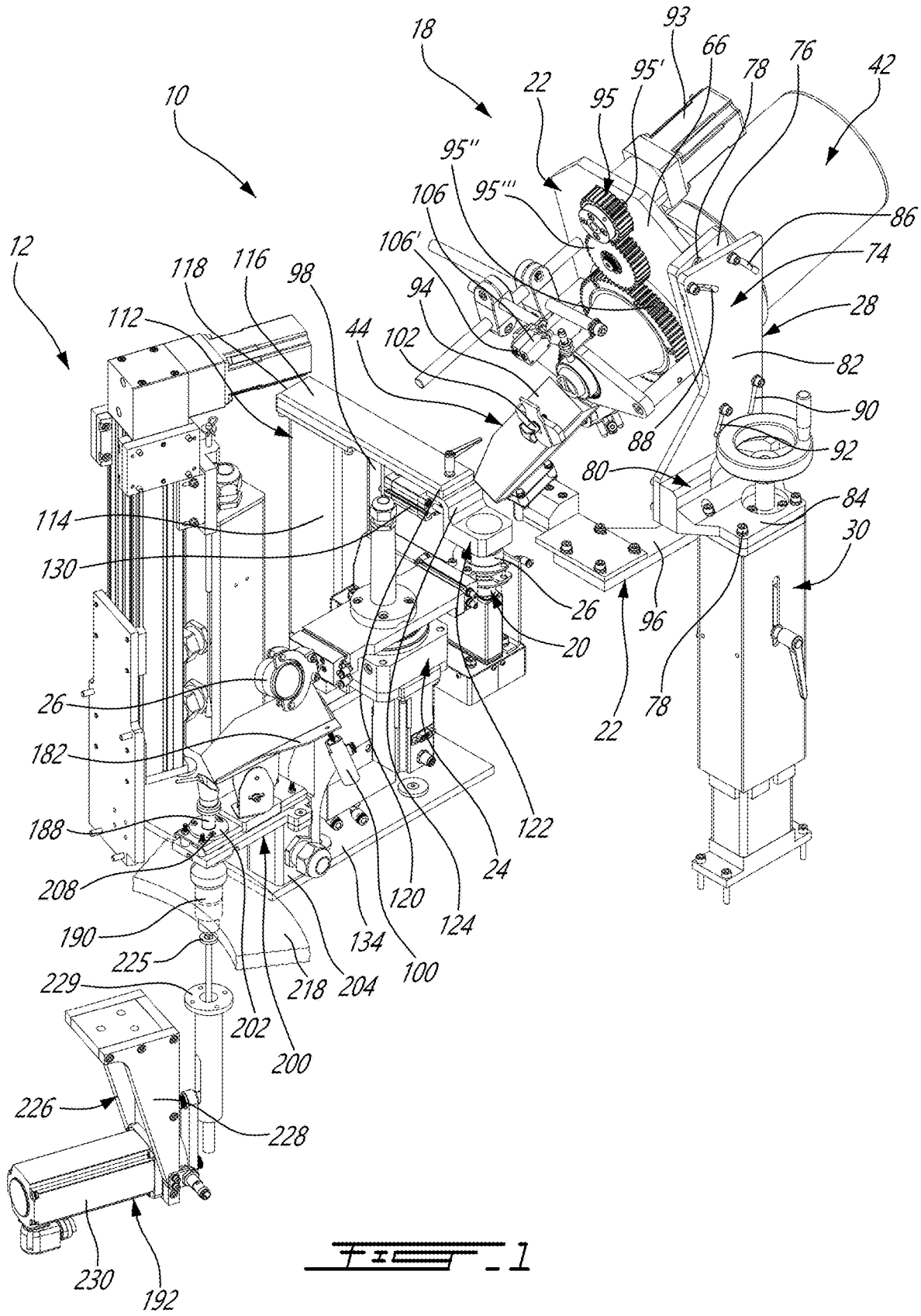
(52) **U.S. Cl.**

CPC ***A24C 1/02*** (2013.01); ***A24C 5/002*** (2013.01); ***A24C 5/02*** (2013.01)

(57) **ABSTRACT**

A *cannabis* joints filling system includes a *cannabis* joint filling apparatus for receiving and holding a paper cone along a longitudinal axis and for receiving and pre-compacting a predetermined quantity of *cannabis* into the paper cone; and a *cannabis* feeding system including i) a weighing scale, ii) a *cannabis* feeding apparatus adjacent the weighing scale for receiving *cannabis* in bulk and for controllably outputting a predetermined portion of the *cannabis* in bulk onto the weighing scale, and iii) a single portion *cannabis* distributing device, including two cups that are sequentially movable between a) a *cannabis* weighing position, wherein one of the two cups cooperates with the weighing scale to measure the predetermined portion of the *cannabis*, and b) a *cannabis* distributing position, where the predetermined portion of the *cannabis* is fed to the *cannabis* joint filling apparatus.

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182
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192

Fig. 1

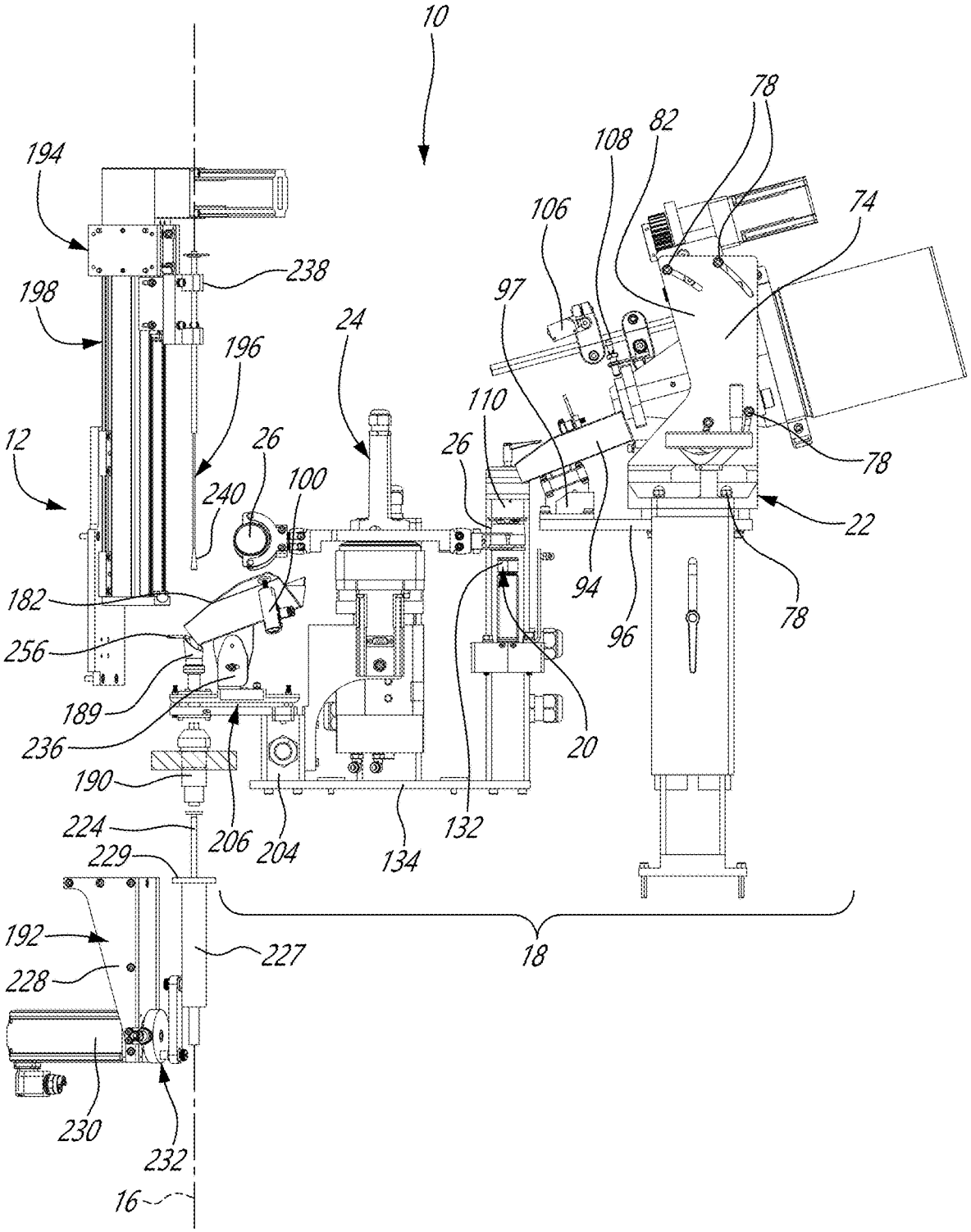
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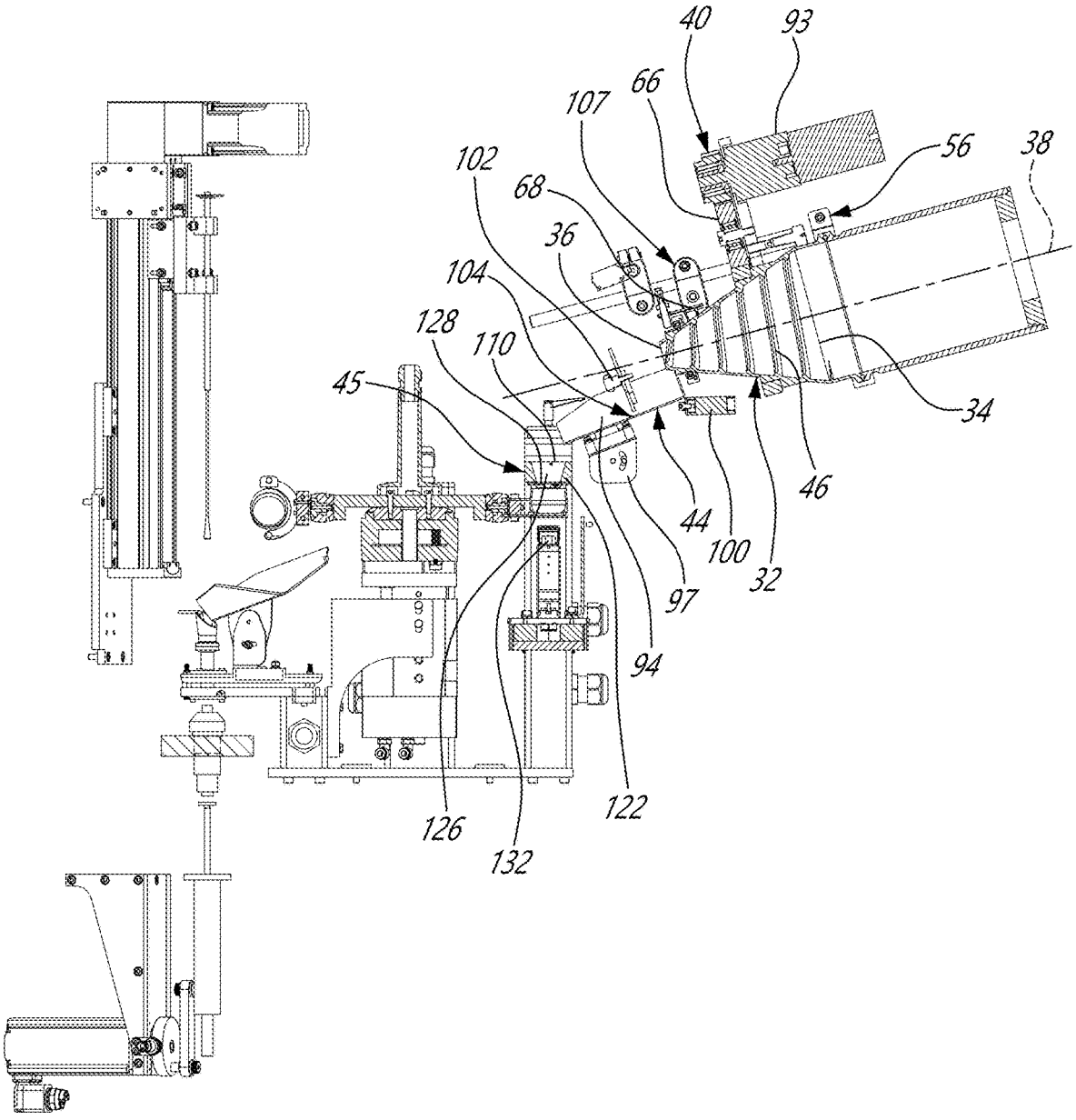
Fig. 2


40
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107
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128
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122
126
132

