

(57) **Abrégé(suite)/Abstract(continued):**

define, in use, at least a neck region of a preform, is provided. The replaceable indicia imprinting insert (914) comprises an insert body (142) including a locating structure (144) configured to locate, in use, the insert body (142) within an insert bore (220) of the neck ring half (102); a retaining structure (141) configured to releasably retain the insert body (142) in an in-use position; an insert cooling channel defining structure (146) configured to cooperate, in use, with a cooling channel (112) of the neck ring half (102) to define a flow path for a cooling fluid; a sealing structure (148) associated with the insert cooling channel defining structure (146) configured to substantially prevent, in use, leakage of the cooling fluid; a molding surface defining structure (150) configured to define, in use, a portion of the preform and including an indicia imprinting face (152), the indicia imprinting face (152) including a pattern for imprinting a desired indicia onto the preform.

H-7369-0-CA

ABSTRACT

According to embodiments of the present invention, there is provided a replaceable indicia imprinting insert for a neck ring and the neck ring incorporating same. A replaceable indicia imprinting insert (140) for use with a neck ring half (102), which is configured to define, in use, at least a neck region of a preform, is provided. The replaceable indicia imprinting insert (914) comprises an insert body (142) including a locating structure (144) configured to locate, in use, the insert body (142) within an insert bore (220) of the neck ring half (102); a retaining structure (141) configured to releasably retain the insert body (142) in an in-use position; an insert cooling channel defining structure (146) configured to cooperate, in use, with a cooling channel (112) of the neck ring half (102) to define a flow path for a cooling fluid; a sealing structure (148) associated with the insert cooling channel defining structure (146) configured to substantially prevent, in use, leakage of the cooling fluid; a molding surface defining structure (150) configured to define, in use, a portion of the preform and including an indicia imprinting face (152), the indicia imprinting face (152) including a pattern for imprinting a desired indicia onto the preform.

H-7369-0-CA

**A REPLACEABLE INDICIA IMPRINTING INSERT FOR A NECK RING AND THE
NECK RING INCORPORATING SAME**

FIELD OF THE INVENTION

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The present invention generally relates to, but is not limited to, molding systems, and more specifically the present invention relates to, but is not limited to, a replaceable indicia imprinting insert for a neck ring and the neck ring incorporating same.

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BACKGROUND OF THE INVENTION

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Molding is a process by virtue of which a molded article can be formed from molding material by using a molding system. Various molded articles can be formed by using the molding process, such as an injection molding process. One example of a molded article that can be formed, for example, from Polyethylene Teraphalate (PET) material is a preform that is capable of being subsequently blown into a beverage container, such as, a bottle and the like.

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As an illustration, injection molding of PET material involves heating the PET material (ex. PET pellets, PEN powder, PLA, etc.) to a homogeneous molten state and injecting, under pressure, the so-melted PET material is injected into a molding cavity defined, at least in part, by a female cavity piece and a male core piece mounted respectively on a cavity plate and a core plate of the mold. The cavity plate and the core plate are urged together and are held together by clamp force, the clamp force being sufficient enough to keep the cavity and the core pieces together against the pressure of the injected PET material. The molding cavity has a shape that substantially corresponds to a final cold-state shape of the molded article to be molded. The so-injected PET material is then cooled to a temperature sufficient to enable ejection of the so-formed molded article from the mold. When cooled, the molded article shrinks inside of the molding cavity and, as such, when the cavity and core plates are urged apart, the molded article tends to remain associated with the core piece. Accordingly, by urging the core plate away from the cavity plate, the molded article can be demolded, i.e. ejected off of

H-7369-0-CA

the core piece. Ejection structures are known to assist in removing the molded articles from the core halves. Examples of the ejection structures include stripper plates, ejector pins, etc.

5 When dealing with molding a preform that is capable of being blown into a beverage container, one consideration that needs to be addressed is forming a so-called "neck region". Typically and as an example, the neck region includes (i) threads (or other suitable structure) for accepting and retaining a closure assembly (ex. a bottle cap), and (ii) an anti-pilferage assembly configured to cooperate, for example, with the closure assembly to indicate whether the end product (i.e. the beverage container that has been filled with a beverage and shipped to a store)
10 has been tampered with in any way. The neck region may comprise other additional elements used for various purposes, for example, to cooperate with parts of the molding system (ex. a support ledge, etc.). As is appreciated in the art, the neck region can not be easily formed by using the cavity and core halves. Traditionally, split mold inserts (sometimes referred to by those skilled in the art as "neck rings") have been used to form the neck region.

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It is generally known in the art to imprint certain indicia onto an outer skin of the preform during the injection molding process. Some examples of the indicia so-imprinted include: a unique identifier of the molding cavity where the preform has been molded, a logo associated for example with a converter who produced the preform or a downstream bottler and the like.

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US patent 4,137,962 issued to Pol on February 6, 1979 discloses a casting-marking apparatus that is adapted for incorporation in a permanent foundry pattern of the type used to produce sand molds for metal casting. The apparatus carries a marking that is impressed in the sand mold and subsequently reproduced on a casting. The apparatus is designed and constructed so
25 that the marking that it carries can be altered from a station remote from the pattern. In the apparatus, the alterable marking is carried by a marking body that is rotated by an air actuated piston.

US patent 4,384,702 issued to Boscovic on May 24, 1983 discloses a removable insert for a
30 mold for impressing indicia on each molded product formed in the mold. The insert includes a plug body, a bore through the plug body, and a plug situated in the bore and having a mold

H-7369-0-CA

engaging surface for impressing an article formed in the mold. The plug is rotatable and include an indicator which may be directed toward a series of indicia spaced about the periphery of the bore.

5 US patent 4,708,314 issued to Kuhling on November 24, 1987 discloses a die for processing a pliable plastic moldable material, particularly a plastic resin, and has a cylindrical circular cross sectioned passage provided in the die wall. A marking device for the die comprises a ring body held space-fixed in the cylindrical circular cross sectioned passage of the die and a cylindrical circular cross sectioned central body received rotatable, coaxial, and stepwise lockable in the
10 ring body. Both the front surface of the central body and the ring shaped front surface of the ring body form part of the embossing surfaces of the die. The rotatable front surface of the central body carries an indicating mark, while the space-fixed ring shaped front surface of the ring body adjoining the rotatable front surface of the central body is provided with a number of other marks, which can give the date or dates. The marking device can advantageously be
15 constructed as a standardized part and is easily mounted in the die, without which the embossing die must be provided with additional marks on its embossing surfaces. For a case in which the marking assembly must be changed due to for example a date change, the central body is conveniently adjustable by a tool from the die space.

20 US patent 5,620,716 issued to Opitz on April 15, 1997 discloses a time stamp for insertion into a mould for metal or plastics processing, with a basic body which can be inserted into the mould and in which an insert designed as a screw is arranged rotatably. The insert, in order to maintain its rotary position relative to the basic body, is retained in the basic body in that its shank end is in threaded engagement with a spring-pretensioned holding part arranged in the
25 inner region of the basic body, so that the shoulder of the head portion of the insert can be pressed constantly against an annular radial step formed on the basic body.

US patent 5,736,168 issued to Goyal et al. on April 8, 1998 discloses a mold for forming hollow blow molded containers and is made in multiple sections to create a cavity in the shape
30 of the desired container when the mold is in the closed position. A recess is formed in the inner surface of at least one of the sections of the mold body, and a removable insert is designed to be

H-7369-0-CA

placed in the recess. The insert may carry design indicia on it; and it is held in place by a set screw extending through the top of the mold body section in which it is located. Thus, insertion and removal of different inserts may be accomplished without disassembling the mold.

5 US patent 5,788,872 issued to Uratani on April 4, 1998 discloses a removable marking device for a mold which includes a substantially cylindrical outer member fitted into the mold, an axially rotatable indicator fitted into the outer member and indications formed on top surfaces of the outer member and the indicator which is formed by an indication portion facing an inner surface of the mold and a screw portion extended from the indication portion, the outer member
10 having a three-stepped bore which has an upper bore portion, a middle bore portion extending from the upper bore portion of a cross-sectional dimension larger than that of the upper bore portion and a lower bore portion extending from the middle bore portion of a cross-sectional dimension larger than that of the middle bore portion, the indicator inserted into the bore with the indication portion arranged in the upper bore portion and the screw portion arranged into
15 the middle bore portion, a cover member inserted to the lower bore portion and clinging to the outer member, a nut threaded to a lower end of the screw portion of the indicator, a spring interposed above the nut within the middle bore portion, and the indicator biased downwardly by the spring in combination with the nut. Making use of the present removable marking device for a mold, molded products each having an even surface with no irregularity can be formed,
20 and indications can be readily changed.

US patent 5,902,512 issued to Streit on May 11, 1999 discloses a mold insert for transferring selectable reference indicia to a molded part is used for tracking various production parameters for a manufactured component. The mold insert contains a plurality of tapered concentric rings,
25 each tapered concentric ring having a face surface containing various transferable reference indicia. A housing having a bore accommodates the plurality of tapered concentric rings and permits rotatable adjustment of the tapered concentric rings relative to a reference indicator. A releasable fastener connected with respect to a tapered core within the tapered concentric rings is used for adjusting and fixing a position of each one of the plurality of tapered concentric
30 rings with respect to one another and the reference indicator.