FIG. 3

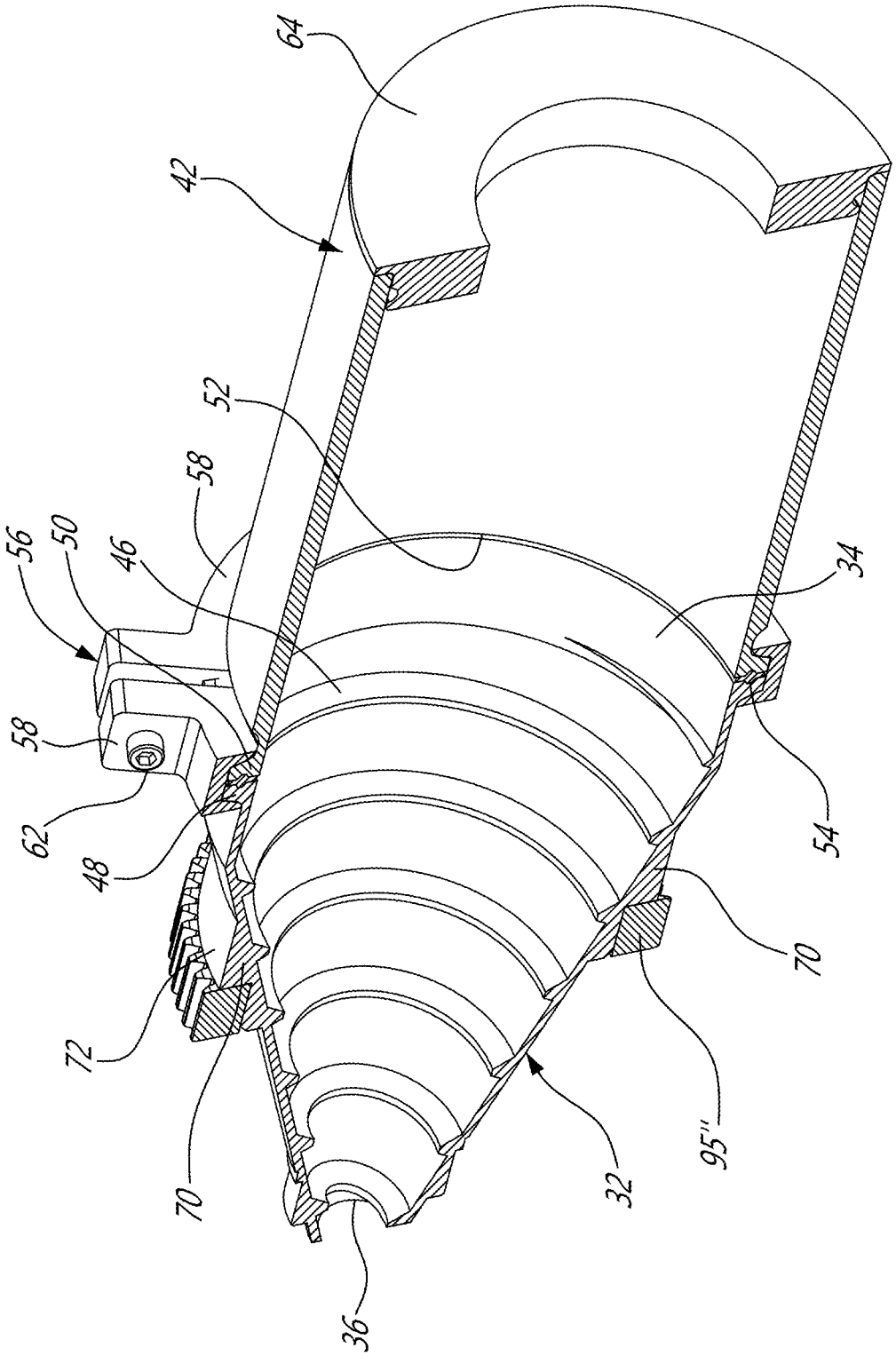


FIG - 4

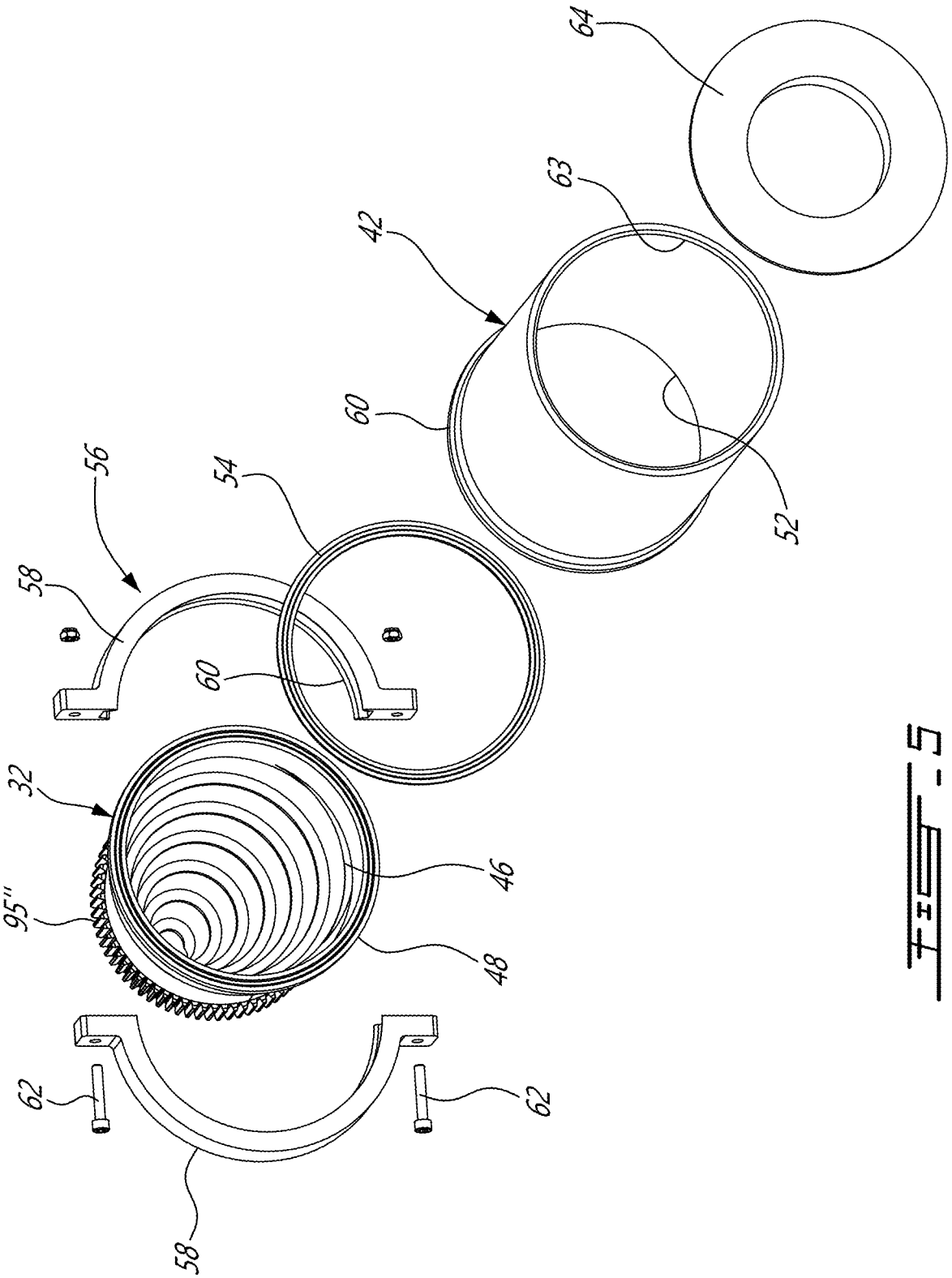
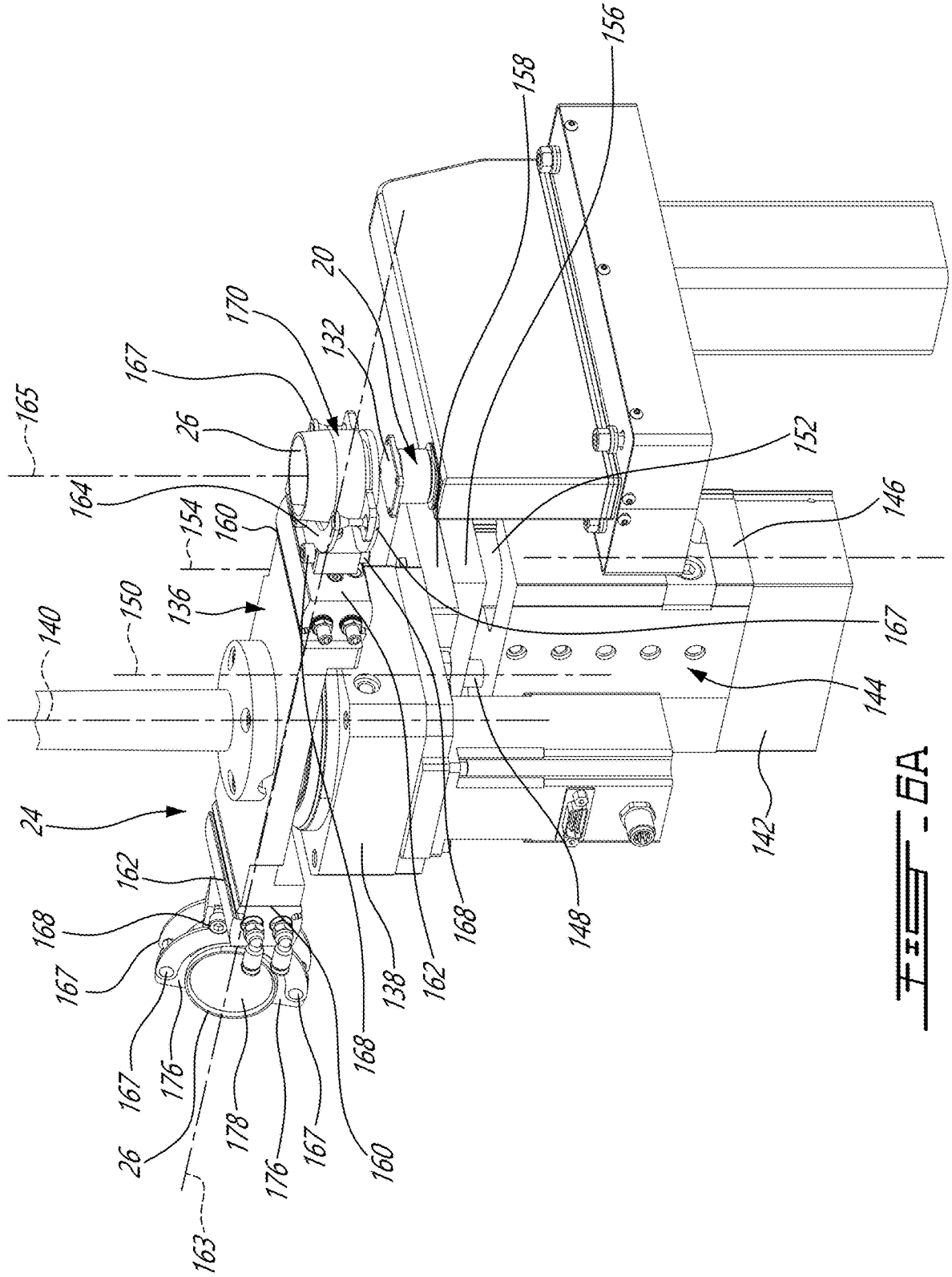


FIG. 5


156
158
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132
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136
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144
24
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163

FIG. 6A

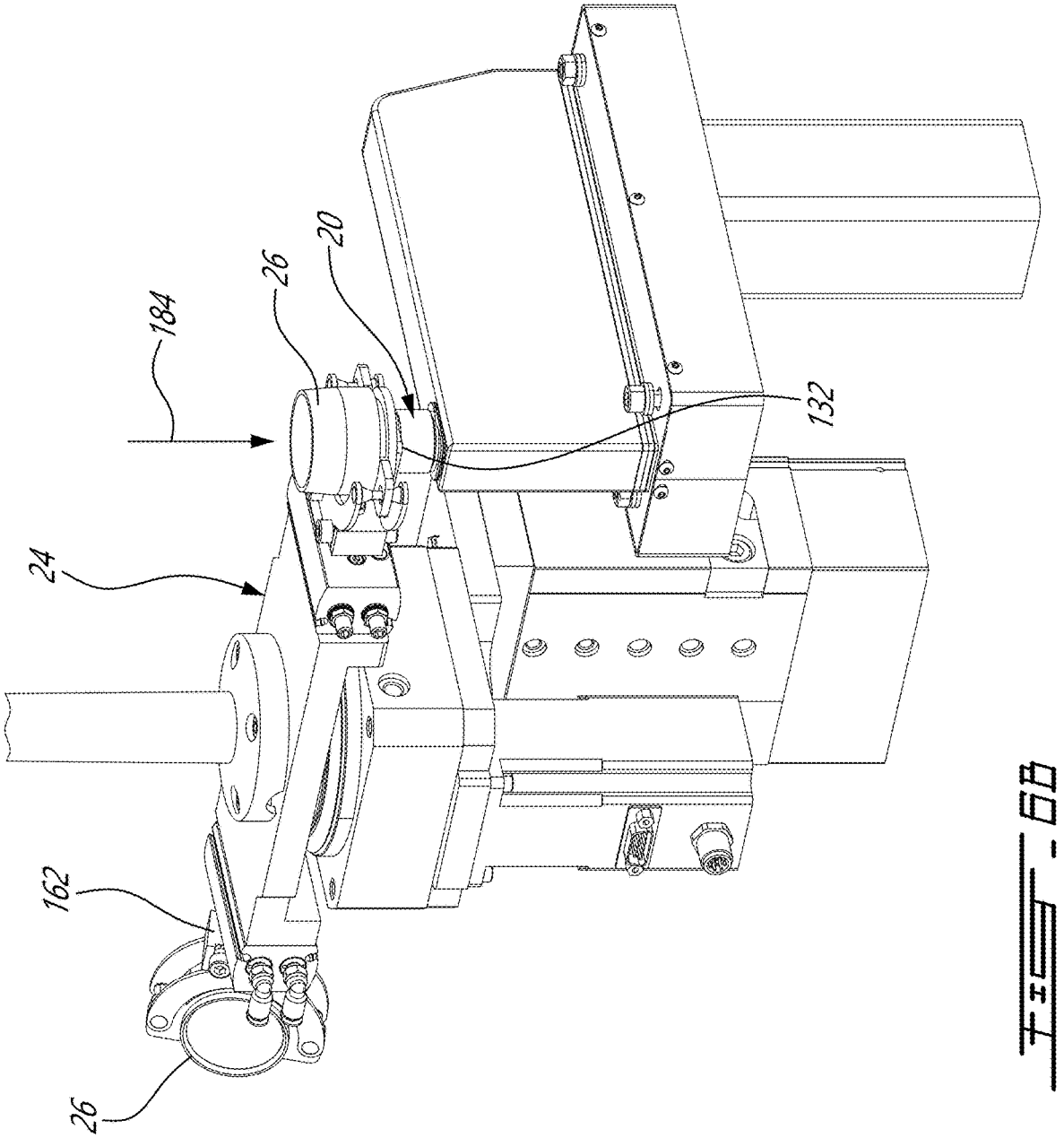
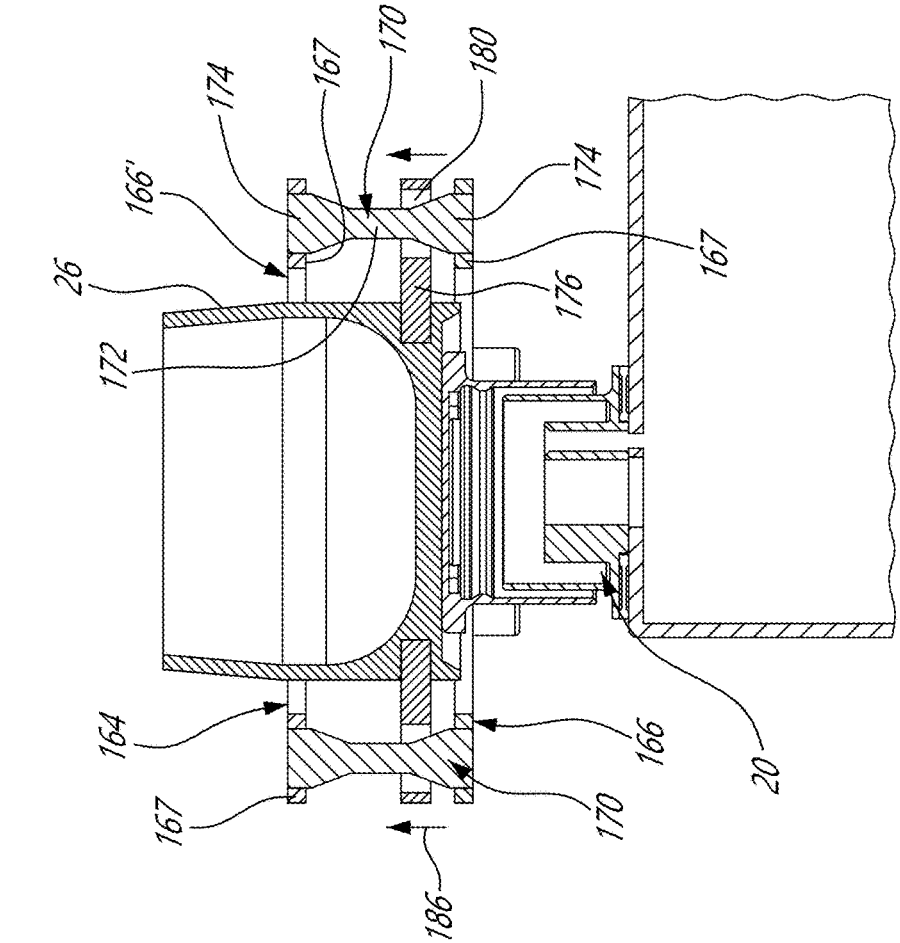