H-7369-0-CA

US patent 6,299,126 issued to Hughes II on October 8, 2001 discloses an apparatus for changeable forming information, such as date, time, shift, and/or lot of manufacturer information, on members being die cast or molded. The present apparatus includes at least one information forming element adapted to be mounted in communication with the interior cavity
5 of the die or mold and having a face positioned for forming information on the member. The face is adjustably movable relative to a reference element by an adjusting element located externally to the die or mold. According to a preferred aspect of the invention, the apparatus includes at least one additional information forming element, the additional element being concentric with the first named information forming element and being independently rotatable
10 to allow quickly and easily changing the information to be formed on the member.

US patent 6,308,929 issued to Wieder on October 30, 2001 discloses an insert for a mold comprising a plug, having an insert face, and a receiver defined by a sidewall with one of the plug and the receiver having a groove that receives a guide that extends from the other of the
15 plug and the receiver so as to facilitate rotation of the plug while opposing withdrawal of the plug. In one preferred embodiment, the groove has an inclined entranceway, that facilitates plug insertion and removal, and a transverse portion and extends circumferentially no more than about one and one-quarter rotation about the plug. In another embodiment, the guide is resiliently urged outwardly from the plug to ride in a groove in the sidewall and the sidewall
20 has an access port for prying free the plug from the receiver. A detent assembly comprised of notches on the plug and a detent carried by the receiver permit the plug to be selectively indexed. The insert can be mounted to or carried by an ejector pin having a head constructed and arranged to prevent rotation of the pin during mold operation. A portion of the barrel is machined and hardened before shipment to another location, typically to an end user, where the
25 unmachined portion is cut to length before machining the head and remainder of the barrel.

US patent 6,354,560 issued to Kawasaki et al. on March 12, 2002 discloses a marking device that can confirm a mark imprinted on a molded piece from outside a molding tool and can inscribe a plurality of marks with a sole marker. The marking device consists of a reference
30 sleeve, a top imprint portion and a pin. The reference sleeve is fixedly assembled and has the top reference imprint surface confronting a molding area, a reference imprint mark being

H-7369-0-CA

formed on the stamp surface. The top imprint portion is rotatably journaled within the reference sleeve and has the top display imprint surface being flush with the top reference imprint surface, on which data imprint marks to be pointed by a reference imprint mark are formed. The sleeve has a base end actuator, on which data display are indicated, formed at a protrusion protruded from a molding area outward. The top imprint member is rotatably journaled within the sleeve and has a top display imprint surface being flush with the top reference imprint surface, on which a data imprint mark to be pointed a reference imprint mark is formed. The pin has a base end actuator having a protrusion protruded from a molding area outward, on which data display indicators respectively corresponding to data imprint marks are indicated.

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US patent 6,554,245 issued to Picco et al. on April 29, 2003 discloses a marking device for a mould having a housing in a wall. The device includes a threaded cylindrical body and a circular head of a diameter about equal to the diameter of the housing. A face of the head opposite to the body includes structure that turns the head and a marking distinct from the structure and independent from the position of the structure. A length of the body and head are less than the length of the housing in the mould in order that the face with the marking lies flush with the internal face of the wall of the mould when the device is in the housing.

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US patent 6,755,386 issued to Navarra Pruna on June 29, 2004 discloses a marker having three parts: an annular, enveloping body that is fixed in the location of the mold; and an equally annular intermediate body that is rotatably mounted inside intermediate body and which can rotate relative to the body. Each of these three parts is provided with a signal. Two narrow annular locations are disposed in the area of the marker opposite the operative front, where a helical spring ending in a lug is placed in each of the locations. The lug of the outer spring is the single actuation control of the marker while the lug of the inner spring exhibits play in a small location of the intermediate body. Both springs are oppositely coiled in such a way that strangling of one of the springs takes place simultaneously while the other spring is being released.

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US patent 6,889,954 issued to Navarra Pruna on May 10, 2005 discloses a universal marking insert for injection molds having a body that forms the marking insert body. This body has a

H-7369-0-CA

central opening into which the marking case will be inserted and a ring being set out externally on the side to be inserted into the mould, on which different motifs to be transferred to the moulded body, will be engraved. Internally it has a nut secured by means of a spring to the closing end-cap, the shaft of the marking unit screwing into said nut, the spring staying in
5 tension while in use, and retaining the marking insert from a possible withdrawal.

US patent 6,966,257 issued to Uratani on November 22, 2005 discloses a removable marking device for mold that consists of a substantially cylindrical outer member, an indicator that can be rotated around axis line of outer member, a mark portion that is formed on upper surface of
10 outer member and said indicator, wherein in said indicator, plural positioning projection portions protruding in radial direction of indicator is located, positioning projection portion consists of a positioning spring buried in indicator and an insert portion located in a tip of positioning spring, in inner wall of outer member, a positioning groove extending in an axis direction of outer member is formed at even intervals along circumferential direction of middle
15 bore portion, in plural positioning projection portions, when at least one positioning projection portion is inserted in positioning groove, other positioning projection portion touches in inner wall of outer member in positioning groove.

US patent 7,014,446 issued to Hall on March 21, 2006 discloses a molding machine and a mold
20 assembly having a quick change volume control insert. The volume control insert can be changed without disassembly of the mold or use of special tools. The molding machine includes a mold, a mold insert, a locking member, and a release member. The mold insert is received in one of the mold halves and further includes a mold detail defining a portion of the mold cavity, and a retention member. A locking member engages the retention member when
25 the mold detail is received within the mold half. The release member, accessible from the exterior of the mold half, and is adapted to disengage the locking member from the retention member, allowing the mold detail to be removed.

US patent 7,171,894 issued to Uratani on February 6, 2007 discloses a removable marking
30 device for a mold that enables to leave two marks of different meanings accurately with simple operation. A removable marking device for a mold has a control mechanism that allows said

H-7369-0-CA

indicator axle to rotate with said rotatable tube when said indicator axle rotates in the other direction.

5 US patent 7,431,580 issued to Chiang on October 7, 2008 discloses a mold for forming a work piece that includes a first core holder, a first core member, a second core holder, a second core member, a mounting member, and an adjusting member. The first core member is mounted in the first core holder, the second core holder is configured for attachment to the first core holder, the second core member is mounted in the second core holder, the first core member and the second core member are configured for cooperatively defining a mold chamber. The mounting member is coupled to the first core holder, the adjusting member has a threaded portion in threaded engagement with the mounting member and a distal portion coupled to the first core member, the adjusting member is configured for adjustably moving the first core member relative to the second core member, thus adjusting a size of the mold chamber.

15 SUMMARY OF THE INVENTION

According to a first broad aspect of the present invention, there is provided a replaceable indicia imprinting insert for use with a neck ring half, which is configured to define, in use, at least a neck region of a preform. The replaceable indicia imprinting insert comprises an insert body including: a locating structure configured to locate, in use, the insert body within an insert bore of the neck ring half; a retaining structure configured to releasably retain the insert body in an in-use position; an insert cooling channel defining structure configured to cooperate, in use, with a cooling channel of the neck ring half to define a flow path for a cooling fluid; a sealing structure associated with the insert cooling channel defining structure configured to substantially prevent, in use, leakage of the cooling fluid; a molding surface defining structure configured to define, in use, a portion of the preform and including an indicia imprinting face, the indicia imprinting face including a pattern for imprinting a desired indicia onto the preform.

30 According to a second broad aspect of the present invention, there is provided a neck ring assembly. The neck ring assembly comprises a neck ring half configured to define, in use, at least a neck region of a preform; and a replaceable indicia imprinting insert configured to be

H-7369-0-CA

positionable, in use, within the neck ring half to imprint a desired indicia onto a portion of the neck ring half.

5 These and other aspects and features of non-limiting embodiments of the present invention will now become apparent to those skilled in the art upon review of the following description of specific non-limiting embodiments of the invention in conjunction with the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

10 A better understanding of the embodiments of the present invention (including alternatives and/or variations thereof) may be obtained with reference to the detailed description of the exemplary embodiments along with the following drawings, in which:

15 Figure 1 depicts a perspective exploded view of a neck ring half 102 and a replaceable indicia imprinting insert 140, implemented according to a non-limiting embodiment of the present invention.

Figure 2 depicts a cut-out perspective view of the neck ring half 102 of Figure 1 with the replaceable indicia imprinting insert 140 installed therein.

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Figure 3A, Figure 3B and Figure 3C depict, respectively, a front view of the neck ring half 102, a side view of the neck ring half 102 and a top view of the neck ring half 102 with a replaceable indicia imprinting insert 340 being installed therein, the replaceable indicia imprinting insert 340 being implemented in accordance with an alternative non-limiting embodiment of the present invention.

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Figure 4 depicts a cut-out perspective view of the neck ring half 102 with a replaceable indicia imprinting insert 440 installed therein, the replaceable indicia imprinting insert 440 being implemented in accordance with an alternative non-limiting embodiment of the present invention.

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H-7369-0-CA

The drawings are not necessarily to scale and are may be illustrated by phantom lines, diagrammatic representations and fragmentary views. In certain instances, details that are not necessary for an understanding of the exemplary embodiments or that render other details difficult to perceive may have been omitted.

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DETAILED DESCRIPTION OF EMBODIMENTS

Embodiments of the present invention have been developed based on the inventor's appreciation of at least one problem associated with the prior art designs of in-mold imprinting of indicia onto preforms. Inventor has realized that in certain circumstances it is required to change the indicia so-imprinted without having to replace the mold component, such as the neck ring (for example, to mitigate cost impact associated with having to replace the whole neck ring assembly).