FIG. 6B


174
167
170
180
166'
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26
167
176
172
164
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167
170
20
186

FIG-7B

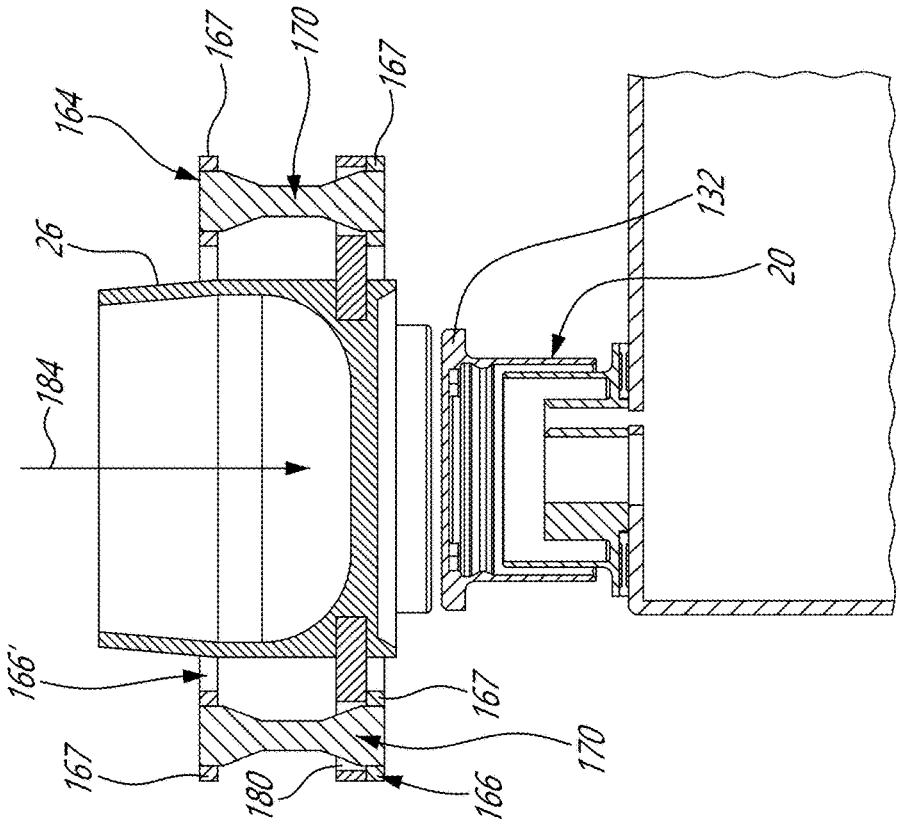
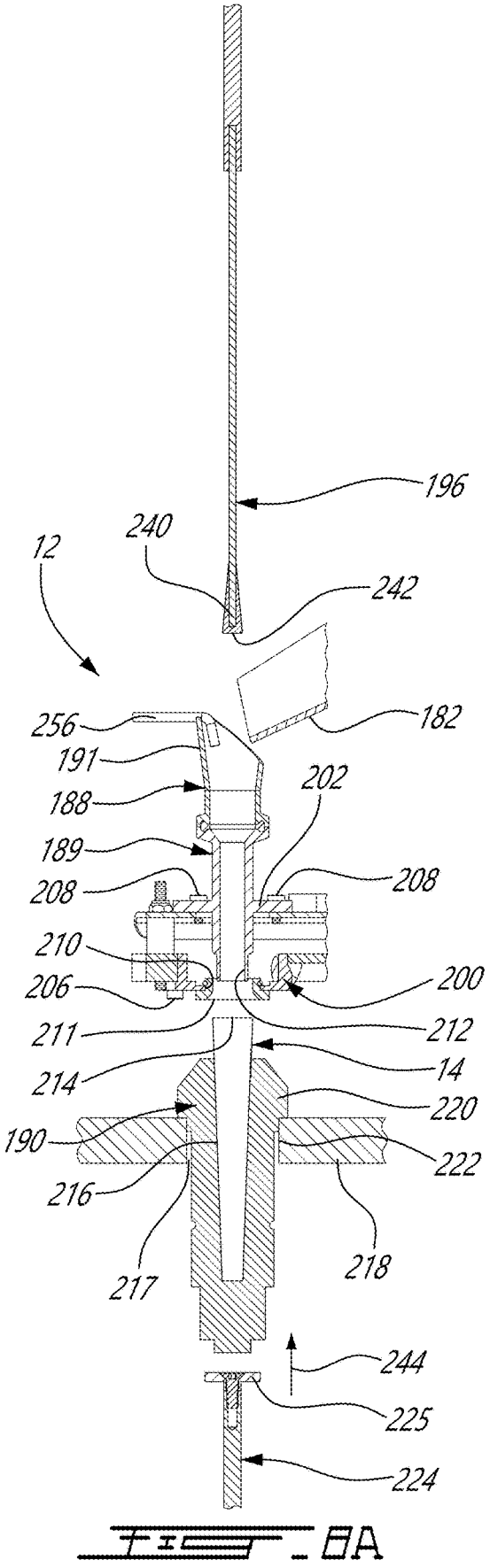

167
170
167
164
26
132
20
184
166'
167
167
180
166
170

FIG-7A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12
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182
256
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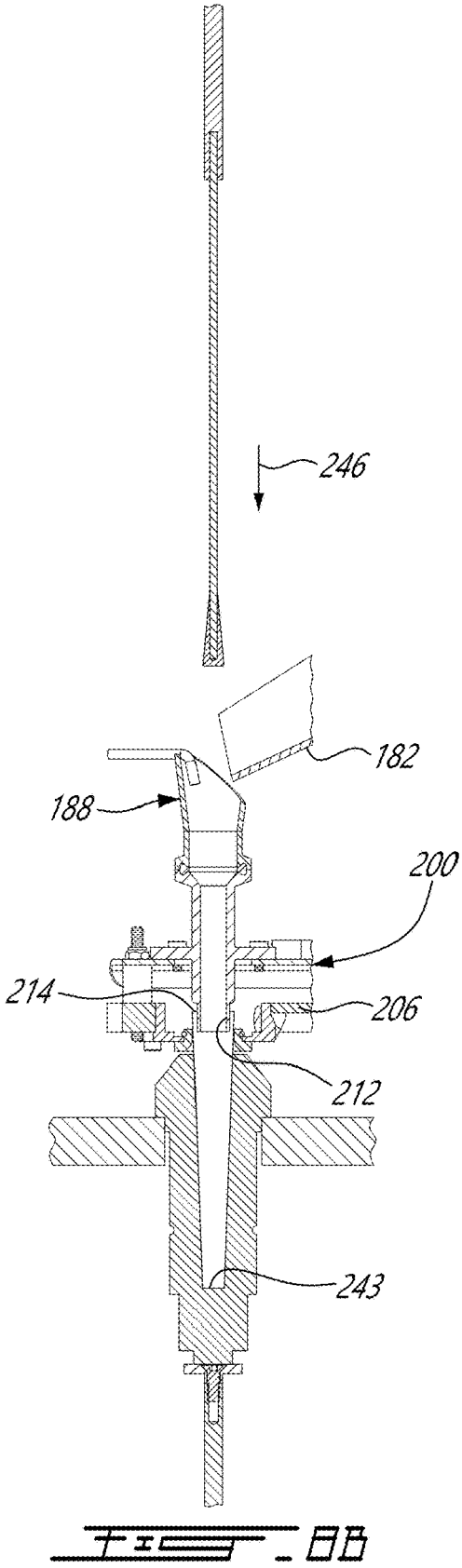
FIG. 8A