10 With reference to Figure 1, a neck ring half 102 is depicted, the neck ring half 102 being suitable for implementation of embodiments of the present invention. Figure 1, more specifically, depicts a perspective view thereof. The neck ring half 102 is configured to mate with another neck ring half (not depicted, but which would constitute a mirror image of the neck ring half 102), in use, to define at least a portion of the neck portion of the preform to be molded. To that extent, the neck ring half 102 comprises a neck ring body 104. The neck ring body 104 includes a mounting flange 106, which is configured to be mounted, in use, within a mold (not depicted), typically onto a neck ring slide (not depicted). This is achieved for example, by means of a coupling interface 108, which is configured to accept, in use, a fastener (not depicted).

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The neck ring body 104 further defines a molding face 110. The molding face 110 includes a molding pattern defining, in use, the desired shape of the neck region of the preform. The neck ring body 104 further includes a cooling channel 112 (only a plugged end of which is visible in Figure 1). The cooling channel 112 is configured to be coupled, in use, to a source of cooling fluid (not depicted) via an inlet (not visible) typically located on a bottom surface of neck ring body 104. The cooling channel 112 penetrates the inside of the neck ring body 104 to deliver

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H-7369-0-CA

the cooling fluid into desired portions thereof, typically, relatively close to the preform being molded to affect cooling thereof, during relevant portions of the molding cycle. Several layouts of the cooling channel 112 are known to those of skill in the art and, as such, will not be described here at any length.

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The neck ring body 104 further includes a number of additional features, all known to those skilled in the art, such as vent grooves 114, tapers 116, 118; identification area 120 and the like. All of these are well-known and, as such, will not be described here at any length.

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According to embodiments of the present invention, there is also provided a replaceable indicia imprinting insert 140, which is configured to cooperate with the neck ring half 102. The replaceable indicia imprinting insert 140 comprises an insert body 142. The insert body 142 includes a locating structure 144, which is configured to be positionable within an insert bore 220 (as is best seen in Figure 2, which depicts a cut-out perspective view of the neck ring half 102 of Figure 1 with the replaceable indicia imprinting insert 140 having been installed therein). The purpose of the locating structure 144 is to positively locate the replaceable indicia imprinting insert 140 within the insert bore 220. It is worthwhile noting that Figure 2 depicts what can be thought of a neck ring assembly (not separately numbered), which includes the neck ring half 102 and the replaceable indicia imprinting insert 140 (even though Figure 2 shows it assembled, it can be also be disassembled, as is shown in an exploded view of Figure 1).

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Continuing with the description of Figure 1 and Figure 2, the insert body 142 further includes a retaining structure 141, which is configured to releasably retain the replaceable indicia imprinting insert 140 within the neck ring half 102. More specifically, the retaining structure 141 comprises a retaining body 143, which is configured to abut, in use, a rear face (not separately numbered) of the neck ring body 104. The retaining body 143 further includes an aperture 145, which is configured to accept, in use, a fastener 147. The fastener 147 cooperates with a body aperture 222 (Figure 2) defined within the neck ring body 104 of the neck ring half 102 to retain the replaceable indicia imprinting insert 140 in an in-use position. It is worthwhile noting that within these embodiments of the present invention, the body aperture 222 (and

H-7369-0-CA

therefore, a major portion (i.e. more than 50%) of the insert body 142, when in use) penetrates the neck ring half 102 from the rear face thereof (not separately numbered) to the molding face 110.

5 The insert body 142 further includes an insert cooling channel defining structure 146. In use, when installed, the insert cooling channel defining structure 146 is positioned within the cooling channel 112. It is noted that within the illustration of Figure 2, the insert cooling channel defining structure 146 has a cross-sectional dimension that is smaller than that of the remainder of the insert body 142. This is done in order to enable the insert cooling channel
10 defining structure 146 to be able to cooperate with the cooling channel 112 to provide a substantially unobstructed flow path for the cooling fluid.

The insert body 142 further includes a sealing structure 148, associated with the insert cooling channel defining structure 146 and configured to prevent any leakage of the cooling fluid. In
15 the specific example depicted in Figure 1 and Figure 2, the sealing structure 148 is implemented as a pair of O-rings (i.e. two O-rings), each of the pair of O-rings positioned on a respective side vis-à-vis the insert cooling channel defining structure 146. However, other implementations are of course possible. For example, in an alternative non-limiting embodiment, the sealing structure 148 can be implemented differently.

20 The insert body 142 further includes a molding surface defining structure 150. The molding surface defining structure 150 includes an indicia imprinting face 152, which includes a pattern for imprinting a desired indicia onto the preform, that is formed in use by the neck ring half 102. Examples of the desired indicia include, but are not limited to, a unique identifier of the
25 molding cavity where the preform has been molded, a logo associated for example with a converter who produced the preform or a downstream bottler, time of manufacturing, batch number and the like.