246
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212
243

FIG. 8B

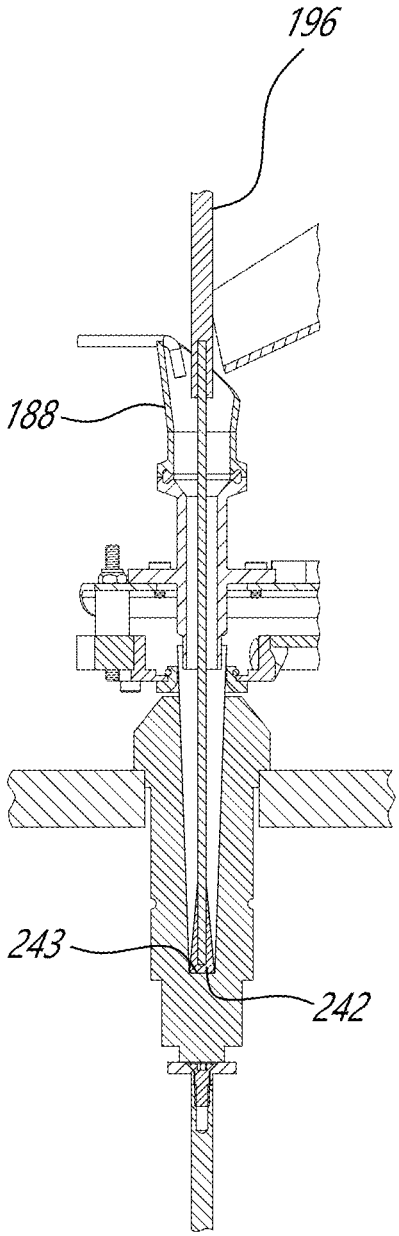

Fig. 8C

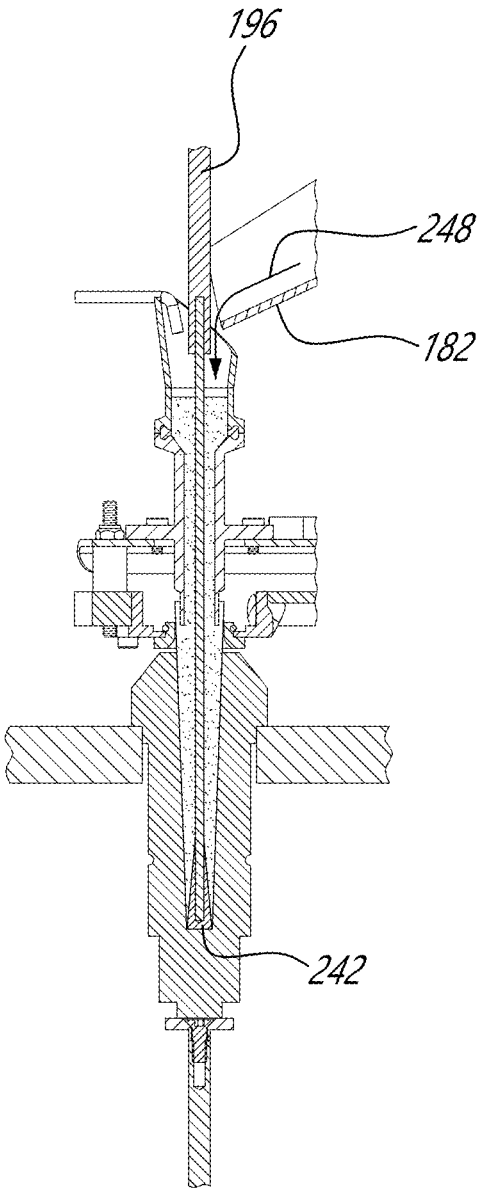

Fig. 8D

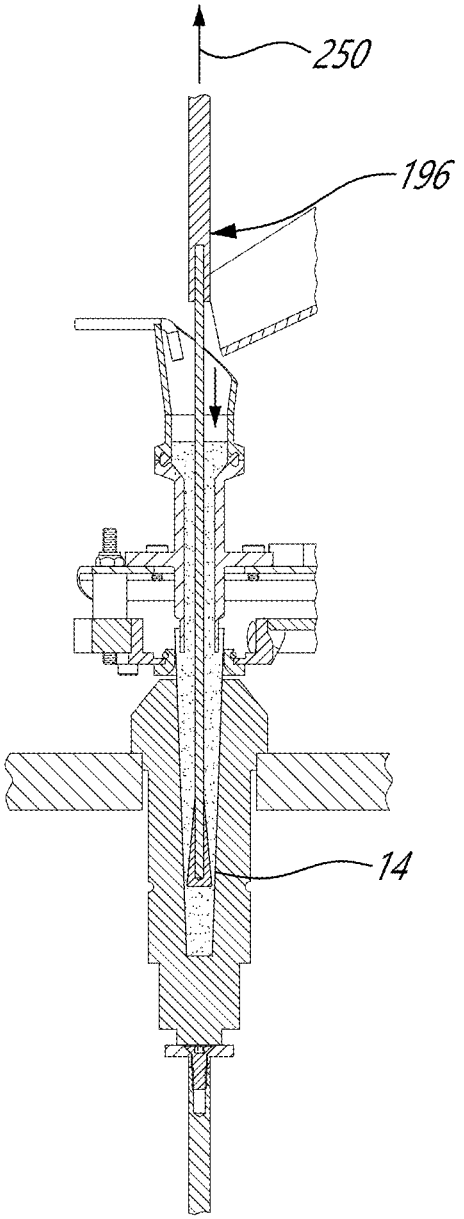

FIG. 8E

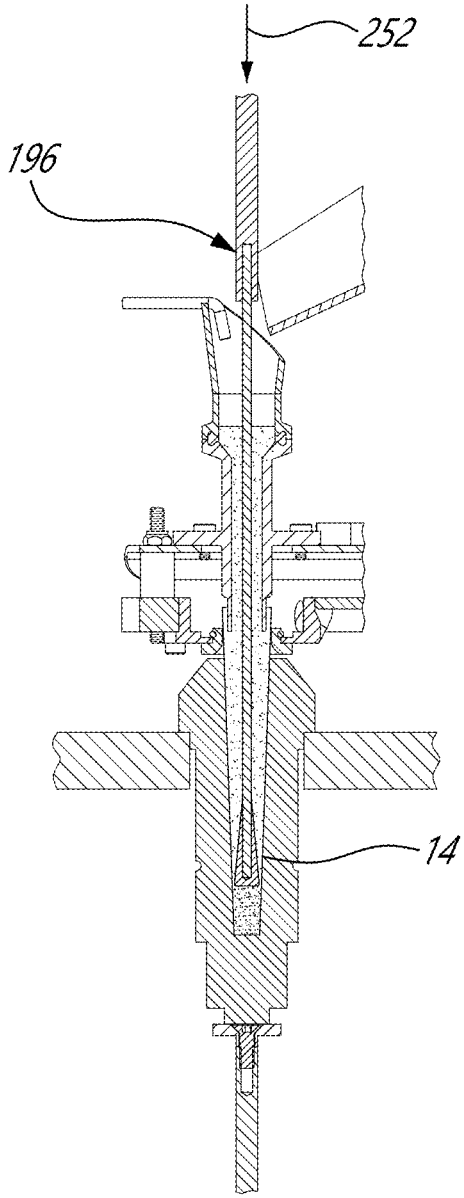

FIG. 8F

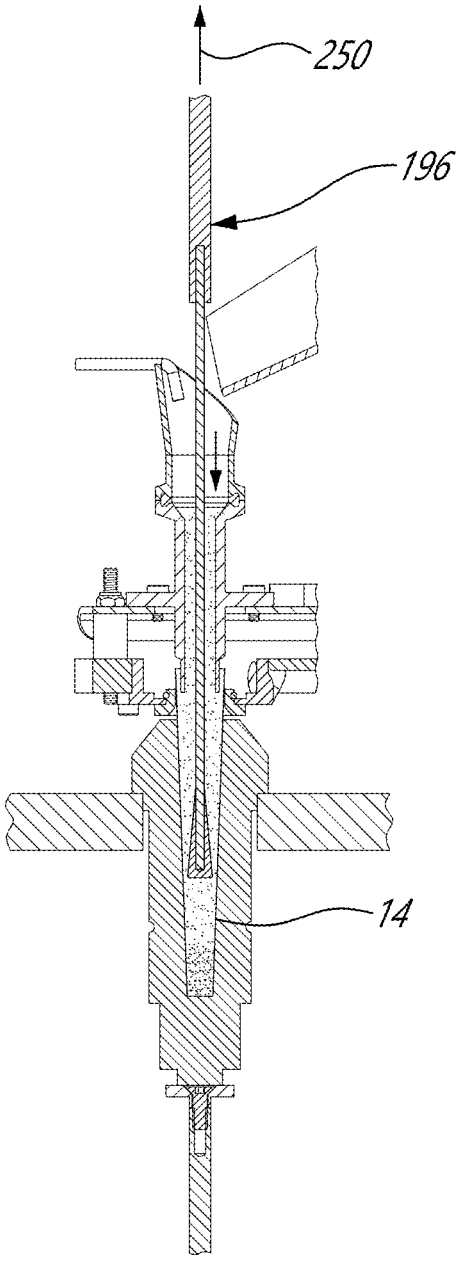

Fig. 8G

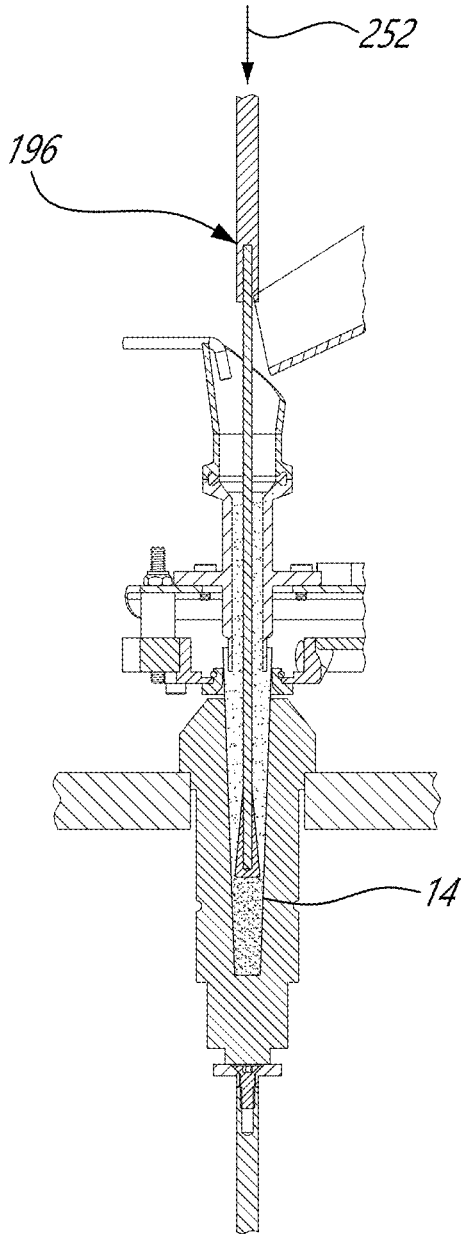

Fig. 8H

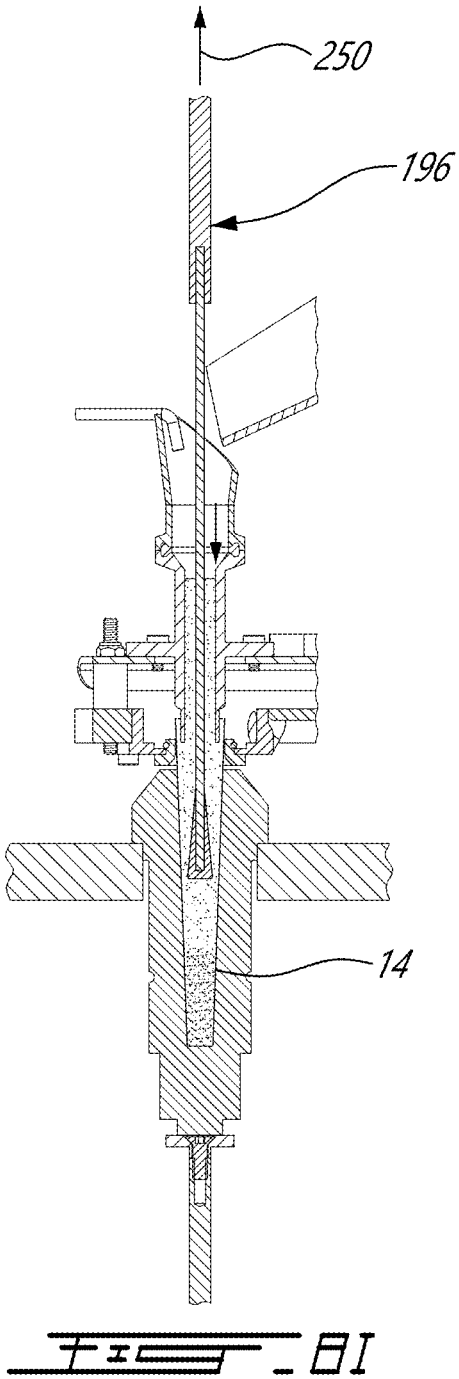

FIG. 8I

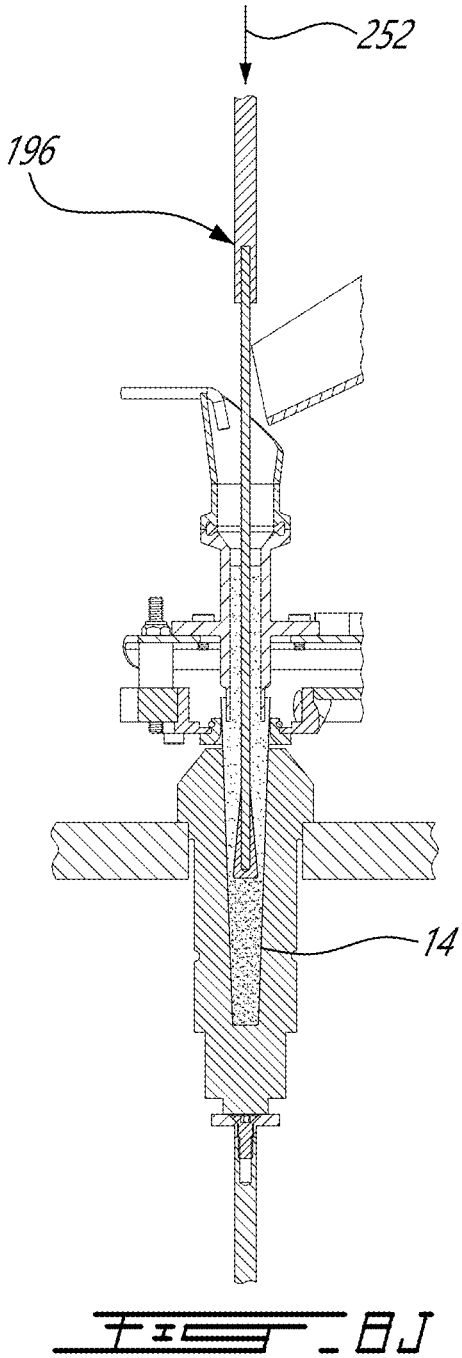

FIG. 8J

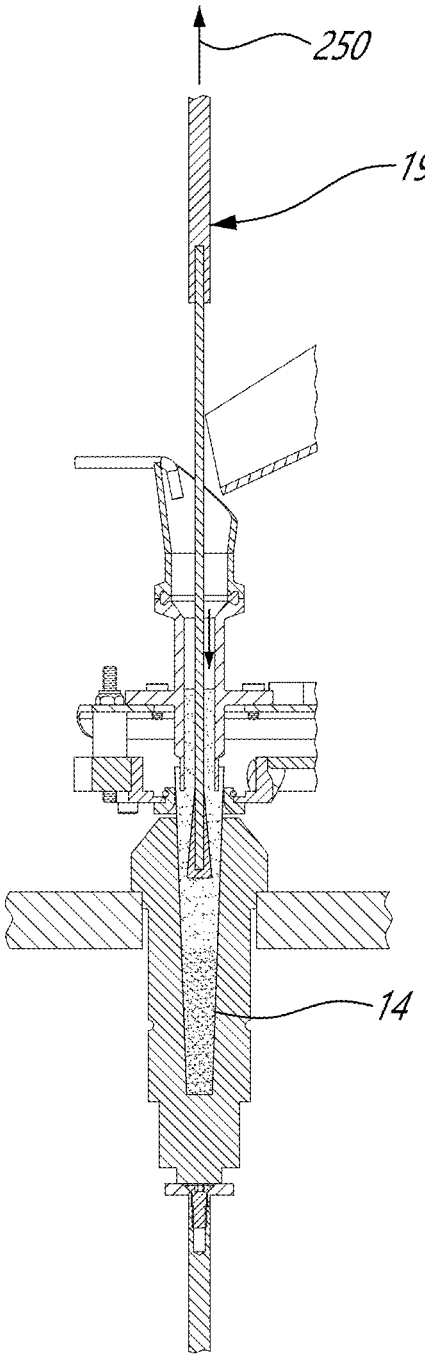

Fig. 8K

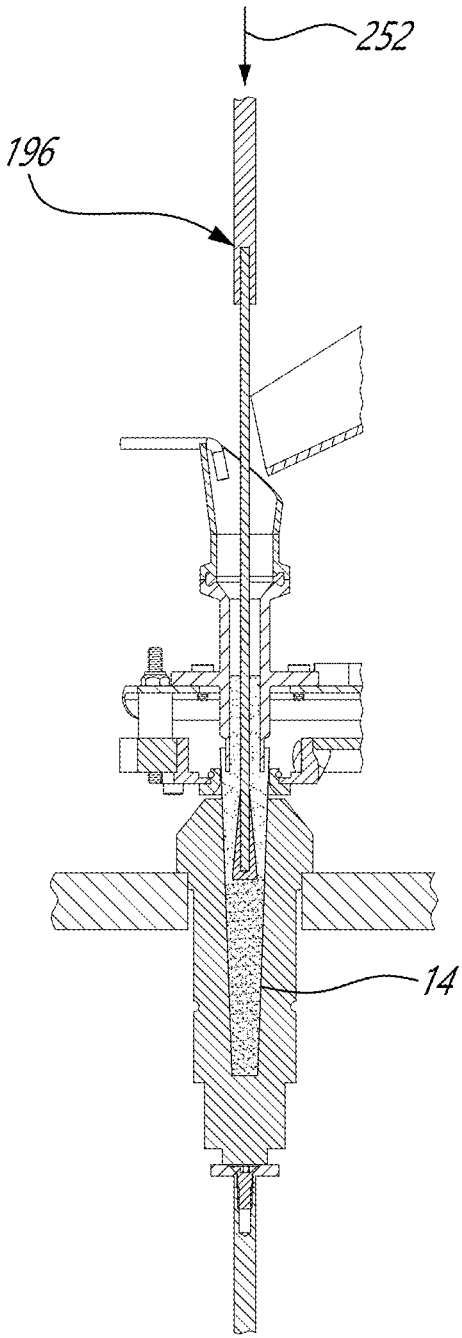

Fig. 8L

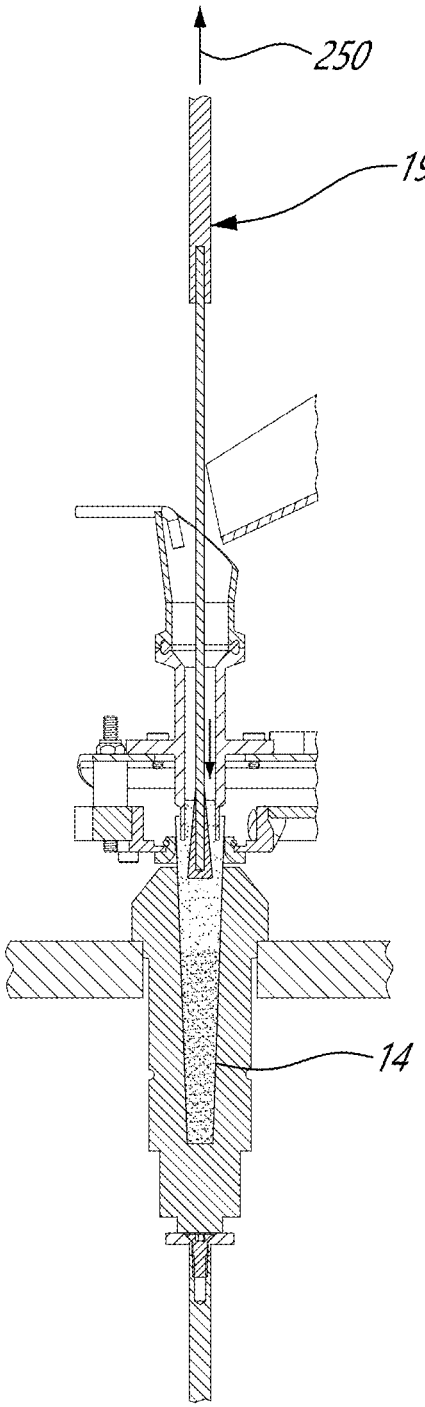

Fig. 8M

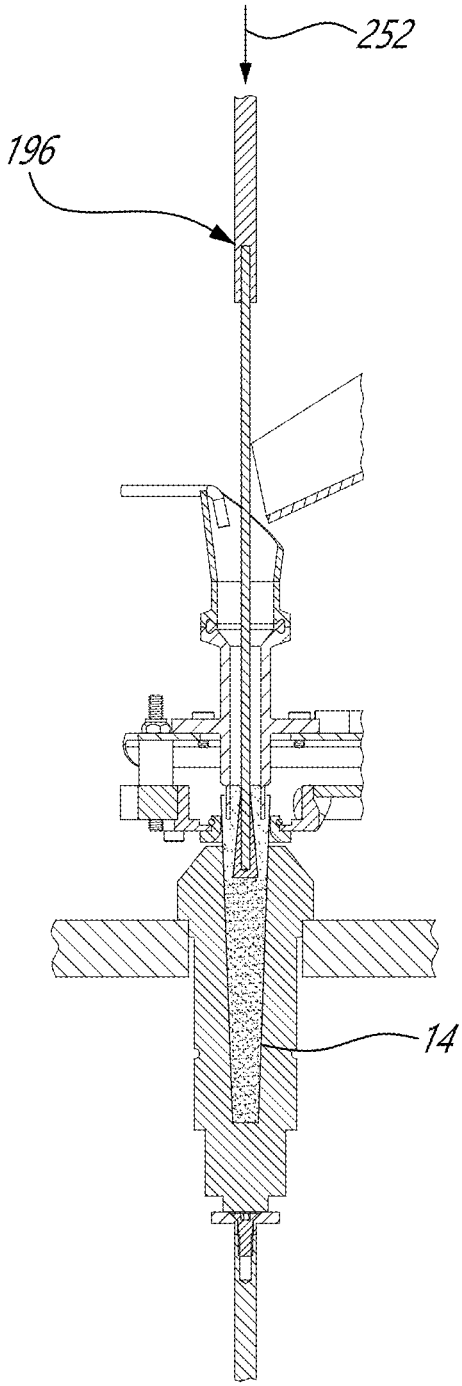

Fig. 8N

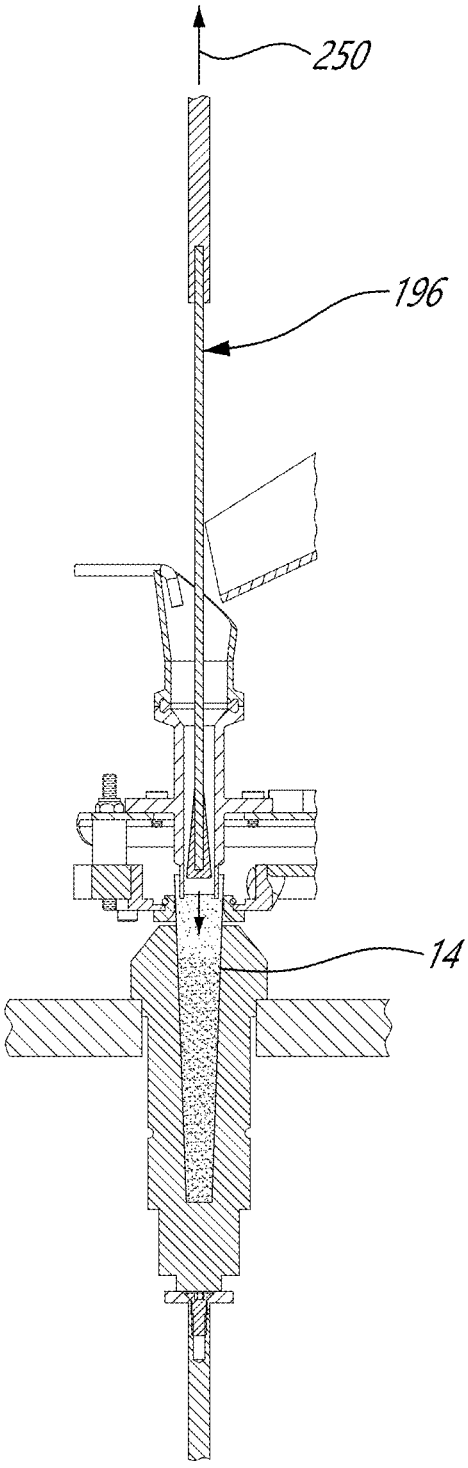

Fig. 8O

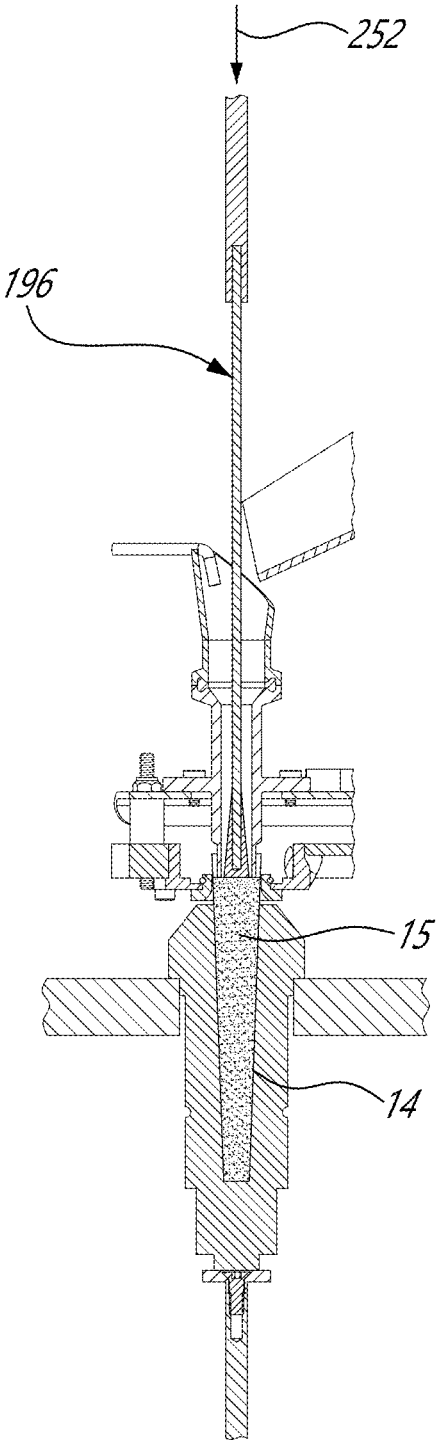

Fig. 8P

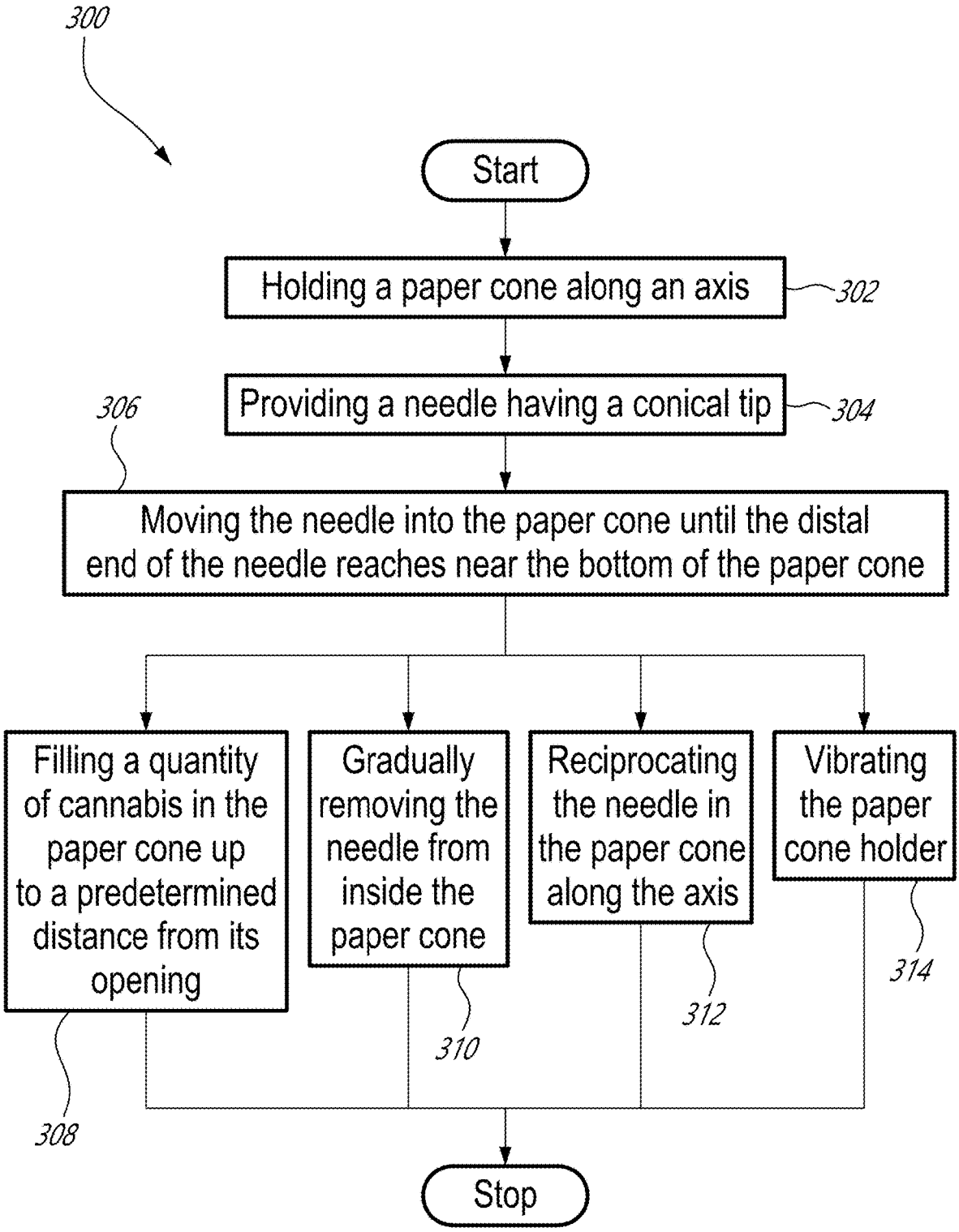
300
Start
Holding a paper cone along an axis
302
Providing a needle having a conical tip
304
306
Moving the needle into the paper cone until the distal end of the needle reaches near the bottom of the paper cone
Filling a quantity of cannabis in the paper cone up to a predetermined distance from its opening
Gradually removing the needle from inside the paper cone
Reciprocating the needle in the paper cone along the axis
Vibrating the paper cone holder
308
310
312
314
Stop

FIG. 9

CANNABIS JOINTS FILLING APPARATUS

CROSS REFERENCE TO RELATED PATENT APPLICATION

[0001] This application is a division of U.S. patent application Ser. No. 17/496,435, filed on Oct. 7, 2021, titled "*Cannabis* Joints Filling System", currently pending, the content of which is incorporated by reference herein.

FIELD

[0002] The present disclosure generally relates to *cannabis* joints and more specifically to a *cannabis* joints filling system.

BACKGROUND

[0003] *Cannabis* joints have long been and are still very often prepared by hands.

[0004] However, the legalization of *cannabis* in many territories have seen the coming of the automatization in the manufacturing of *cannabis* joint.

[0005] Some of the automated processes in the manufacturing of *cannabis* involve inserting paper cones in a cone holding tray and then vibrating the whole tray while it receives *cannabis* in bulk, the vibrations aiming at evening out the filling of the cones.

[0006] A drawback of such vibrating tray is that strong and moderate vibrations have been found to separate the delta-9-tétrahydrocannabinol (THC) from *cannabis*, thereby decreasing the quality of the product.

[0007] Another known automated process for the filling of *cannabis* includes literally injecting *cannabis* in each cone and then compacting the *cannabis*.

[0008] Drawbacks of such *cannabis* injection include separation of THC as described hereinabove and the lack of uniformity along the length of the cone considering its shape.

[0009] Also, known automated processes of filling *cannabis* in a paper cone are often imprecise in the quantity inserted in each cone.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] In the appended drawings:

[0011] FIG. **1** is a perspective view of a *cannabis* joints filling system according to a first illustrative embodiment;

[0012] FIG. **2** is a front view of the system from FIG. **1**;

[0013] FIG. **3** is cross sectional front view of the system from FIG. **1**;

[0014] FIG. **4** is a cross sectional perspective of the feeding rotary tumbler that is part of the *cannabis* feeding system shown in FIG. **1**;

[0015] FIG. **5** is an exploded view of the feeding cone from FIG. **4**;

[0016] FIGS. **6**A and **6**B are isolated perspective views of both a weighing scale and a single portion *cannabis* distributing device that is part of the *cannabis* joints filling system from FIG. **1**, illustrating their operations while weighing a single dose of *cannabis;*

[0017] FIGS. **7**A and **7**B are cross-sections of one of the two cups of the single portion *cannabis* distributing device, corresponding respectively to FIGS. **6**A and **6**B;

[0018] FIGS. **8**A to **8**P are cross sections of parts of the *cannabis* joint filling apparatus, part of the system from FIG. **1**; and

[0019] FIG. **9** is a flowchart of a method for pre-compacting *cannabis* in a paper cone.

SUMMARY

[0020] According to illustrative embodiments, there is provided a *cannabis* joint filling apparatus comprising:

[0021] a paper cone holder, having a bottom, for receiving and holding a paper cone along a longitudinal axis; and

[0022] a reciprocating needle mechanism including a needle having a tip and an actuating mechanism to controllably cause the needle to reciprocate in the paper cone holder along the longitudinal axis;

[0023] whereby, in operation, the reciprocating needle mechanism causes the needle to reciprocate in the paper cone received in the paper cone holder while gradually and simultaneously i) the reciprocating needle mechanism causing the needle to move along the longitudinal axis from a first position to a second position relative to the bottom of the paper cone holder, and ii) the paper cone receiving a predetermined portion of *cannabis*.

[0024] According to more specific illustrative embodiments, there is provided a *cannabis* joints filling system comprising:

[0025] a *cannabis* joint filling apparatus for receiving and holding a paper cone along a longitudinal axis and for receiving and pre-compacting a predetermined quantity of *cannabis* into the paper cone; the *cannabis* joint filling apparatus including i) a reciprocating needle mechanism, and ii) an actuating mechanism to controllably cause the needle to reciprocate in the paper cone along the longitudinal axis while moving from a first position, wherein the conical tip is near a bottom of the paper cone, and a second position, wherein the conical tip is out of the paper cone.

[0026] and

[0027] a *cannabis* feeding system including i) a weighing scale, ii) a *cannabis* feeding apparatus adjacent the weighing scale for receiving *cannabis* in bulk and for controllably outputting a predetermined portion of the *cannabis* in bulk onto the weighing scale, and iii) a device for distributing a single portion of *cannabis*, including two cups that are sequentially movable between a) a *cannabis* weighing position, wherein one of the two cups cooperates with the weighing scale to measure the predetermined portion of the *cannabis*, and b) a *cannabis* distributing position, where the predetermined portion of the *cannabis* is fed to the *cannabis* joint filling apparatus;

[0028] wherein the *cannabis* feeding system includes:

[0029] a support frame;

[0030] a feeding cone defining a large inlet and a narrow outlet and that is mounted to the support frame for rotation about a rotational axis that is so angled relative to a horizontal axis that the inlet is higher than the outlet; the feeding cone having an inner surface and including a spiral shaped protrusion on the inner surface;

[0031] an actuating mechanism secured to the frame and operatively coupled to the feeding cone for selectively causing the rotation of the feeding cone; and

[0032] whereby, in operation, *cannabis* fed in the inlet of the feeding cone is gradually moved from the inlet

of the feeding cone to the outlet thereof by the spiral shaped protrusion when the feeding cone is caused to rotate by the actuating mechanism;

[0033] wherein the device for distributing single portions of *cannabis* includes:

[0034] a revolving support that is movable about a first axis; the revolving support being further movable between first and second position along the first axis;

[0035] first and second cup holders, each mounted to the revolving support for pivotal movement between a weighing position and a content-emptying position about a second axis that is perpendicular to the first axis, and

[0036] first and second cups, each mounted to a respective one of the first and second cup holders so as to be free to translate in and out of a position wherein the cup is supported by the cup holder.

[0037] According to another illustrative embodiment, there is provided a method for pre-compacting *cannabis* in a paper cone, the method comprising:

[0038] holding a paper cone along a longitudinal axis; the paper cone having a bottom and an opening;

[0039] providing a needle;

[0040] moving the needle into the paper cone until the distal end of the needle reaches near the bottom of the paper cone; and

[0041] then simultaneously:

[0042] filling a quantity of *cannabis* in the paper cone to fill the paper cone up to a predetermined distance from the opening; and

[0043] gradually removing the needle from inside the paper cone; and

[0044] reciprocating the needle in the paper cone along the longitudinal axis;

[0045] whereby i) and ii) are so synchronized as to both ends substantially simultaneously.

[0046] Other objects, advantages and features of the *cannabis* joints filling system and apparatus and of a method for pre-compacting *cannabis* in a paper cone will become more apparent upon reading the following non-restrictive description of illustrated embodiments thereof, given by way of example only with reference to the accompanying drawings.

DETAILED DESCRIPTION

[0047] In the following description, similar features in the drawings have been given similar reference numerals, and in order not to weigh down the figures, some elements are not referred to in some figures if they were already identified in a precedent figure. Herein, it shall further be noted that, for avoiding unnecessary details obscuring the invention, only device structures and/or processing steps closely relevant to schemes according to the invention are shown in the accompanying drawings while omitting other details less relevant to the invention.

[0048] The use of the word "a" or "an" when used in conjunction with the term "comprising" in the claims and/or the specification may mean "one", but it is also consistent with the meaning of "one or more", "at least one", and "one or more than one". Similarly, the word "another" may mean at least a second or more.

[0049] As used in this specification and claim(s), the words 'comprising" (and any form of comprising, such as "comprise" and "comprises"), "having" (and any form of having, such as "have" and "has"), "including" (and any form of including, such as "include" and "includes") or "containing" (and any form of containing, such as "contain" and "contains"), are inclusive or open-ended and do not exclude additional, un-recited elements.

[0050] A first illustrative embodiment of a *cannabis* joints filling system **10** will now be described with reference first to FIGS. **1** and **2**.

[0051] The *cannabis* joints filling system **10** comprises a *cannabis* joint filling apparatus **12** for receiving and holding a paper cone **14** along a longitudinal axis **16** and for receiving and pre-compacting a predetermined portion of *cannabis* therein (not shown), and a *cannabis* feeding system **18** for feeding the predetermined portion of *cannabis* to the *cannabis* joint filling apparatus **12**.

[0052] The predetermined portion of *cannabis* will also be referred to as a single dose **15** of *cannabis* **15** (see FIG. **8**P) and is a predetermined quantity of *cannabis* that is intended to fill a paper cone **14** to form a joint. Of course, such a single dose **15** may vary depending on the size of the paper cone **14** to fill.

[0053] The *cannabis* feeding system **18** comprises i) a weighing scale **20**, ii) a *cannabis* feeding apparatus **22**, adjacent the weighing scale **20**, for receiving *cannabis* in bulk (not shown) and for controllably outputting the *cannabis* onto the weighing scale **20**, and iii) a single portion *cannabis* distributing device **24** including two cups **26** that are sequentially movable between a *cannabis* weighing position, wherein one of the two cups **26** cooperates with the weighing scale **20** to measure the predetermined portion of the *cannabis*, and a *cannabis* distributing position, where the predetermined portion of the *cannabis* is fed to the *cannabis* joint filling apparatus **12**.

[0054] With references to FIGS. **1** and **3-5**, the *cannabis* feeding apparatus **22** will now be described in more detail.

[0055] The *cannabis* feeding apparatus **22** comprises a support frame **28** mounted to a height adjustment mechanism **30**, a feeding cone **32** defining a large inlet **34** and a narrow outlet **36** and that is mounted to the support frame **28** for rotation about a rotational axis **38**, an actuating mechanism **40** secured to the frame **28** and operatively coupled to the feeding cone **32** for selectively causing the rotation thereof about the axis **38**, a cone extension **42** secured to the feeding cone **32** at the inlet thereof **34** so as to be in fluid communication therewith, a chute **44** secured to the frame **28**, adjacent the feeding cone outlet **36**, so as to receive *cannabis* therefrom, and a controllable gate **45**.

[0056] The inner surface of the feeding cone **32** includes a spiral-shaped protrusion **46** thereon, which contributes to move *cannabis* precisely and gradually from the inlet **34** of the feeding cone **32** to the outlet **36** thereof when the feeding cone **32** is caused to rotate by the actuating mechanism **40**.

[0057] According to another embodiment, the *cannabis* feeding apparatus **22** is replaced by another apparatus or system allowing to receiving *cannabis* in bulk and to output a portion thereof to the weighing scale **20**.

[0058] As will be described hereinbelow in more detail, the *cannabis* feeding system **18** is further equipped with low and high-level sensors **106-106'** which allows detecting the flow of *cannabis* that exits the feeding cone **32**. This feature, in combination with the configuration of the feeding cone **32**, notably the spiral-shaped protrusion **46** therein allows optimizing the rotation of the feeding cone **32** to extract its content, which in turn minimizes both its energy consumption and its wear.

[0059] Compared to the use of a vibrating conveyor to bring *cannabis* into the filling system **12**, the use of the feeding cone **32** therefore allows an improved control on the *cannabis* flow into the system **10** and minimizes the aforementioned separation of the delta-9-tétrahydrocannabinol (THC) from *cannabis*, thereby improving the quality of the product.

[0060] The cone extension **42** has a diameter similar to the diameter of the feeding cone **32** at the inlet **34** thereof. Both the feeding cone **32** and the cone extension **42** include an outer flange **48** and **50** respectively at the inlet **34** and outlet **52** thereof. A cushioning washer ring **54** is provided between the feeding cone **32** and cone extension **42** and a clamp collar **56** is provided to secure the joint therebetween. The clamp collar **56** includes two identical complementary C-shaped parts **58**, each including a groove **60** therein to receive both flanges **48** and **50** and ring **54** in an abutting relationship The two parts **58** attach the cone extension **42** to the feeding cone **32** when they are assembled thereon using fasteners **62**.

[0061] According to another embodiment (not shown), the cone extension is detachably or permanently attached to the feeding cone **32** using another attachment than a clamp collar **56**. According to still another embodiment, the cone extension **42** is integral to the feeding cone **32**.

[0062] The inlet **63** of the cone extension **42** is provided with an inward flange **64** that defines an opening thereof that is narrower than its outer diameter.

[0063] The cone extension **42** defines a container to receive *cannabis* in bulk.

[0064] It is to be noted that the sizes and configurations of the feeding cone **32** and cone extension **42** may be different than illustrated so as to be adapted for the grade or quantity of *cannabis*.

[0065] The support frame **28** includes a first plate **66** having a circular opening **68** that receives the feeding cone **32** for free rotation therein. For that purpose, the feeding cone **32** is provided with a collar portion **70** extending outwardly therefrom and which includes an annular section **72** that is shaped to be complementary received within the opening **68**.

[0066] The support frame **28** further includes a generally L-shaped mounting assembly **74** that mounts the first plate **66** to the height adjustment mechanism **30**. More specifically, the mounting assembly **74** includes a second plate **76** that fixedly receives the first plate **66** using fasteners **78**, and a generally L-shaped member **80** including a third plate **82** that receives the second plate **76** on a first lateral side thereof, and an anchor portion **84** that extends from the third plate **82**, generally perpendicular therefrom on a second lateral side thereof.

[0067] The anchor portion **84** is fixedly mounted to the height adjustment mechanism **30** using fasteners **78**.