The molding surface defining structure 150 is positioned in a face aperture 190 defined within
30 the molding face 110. It is noted that the molding surface defining structure 150 and the face aperture 190 are dimensioned in a close toleranced relationship. More specifically, the molding

H-7369-0-CA

surface defining structure 150 and the face aperture 190 are dimensioned such that to permit the molding surface defining structure 150 to be inserted and removed through the face aperture 190, while preventing any substantial leakage, in use, of the molding material via the face aperture 190 and past the molding surface defining structure 150.

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In some embodiments of the present invention, optionally, the insert body 142 further comprises a removal structure 224 (Figure 2). Within the embodiment of Figure 2, the removal structure 224 comprises a bore defined within the neck ring body 104. In some embodiments of the present invention, the removal structure 224 can be a threaded bore. The removal structure 224 is configured to facilitate removal of the replaceable indicia imprinting insert 140 from the neck ring half 102, when it is desired to replace same, for example, to exchange one desired indicia for another desired indicia. In those embodiments of the present invention, where the removal structure 224 is implemented as a threaded bore, removal of same can be facilitated by using a bolt complementary to the threaded bore to affect removal of the replaceable indicia imprinting insert 140 from the neck ring half 102.

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Accordingly, within embodiments of Figure 1 and Figure 2, there is provided a replaceable indicia imprinting insert 140 which is positionable and retainable in use within the neck ring half 102 from the rear face (not separately numbered) thereof. However, this needs not be so in every embodiment of the present invention. Accordingly, in alternative non-limiting embodiments of the present invention, a replaceable indicia imprinting insert can be positioned in a front face of the neck ring half 102. This is illustrated in greater detail with reference to Figure 3A, Figure 3B and Figure 3C, which depict, respectively, a front view of the neck ring half 102, a side view of the neck ring half 102 and a top view of the neck ring half 102 with a replaceable indicia imprinting insert 340 being installed therein, the replaceable indicia imprinting insert 340 being implemented in accordance with an alternative non-limiting embodiment of the present invention. It is noted that certain details (such as, the neck finish in Figure 3A, etc.) have been omitted from illustration of Figure 3A, 3B, 3C for the sake of simplicity of illustration, but those details of implementation are very well known to those of skill in the art.

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H-7369-0-CA

Construction of the neck ring half 102 is implemented in a substantially the same manner as described above. According to embodiments of the present invention, there is also provided the replaceable indicia imprinting insert 340, which is configured to cooperate with the neck ring half 102. More specifically, the replaceable indicia imprinting insert 340 is positionable, in use,
5 within a slot 302 defined within the neck ring half 102 and more specifically, the slot 302 being defined in a front face thereof.

The replaceable indicia imprinting insert 340 comprises an insert body 342. The insert body 342 further includes a retaining structure 341, which is configured to releasably retain the
10 replaceable indicia imprinting insert 340 within the neck ring half 102. More specifically, the retaining structure 341 comprises two instances of an aperture that cooperate with respective bolts for releasably retaining the replaceable indicia imprinting insert 340 within the neck ring half 102.

15 The insert body 342 further includes a molding surface defining structure 350. The molding surface defining structure 350 includes a feature defining area 351 for defining portions of the neck finish and an indicia imprinting face 352, which includes a pattern for imprinting a desired indicia onto the preform, that is formed in use by the neck ring half 102. Examples of the desired indicia include, but are not limited to, a unique identifier of the molding cavity where
20 the preform has been molded, a logo associated for example with a converter who produced the preform or a downstream bottler, time of manufacturing, batch number and the like.

The feature defining area 351 is configured to cooperate with the rest of the molding face 110 of the neck ring body 104 to define the whole of the neck ring finish substantially free of
25 additional split lines. To that extent, the replaceable indicia imprinting insert 340 can be positioned within the slot 302 and the desired pattern for the neck finish can be machined into the feature defining area 351 and the molding face 110. Alternatively, the desired pattern can be machined into the feature defining area 351 prior to installing the replaceable indicia imprinting insert 340 within the slot 302.

H-7369-0-CA

Accordingly, within embodiments of Figure 3A, Figure 3B and Figure 3C, there is provided a replaceable indicia imprinting insert 340 which is positionable and retainable in use within the neck ring half 102 from the front face (not separately numbered) thereof.

5 Figure 4 depicts another non-limiting embodiment for implementing the rear face mounted version of embodiments of the present invention. Figure 4 depicts a perspective view of the neck ring half 102, which is implemented in substantially the same manner to that described above. Also provided is a replaceable indicia imprinting insert 440, which is configured to cooperate with the neck ring half 102. The replaceable indicia imprinting insert 440 comprises
10 an insert body 442. The insert body 442 includes a locating structure 444, which is configured to be positionable within the insert bore 220. The purpose of the locating structure 444 is to positively locate the replaceable indicia imprinting insert 440 within the insert bore 220.