[0068] The third plate **82** includes grooves **86-92** that allows mounting the second plate via fasteners **78** in a manner that allows adjusting the angle of the second plate **76** and therefore of the axis **38** relative to the horizontal.

[0069] The support frame **28** can have another configuration than illustrated. According to another embodiment (not shown), the height adjustment mechanism **30** is omitted and or the support frame **28** has fixed configuration that yields a fixed angle of the axis **38** relative to the horizontal.

[0070] Since the height adjustment mechanism **30** are believed to be well-known in the art, it will not be described herein in more detail for concision purposes.

[0071] The actuating mechanism **40** includes a rotary actuator **93** secured to the first plate **66** on a first side face thereof, and a transmission mechanism, in the form of a gear assembly **95**, rotatably coupling the feeding cone **32** to the actuator **93**. The gear assembly **95** includes a first gear **95'** secured to the actuator **93**, coaxially to the output thereof, a second gear **95"** fixedly mounted to the feeding cone **32** on its outer surface coaxially thereto, and a third gear **95"** rotatably mounted to first plate **66** so as to rotatably couple the first and second gears **95'** and **95"**. The gear assembly **95** is on the second side face of the first plate.

[0072] According to another embodiment (not shown), the gear assembly is differently configured to transmit the rotational movement of the actuator **93** to the feeding cone **32**. According to still another embodiment (not shown), the transmission mechanism takes another form than a gear assembly **95**.

[0073] The chute **44** includes a V-shaped channel **94** that is mounted to the support frame **28** so as to be positioned at the outlet **36** of the feeding cone **32**, operatively below thereof so as to receive *cannabis* therefrom. The V-shaped channel **94** is positioned between the feeding cone **32** and the weighing scale **20**. The V-shaped channel **94** is further slanted similarly to the feeding cone **32** so as to define a smooth continuity thereof.

[0074] The support frame **28** further includes an L-shaped mounting assembly **96** that extends from the anchor portion **84** thereof.

[0075] The chute **44** further includes a tilting bracket **97** that is mounted at the distal end **98** of the L-shaped mounting assembly **96** and that allows adjusting the angle of the channel **94**, and a pneumatic vibrator **100** that is provided to induce vibration selectively and controllably onto the V-shaped channel **94** to reduce friction of the *cannabis* thereon and hence promote its flow between the feeding cone **32** and the weighing scale **20**.

[0076] The chute **44** further includes a flow restrainer **102** that is mounted to the V-shaped channel **94** therein. The flow restrainer **102** is in the form of a plate that is so configured as to define a partial stopper within the channel **94**, which defines therewith a small opening **104** that aims at limiting the flow of *cannabis* on the chute **44**.

[0077] The vibrator **100** is controlled so as induce onto the channel **94** stronger vibrations at first, and then gradually fainter vibrations. This mode of operation of the vibrator **100** aims at rapidly moving a major portion of the predetermined single dose **15** of *cannabis* from the feeding cone **32** to the weighing scale **20** and then gradually diminishing the flow of *cannabis* so as to increase the weighing precision.

[0078] The vibrator **100** is not limited to the illustrated embodiment and can also be, for example, of the electric type. Since a vibrator **100** is believed to be well-known in the art, it will not be described herein in more detail.

[0079] According to another embodiment (not shown), the vibrator **100** can be operated according to another mode. According to still another embodiment (not shown), the vibrator **100** is omitted or replaced by another mechanism or system allowing to promote the flow of *cannabis* between the feeding cone **32** and weighing scale **20**.

[0080] The *cannabis* feeding system **18** is further equipped with low and high-level sensors **106-106'**, which

are mounted side-by-side to the support frame **28** via an adjustable mounting assembly **108** so as to have a line of sight to the first chute **44**. The sensors **106-106'** are in the form of two identical laser detectors, the first one configured to detect a predetermined low level of *cannabis* onto the chute **44** and the other to detect a predetermined high level thereof.

[0081] When the sensors **106-106'** detect that the flow of *cannabis* onto the channel **94** is reduced or absent, the actuator **40** is energized to rotate the feeding cone a predetermined amount to allow more *cannabis* towards the weighing scale **20** via the chute **44** and through the gate **45**.

[0082] The controllable gate **45** includes a recipient **110** that is positioned above the weighing scale **20** by an L-shaped mounting assembly **112**, which includes a post **114** and an arm **116** having first and second longitudinal ends **118-120** and being secured to the post **114** near its first longitudinal end **118** so as to extend generally perpendicularly therefrom towards the weighing scale **20**. The recipient **110** includes a container portion **122** and a L-shaped mounting portion **124** that extends from the container portion **122** and that is secured to the arm **116** at the second longitudinal end **120** thereof.

[0083] The container portion **122** includes a frusto-conical opening **126** that defines a gradually narrowing passage from the V-shaped channel **94** towards the weighing scale **20**.

[0084] The container **122** further includes a bottom **128** that is slidable between a first position, which closes the opening **126**, and a second position, which completely frees the opening **126**. For that purpose, the controllable gate **45** further includes a linear actuator **130** that is mounted to the arm **116** thereunder and that is operatively coupled to the bottom **128**.

[0085] In operation, the controllable gate **45** is operated to allow passage of *cannabis* from the feeding cone **32**, through the V-shaped channel **94**, onto the weighing scale **20** until a predetermined amount of *cannabis* is weighed thereon. The controllable gate **45** is then closed to stop additional *cannabis* from reaching the scale **20**, until the predetermined amount of *cannabis* is moved to the *cannabis* joint feeding apparatus **12** by the single portion *cannabis* distributing device **24** as will be described hereinbelow in more detail. This predetermined amount of *cannabis* will also be referred to as a single dose of *cannabis* **15**, which is to be filled into each paper cone **14**.

[0086] It is to be noted that the controllable gate **45** can have another form than illustrated hereinabove. For example, the configuration and size of the recipient **110**, mounting assembly **112** and/or actuator **130** can be different.

[0087] The weighing scale **20** is an electronic analytical-type scale that includes a plate **132** that is configured and positioned to operatively receive a cup **26** from the single portion *cannabis* distributing device **24** as will be described hereinbelow in more detail. The weighing scale **20** allows measuring weight as low as 0.001 g. According to the illustrated embodiment, the weighing scale **20** is configured to measure a single dose of *cannabis* of 0.25 g with a tolerance of 5 percent but can be configured to measure another quantity of *cannabis* within a different tolerance.

[0088] The weighing scale **20** and controllable gate **45** are both secured to a same base **134**.

[0089] Since an electronic analytical-type scale is believed to be well-known in the art, it will not be described herein in more detail for concision purposes.

[0090] The *cannabis* feeding system **18** is not limited to include an electronic analytical type weighing scale and can be equipped with another type of weighing scale.

[0091] The single portion *cannabis* distributing device **24** will now be described in more detail with reference first to FIG. **6**A.

[0092] The single portion *cannabis* distributing device **24** comprises a turntable **136** that is mounted to a primary support base in the form of a gearbox **138** for rotational movement about a rotational axis **140**. The distributing device **24** further comprises a secondary support base **142** that receives the primary support base **138** via a linear actuator **144** for reciprocal movement of the primary support base **138** relative to the secondary support base **142** along the rotational axis **140**.

[0093] More specifically, the linear actuator **144** includes a guide body **146** that is fixedly sat onto the secondary support base **142**, a thrust rod **148** that is slidably mounted in the guide body **146** so as to be movable along an axis **150** that is parallel to the axis **140**, a sliding support column **152** that is slidably mounted in the guide body **146** for reciprocal movement along an axis **154** parallel to both axes **140** and **150**, and a runner plate **156** secured to both the rod **148** and column **152** for reciprocal movement in unison with both rod **148** and column **152**.

[0094] The primary support base **138** is fixedly sat onto the plate **156** via a spacer plate **158** for reciprocal movement in unison with the plate **156**. It results that from the above-described assembly that the turntable **136** is also mounted to the secondary support base **142** for reciprocal movement along the rotational axis **140** in addition to being rotatable thereabout.

[0095] The two cups **26** are each mounted to a respective lateral side **160** of the turntable **136** via a rotary actuator **162** for pivotal movement about a pivot axis **163** between a first position, wherein the cup **26** is right side up (see the right cup **26** on FIG. **6**A), and a second position, wherein the cup **26** is tilted more than ninety (90) degrees, which causes the cup **26** to be emptied of its content (see the left cup **26** on FIG. **6**A).

[0096] Each cup **26** is mounted to a respective rotary actuator **162** via a mounting bracket **164** for further free sliding movement along an axis **165** that is perpendicular to the pivot axis **163**.

[0097] With references to FIGS. **6**A and **7**A and **7**B, the mounting bracket **164** will now be described in more detail.

[0098] Each mounting bracket **164** includes two small C-shaped plates **166-166'**, each having a middle section and two free ends **167**. The C-shaped plates **166-166'** are fixedly mounted to the rotary actuator **162** through their middle section using fasteners **168** to be generally parallel one from the other. The pair of C-shaped plates **166-166'** are further joined at their facing free ends **167** by spacers **170**. The spacers **170** have a narrow middle section **172** and two gradually larger ends **174**.

[0099] Each of the cups **26** is provided with two fins **176** that extend on diametrically opposite sides thereof, near its bottom **178**. Each fin **176** is provided with a hole **180** that receives the spacers **174** therein. The diameter of the hole **180** is dimensioned for receiving the larger ends **174** of the spacers **170** in a snuggly-fit manner.

[0100] As can be seen in FIG. **7**A, each cup **26** is mounted to a respective rotary actuator **162** for free movement between a first rested position, wherein the fins **176** sits on the lower C-shaped plate **166**, and a second raised position, wherein the fins **176** abuts the higher C-shaped plate **166'** from below. The rested position is naturally reached under the combined force of gravity and rotation when the rotary actuator **162** is in its first position.

[0101] The operation of the single portion *cannabis* distributing device **24** will now be described with references to FIGS. **6**B and **7**A-**7**B.

[0102] The cup **26** that is on the side of the weighing scale is first moved in its first position, wherein the cup **26** is right side up (see FIGS. **6**B and **7**A). While in this position, one of its cups **26** is positioned above the weighing scale **20** and coaxially therewith.

[0103] As can be seen in FIGS. **1** and **6**B, also while in this position of the distributing device **24**, the cup **26** that is on the side of the *cannabis* joint filling apparatus **12** is first positioned above a second chute **182** that is part of the *cannabis* joint filling system **12**, and then tilted by the rotary actuator **162** into its second position so as to drop its content onto the second chute **182**. The emptying of the right-side cup **26** into the *cannabis* joint filling apparatus **12** is therefore performed simultaneously to the weighing of the right-side cup **26** as will now be described in more detail.

[0104] The turntable **136** is lowered (see arrow **184** on both FIGS. **6**B and **7**A) until the right-side cup **26** rests onto the plate **132** of the scale **20**. As can be better seen in FIG. **7**B, the fins **176** of the cup **26** are then moved from its first rested position towards its second raised position (see arrow **186** on FIG. **7**B). It is to be noted that the weighing scale **20** is calibrated to take into account the weight of the empty cup **26** when measuring a predetermined single portion of *cannabis*.

[0105] With references briefly to FIGS. **1** to **3**, and as described hereinabove, *cannabis* in bulk is precisely moved from the cone extension **42** to the cup **26** that has been moved adjacent thereto until the predetermined single portion thereof has been transferred. The controllable gate **45** is then closed and the single portion *cannabis* distributing device **24** is energized so that the two cups **26** are switched between the *cannabis* weighing position and the *cannabis* distributing position. This cycle is repeated indefinitely during the *cannabis* joint filling process.

[0106] According to another embodiment (not shown), another mechanism than the turntable **136** is used to move a cup **26** from a *cannabis* filling and weighing position to a *cannabis* joint filling position.

[0107] With references now to FIGS. **1**, **2** and **8**A, the *cannabis* joint filling apparatus **12** will now be described in more detail.

[0108] The apparatus **12** comprises a funnel **188**, positioned adjacent the single portion *cannabis* distributing device **24**, for receiving the single dose of *cannabis* therefrom, a paper cone holder **190**, positioned under the funnel **188**, for receiving and holding a paper cone **14** therein, a pusher mechanism **192** for positioning the paper cone holder **188** in abutment with the funnel **190**, and a reciprocating needle mechanism **194** that includes a needle **196** and a needle actuating mechanism **198** that causes the needle **196** to be moved in the paper cone holder **190** and to reciprocate while being moved out of the paper cone holder **190**.

[0109] The funnel **188** includes a base portion **189** that is removably secured to the base **134** via a generally L-shaped mounting bracket **200** and includes an integral peripheral flange **202** for its securing thereto. The configuration and size of the base portion **189** is adapted for specific configuration and size of the paper cone **14** as will now be described in more detail. The funnel **188** further includes a neck portion **191** that is removably mounted to the base portion **189** therein.

[0110] The outer wall of the base portion **189** of the funnel **188** is thinner at the end **212** thereof opposite the neck portion **191**. As will be explained hereinbelow in more detail, this thinning of the outlet portion **212** of the funnel **188** aims at facilitating the insertion of the top opening portion **214** of a paper cone **14** thereabout.

[0111] The generally L-shaped mounting bracket **200** includes a first portion **204** that is secured to the base **134** and a second generally planar hollow portion **206** that extends from the first portion **204** so as to be generally parallel to the base **134**. The funnel **188** is attached to the generally planar hollow portion **206** via its flange **202** using fasteners **208**.

[0112] The hollow portion **206** has an opening **210** that is concentric with the outlet **212** of the funnel **188**. A collar flange **211** is provided in the opening **210**, which yields a gradually narrowing passage for the paper cone **14** therein. The opening yielded by the collar flange **211** being wider than the outlet **212** of the funnel **188**, this facilitates the insertion of the top portion **214** of the paper cone **14** therethrough for positioning about the outlet **212** of the funnel **188**.

[0113] The *cannabis* joint filling apparatus **12** further includes an air blaster (only the exit nozzle **256** thereof being shown) that pushes air into the funnel **188** during the positioning of a paper cone **14**. The blasted air forces that the paper cone **14** remains open during the positioning of its opening **214** around the outlet **212** of the funnel **188**.

[0114] The paper cone holder **190** is in the form of an elongated body having a frusto-conical bore **216** therein that is configured and sized to receive a paper cone **14** therein in a snugly fit manner so as to prevent the deformation and breakage of a cone **14** therein during its filling by *cannabis*.

[0115] The paper cone holder **190** is one of a series of such holders **190** that are freely mounted in corresponding holes **217** in a carrousel **218**. The carrousel **218** is provided to facilitate the consecutive filling of a plurality of paper cones **14**.

[0116] According to another embodiment (not shown), the paper cone holder **190** is mounted to another support or mechanism than the carrousel **218** that can allow receiving and supporting a single paper cone holder or sequentially a plurality thereof.

[0117] The paper holder **190** includes a wider head portion **220**, defining a shoulder portion **222** that provides support to the holder **190** when deposited into the hole **217**.

[0118] The pusher mechanism **192** includes a pushed rod **224**, having a flat head **225** at the distal end thereof, that is aligned with the funnel **188** under the carrousel **218**, The pusher mechanism **192** further includes a rod actuating mechanism **226** that controllably causes the rod **224** to be moved upwardly so as to bring the head portion **220** in abutment with the hollow portion **206** of the bracket **200** (see FIG. **8**B). As can be seen in FIG. **8**B, this positioning of the

paper holder **190** causes the wider top portion **214** of the paper cone **14** therein to slip around the outlet **212** of the funnel **188**.

[0119] The pusher rod **224** is slidably mounted into a sleeve **227** so as to extend partially therefrom. The sleeve **227** includes a top flange **229** for securing the sleeve **229** to a table or to another structure (not shown).

[0120] The rod actuating mechanism **226** includes a mounting bracket **228** that mounts the pusher mechanism **192** to the table so that the pusher rod **192** is under the funnel **188**, aligned with the outlet **212** thereof.

[0121] The rod actuating mechanism **226** further includes a rotary actuator **230** fixed to the mounting bracket **228**, an eccentric pulley assembly **232** mounted to both the rotary actuator **230** and pusher rod **224** therebetween that transform the rotational movement of the output shaft **234** of the rotary actuator **230** into a reciprocating movement of the rod **224** within the sleeve **227**.

[0122] In operation, the rod actuating mechanism **226** is actuated each time the carrousel **218** brings a new paper cone holder **190**, with a paper cone **14** therein, in alignment with the funnel **188** so as to insert the opening **214** of a paper cone **14** around the outlet **212** of the funnel **188**. In such a position, the paper cone **14** is ready to be filled with the single dose **15** portion of *cannabis*. When the paper cone **14** is filled with such a dose **15**, the rod actuating mechanism **226** is further energized to lower the rod **224**, which causes the cone holder **190** to also lower to its resting position within the carrousel **218**. This process is performed for each new paper cone **14** and holder **190** in the carrousel **218**.

[0123] The chute **182** includes a V-shaped channel **94** and a pneumatic vibrator **100** operatively coupled thereto. The V-shaped channel **94** is adjustably mounted to the planar portion **206** of the mounting bracket **200** through an azimuthal mount **236**. According to another embodiment (not shown) the V-shaped channel is fixedly or adjustably positioned between the single portion *cannabis* distributing device **24** and funnel **188** using another support, mechanism or assembly than illustrated.

[0124] The vibrator **100** of the chute **182** is operated so as to yield a regular vibration.

[0125] The *cannabis* joint filling apparatus **12** is not limited to include the illustrated funnel **188**, paper cone holder **190**, pusher mechanism **192** and/or carrousel **218**, and other mechanisms or assemblies can be provided to bring a paper cone **14** in filling proximity with the single portion *cannabis* distributing device **24** for its filling.

[0126] The reciprocating needle mechanism **194** comprises a linear actuator **198**, including a movable carriage **238** to which the needle **196** is attached.

[0127] The needle **196** includes a conical tip **240** that is shaped to be largest at its free end **242**. More specifically, the diameter of the tip **240**, at its free end **242**, is slightly smaller than the diameter of the paper cone **14** and of the bottom **243** of the bore **216** of the paper cone holder **190**.

[0128] As described hereinabove, the needle actuating mechanism **198** is controlled to move the needle **196** in the paper cone holder **190** and to reciprocate while being moved out of the paper cone holder **190**.

[0129] The operation of the *cannabis* joint filling apparatus **12** will now be described with references to FIGS. **2** and **8**A-**8**P.

[0130] As described hereinabove, the single portion *cannabis* distributing device **24** simultaneously i) receives *cannabis* from the feeding cone **32** and hold it while it is weighed by the weighing scale **20** so as to yield a single dose **15** of *cannabis* in one of its cups **26**, while ii) the other cup **26** emptying another such single dose **15** of *cannabis* into a paper cone **14** held in the paper cone holder **190**.

[0131] After an empty paper cone **14** is fed into the holder **188**, and previously to afore-mentioned simultaneous steps, the pusher mechanism **192** is actuated to position the paper cone holder **188** in abutment with the funnel **190** (see arrows **244** in FIG. **8**A). As described hereinabove, this positions the paper cone **14** about the outlet **212** of the funnel **188** (see FIG. **8**B).

[0132] The operation of the needle **196** during the emptying of the cup **26** into the paper cone **14** will now be described in more detail with references to FIGS. **8**D-**8**P, which results in the pre-compacting of the *cannabis* in the paper cone **14**.

[0133] FIG. **9** summarizes the method of pre-compacting the single dose **15** of *cannabis* in the paper cone **14**.

[0134] The linear actuator **198** is first operated to move the needle **196** within the paper cone **14** in the paper cone holder **188** (see arrow **246** in FIG. **8**B) until the tip **242** gently reaches the bottom **243** of the bore **216** thereof, and therefore of the cone **14** therein (see FIG. **8**C and step **306** in FIG. **9**).

[0135] When the filling of the cone **14** is initiated by the single portion *cannabis* distributing device **24** (see arrow **248** in FIG. **8**D and step **308** in FIG. **9**), the linear actuator **188** gradually raises the needle **196** (step **310** in FIG. **9**) while simultaneously inferring to the needle **196** a reciprocating movement within the cone **14** (step **312** in FIG. **9**). The result of these two combine movements of the needle **196** is that the needle **196** is sequentially raised a first distance (see arrow **250** in FIGS. **8**E, **8**G, **8**I, **8**K, **8**M and **8**O) and the lowered a second distance that is shorter than the first distance (see arrow **252** in FIGS. **8**F, **8**H, **8**J, **8**L, **8**N and **8**P).

[0136] The resulting movements of the needle **196**, which are illustrated in FIGS. **8**E-**8**P, continue until the tip **242** of the needle **196** completely exits the paper cone **14**.

[0137] The movements of the needle **196** are controlled to be synchronized with the gradual filling of the paper cone **14** with the single dose **15** **15** of *cannabis*.

[0138] It is to be noted that the operation of the needle **196**, and more specifically of its speed of movements, are adapted to the type of *cannabis*. For example, the total time to raise the needle **196** is for example between 0.5 and 1.5 seconds, while the reciprocating frequency is between 0.25 and 0.75 second.

[0139] The result of the above-described operation of the needle **196** during the filling of the paper cone **14** is the pre-compaction of the single dose **15** of *cannabis* **15** within the paper cone **14** after its filling.

[0140] At the same time of the above-described movements of the needle **196**, the flat head **225** of the pusher rod **224** remains in abutment with the paper cone holder **190** and the pusher mechanism **192** is operated to cause the pushed rod **224** to reciprocate rapidly, inducing vibrations onto the paper cone holder **190** and paper cone **14** therein (step **314**). This has been found to improve both the filling and pre-compacting of the single dose of *cannabis* **15** into the paper cone **14**.

[0141] According to another illustrative embodiment, the pusher rod **224** remains still during the filling step.

[0142] Since an air blaster is believed to be well known in the art, it will not be described herein in more detail for concision purposes.

[0143] It is to be noted that all the actuators described hereinabove are connected to one or more controllers (not shown) so that their operations are triggered and synchronized thereby. All the connectors between such controller(s) and the actuators have been omitted in the drawings so as to alleviate the views.

[0144] It is to be noted that many modifications could be made to the *cannabis* joints filling system **10** described hereinabove and illustrated in the appended drawings. For example:

[0145] anyone or both chutes **44** can be replaced by another element or system allowing transferring the *cannabis* from one subsystem of the system **10** to the other. According to still another embodiment, anyone or both chutes are omitted; and

[0146] the configuration, size and number of the mounting elements may be different than illustrated.

[0147] Although a *cannabis* joints filling system has been described hereinabove by way of illustrated embodiments thereof, it can be modified. It is therefore to be understood that numerous modifications may be made to the illustrative embodiments and that the scope of the claims should not be limited by the preferred embodiment but should be given the broadest interpretation consistent with the description as a whole.

What is claimed is:

1. A *cannabis* joint filling apparatus comprising:

a paper cone holder, having a bottom, for receiving and holding a paper cone along a longitudinal axis; and

a reciprocating needle mechanism, including a needle having a tip, and an actuating mechanism to controllably cause the needle to reciprocate in the paper cone holder along the longitudinal axis;

whereby, in operation, the reciprocating needle mechanism causes the needle to reciprocate in the paper cone received in the paper cone holder while gradually and simultaneously i) the reciprocating needle mechanism causing the needle to move along the longitudinal axis from a first position to a second position relative to the bottom of the paper cone holder, and ii) the paper cone receiving a predetermined portion of *cannabis*.

2. The *cannabis* joint filling apparatus as recited in claim **1**, further comprising a funnel positioned above the paper cone holder for transferring *cannabis* into the paper cone held by the paper cone holder.

3. The *cannabis* joint filling apparatus as recited in claim **2**, further comprising a pusher mechanism for selectively positioning the paper cone holder in operational contact with the funnel.

4. The *cannabis* joint filling apparatus as recited in claim **3**, further comprising an air blaster for blasting air in the funnel to maintain the paper cone open during the positioning of the paper cone holder in operational contact with the funnel.

5. The *cannabis* joint filling apparatus as recited in claim **3**, wherein the pusher mechanism is configured to induce vibrations onto the paper cone holder during said paper cone receiving a predetermined portion of *cannabis*.

6. The *cannabis* joint filling apparatus as recited in claim **3**, wherein the paper cone holder is one of a plurality of paper cone holders so mounted to a movable support for sequentially filling a plurality of paper cone.

7. The *cannabis* joint filling apparatus as recited in claim **1**, wherein the conical tip of the needle has a widest portion at a free end thereof.

8. The *cannabis* joint filling apparatus as recited in claim **1**, wherein the first position corresponds to the tip of the needle being near the bottom of the paper cone holder, and wherein the second position corresponds to the tip of the needle being out of the paper cone holder.

9. The *cannabis* joint filling apparatus as recited in claim **1**, wherein the tip of the needle is conical in shape and is widest at a distal end thereof.

10. A *cannabis* joints filling system comprising:

a *cannabis* joint filling apparatus for receiving and holding a paper cone along a longitudinal axis and for receiving and pre-compacting a predetermined quantity of *cannabis* into the paper cone; the *cannabis* joint filling apparatus including i) a reciprocating needle mechanism, and ii) an actuating mechanism to controllably cause the needle to reciprocate in the paper cone along the longitudinal axis while moving from a first position, wherein the conical tip is near a bottom of the paper cone, and a second position, wherein the conical tip is out of the paper cone.

and

a *cannabis* feeding system including i) a weighing scale, ii) a *cannabis* feeding apparatus adjacent the weighing scale for receiving *cannabis* in bulk and for controllably outputting a predetermined portion of the *cannabis* in bulk onto the weighing scale, and iii) a device for distributing a single portion of *cannabis*, including two cups that are sequentially movable between a) a *cannabis* weighing position, wherein one of the two cups cooperates with the weighing scale to measure the predetermined portion of the *cannabis*, and b) a *cannabis* distributing position, where the predetermined portion of the *cannabis* is fed to the *cannabis* joint filling apparatus;

wherein the *cannabis* feeding system includes:

a support frame;

a feeding cone defining a large inlet and a narrow outlet and that is mounted to the support frame for rotation about a rotational axis that is so angled relative to a horizontal axis that the inlet is higher than the outlet; the feeding cone having an inner surface and including a spiral shaped protrusion on the inner surface;

an actuating mechanism secured to the frame and operatively coupled to the feeding cone for selectively causing the rotation of the feeding cone; and

whereby, in operation, *cannabis* fed in the inlet of the feeding cone is gradually moved from the inlet of the feeding cone to the outlet thereof by the spiral shaped protrusion when the feeding cone is caused to rotate by the actuating mechanism;

wherein the device for distributing single portions of *cannabis* includes:

a revolving support that is movable about a first axis; the revolving support being further movable between first and second position along the first axis;

first and second cup holders, each mounted to the revolving support for pivotal movement between a

weighing position and a content-emptying position about a second axis that is perpendicular to the first axis, and

first and second cups, each mounted to a respective one of the first and second cup holders so as to be free to translate in and out of a position wherein the cup is supported by the cup holder.

11. A method for pre-compacting *cannabis* in a paper cone, the method comprising:

holding a paper cone along a longitudinal axis; the paper cone having a bottom and an opening;

providing a needle;

moving the needle into the paper cone until the distal end of the needle reaches near the bottom of the paper cone; and

then simultaneously:

i) filling a quantity of *cannabis* in the paper cone to fill the paper cone up to a predetermined distance from the opening; and

ii) gradually removing the needle from inside the paper cone; and

iii) reciprocating the needle in the paper cone along the longitudinal axis;

whereby i) and ii) are so synchronized as to both ends substantially simultaneously.

12. The method as recited in claim **11**, further comprising iv) vibrating the paper cone holder simultaneously to i), ii) and iii).

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