The insert body 442 further includes a retaining structure 441, which is configured to releasably
15 retain the replaceable indicia imprinting insert 440 within the neck ring half 102. The retaining structure 441 includes an aperture (not separately numbered) for providing access to a screw interface 402.

The insert body 442 further includes an insert cooling channel defining structure 446. In use,
20 when installed, the insert cooling channel defining structure 446 is positioned within the cooling channel 112. The insert cooling channel defining structure 446 can be implemented in substantially the same manner as the above-described cooling channel defining structure 146. The insert body 442 further includes a sealing structure 448, which can be implemented in substantially the same manner as the above-described sealing structure 148.

25 The insert body 442 further includes a molding surface defining structure 450. The molding surface defining structure 450 includes an indicia imprinting face 452, which includes a pattern for imprinting a desired indicia onto the preform, that is formed in use by the neck ring half 102. Examples of the desired indicia include, but are not limited to, a unique identifier of the
30 molding cavity where the preform has been molded, a logo associated for example with a

H-7369-0-CA

converter who produced the preform or a downstream bottler, time of manufacturing, batch number and the like.

5 The molding surface defining structure 450 is positioned in a face aperture 190 defined within the molding face 110. The molding surface defining structure 450 can be implemented in substantially the same manner to that described above. Within these embodiments of the present invention, the molding surface defining structure 450 is releasably positionable onto an engagement member 410 defined on the insert body 442. The engagement member 410 has a generally circular cross section and the molding surface defining structure 450 has an internal
10 bore (not separately numbered) that is also of generally circular cross section complementary to that of the engagement member 410. Within these embodiments, the engagement member 410 and the internal bore can be threaded for complementary engagement therebetween.

Also provided is a biasing member 412, such as a spring and the like for biasing the insert body
15 442 towards the rear face of the neck ring half 102. Within these embodiments of the present invention, replacement of the molding surface defining structure 450 can be implemented as follows, starting with an assembled configuration shown in Figure 4. An operator engages the screw interface 402 with a screwdriver and the like and rotates the screw counter-clockwise. This disengages the engagement member 410 from the internal bore of the molding surface
20 defining structure 450 and, remembering that the molding surface defining structure 450 has a rectangular-shape cross section, rotation of the insert body 442 will generally push the molding surface defining structure 450 outwardly through the front face of the neck ring half 102. At this point, a new version of the molding surface defining structure 450 can be inserted by repeating these steps in reverse. A specific technical advantage of this particular embodiment is
25 that the molding surface defining structure 450 can be replaced without purging cooling fluid from the cooling channel 112. Even though in the specific description the molding surface defining structure 450 and the engagement member 410 are engaged by means of a threaded connection, this needs not be so in every embodiment and, in alternative implementations, the engagement can be executed by a sliding interface and the like.

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H-7369-0-CA

Accordingly and generally speaking, embodiments of the present invention provide a replaceable indicia imprinting insert for a neck ring half 102 that is configured to imprint a desired indicia onto a portion of a neck finish of a preform to be molded. In different embodiments, the replaceable indicia imprinting insert can be positioned from the rear face or
5 from the front face of the neck ring half 102.

A specific technical effect of embodiments of the present invention includes provision of quick and easy means to replace one desired indicia for another by means of replacing the replaceable indicia imprinting insert 140 for another one. Another specific technical effect of embodiments
10 of the present invention includes provision of the replaceable indicia imprinting insert 140, which in use does not cause creation of additional split lines. A further specific technical effect attributable to some embodiments of the present invention includes provision of the replaceable indicia imprinting insert 140, which does not include any retainers on the molding face 110. It is noted that not each and every technical effect needs to be enjoyed in each and every
15 embodiment of the present invention. The description of the embodiments of the present inventions provides examples of the present invention, and these examples do not limit the scope of the present invention. It is to be expressly understood that the scope of the present invention is limited by the claims only. The concepts described above may be adapted for specific conditions and/or functions, and may be further extended to a variety of other
20 applications that are within the scope of the present invention. Having thus described the embodiments of the present invention, it will be apparent that modifications and enhancements are possible without departing from the concepts as described. Therefore, what is to be protected by way of letters patent are limited only by the scope of the following claims:

H-7369-0-CA

CLAIMS

1. A replaceable indicia imprinting insert (140, 440) for use with a neck ring half (102), which is configured to define, in use, at least a neck region of a preform, the replaceable indicia imprinting insert (140, 440) comprising:
 - an insert body (142, 442) including:
 - a locating structure (144, 444) configured to locate, in use, the insert body (142, 442) within an insert bore (220) of the neck ring half (102);
 - a retaining structure (141, 441) configured to releasably retain the insert body (142, 442) in an in-use position;
 - an insert cooling channel defining structure (146, 446) configured to cooperate, in use, with a cooling channel (112) of the neck ring half (102) to define a flow path for a cooling fluid;
 - a sealing structure (148, 448) associated with the insert cooling channel defining structure (146, 446) configured to substantially prevent, in use, leakage of the cooling fluid;
 - a molding surface defining structure (150, 450) configured to define, in use, a portion of the preform and including an indicia imprinting face (152, 452), the indicia imprinting face (152, 452) including a pattern for imprinting a desired indicia onto the preform.
2. The replaceable indicia imprinting insert (140) of claim 1, wherein the insert body (142) is positionable and retainable via a rear face of the neck ring half (102).
3. The replaceable indicia imprinting insert (140) of claim 2, wherein the insert body (142) penetrates the neck ring half (102) from the rear face to a molding face (110) thereof.
4. The replaceable indicia imprinting insert (140) of claim 1, wherein said retaining structure (141) includes a retaining body (143) that is configured to abut, in use, a rear face of the neck ring half (102).
5. The replaceable indicia imprinting insert (140) of claim 1, wherein a major portion of said insert body (142), when installed in the neck ring half (102) penetrates the neck ring half (102) from a rear face thereof through to a molding face (110) thereof.

H-7369-0-CA

6. The replaceable indicia imprinting insert (140) of claim 1, wherein the insert cooling channel defining structure (146) is associated with a cross-sectional dimension that is smaller than a remainder of the insert body (142).
7. The replaceable indicia imprinting insert (140) of claim 1, wherein the sealing structure (148) comprises two O-rings, each of the two O-rings positioned on a respective side of said insert cooling channel defining structure (146).
8. The replaceable indicia imprinting insert (140) of claim 1, wherein the molding surface defining structure (150) is dimensioned in a close toleranced relationship relative to a face aperture (190) defined in a molding face (110) of the neck ring half (102).
9. The replaceable indicia imprinting insert (140) of claim 1, wherein in use the molding surface defining structure (150) defines a portion of the preform.
10. The replaceable indicia imprinting insert (440) of claim 1, wherein the molding surface defining structure (450) comprises an internal bore, which is positionable onto an engagement member (410) defined on the insert body (442).
11. The replaceable indicia imprinting insert (440) of claim 10, wherein the internal bore and the engagement member (410) are threaded.
12. The replaceable indicia imprinting insert (440) of claim 10, further comprising a biasing member (412) biasing the insert body (442) towards a rear face of the neck ring half (102).
13. A neck ring assembly, comprising:
 - a neck ring half (102) configured to define, in use, at least a neck region of a preform; and
 - a replaceable indicia imprinting insert (140, 440) configured to be positionable in use, within the neck ring half (102) to imprint a desired indicia onto a portion of the neck ring half (102).

H-7369-0-CA

14. The neck ring assembly of claim 13, wherein the replaceable indicia imprinting insert (140, 440) comprises
an insert body (142, 442) including:
a locating structure (144, 444) configured to locate, in use, the insert body (142) within an insert bore (220) of the neck ring half (102);
a retaining structure (141, 441) configured to releasably retain the insert body (142) in an in-use position;
an insert cooling channel defining structure (146, 446) configured to cooperate, in use, with a cooling channel (112) of the neck ring half (102) to define a flow path for a cooling fluid;
a sealing structure (148, 448) associated with the insert cooling channel defining structure (146, 446) configured to substantially prevent, in use, leakage of the cooling fluid;
a molding surface defining structure (150, 450) configured to define, in use, a portion of the preform and including an indicia imprinting face (152, 452), the indicia imprinting face (152, 452) including a pattern for imprinting the desired indicia onto the preform.
15. The neck ring assembly of claim 14, wherein the insert body (142) is positionable and retainable via a rear face of the neck ring half (102).
16. The neck ring assembly of claim 15, wherein the insert body (142) penetrates the neck ring half (102) from the rear face to a molding face (110) thereof.
17. The neck ring assembly of claim 14, wherein said retaining structure (141) includes a retaining body (143) that is configured to abut, in use, a rear face of the neck ring half (102).
18. The neck ring assembly of claim 14 wherein the sealing structure (148) comprises two O-rings, each of the two O-rings positioned on a respective side of said insert cooling channel defining structure (146).
19. The neck ring assembly of claim 14, wherein the replaceable indicia imprinting insert (340) comprises the insert body (342) that is positionable and retainable via a front face of the neck ring half (102).

H-7369-0-CA

20. The neck ring assembly of claim 19, where the insert body (342) is positionable within a slot (302) defined within the front face of the neck ring half (102).

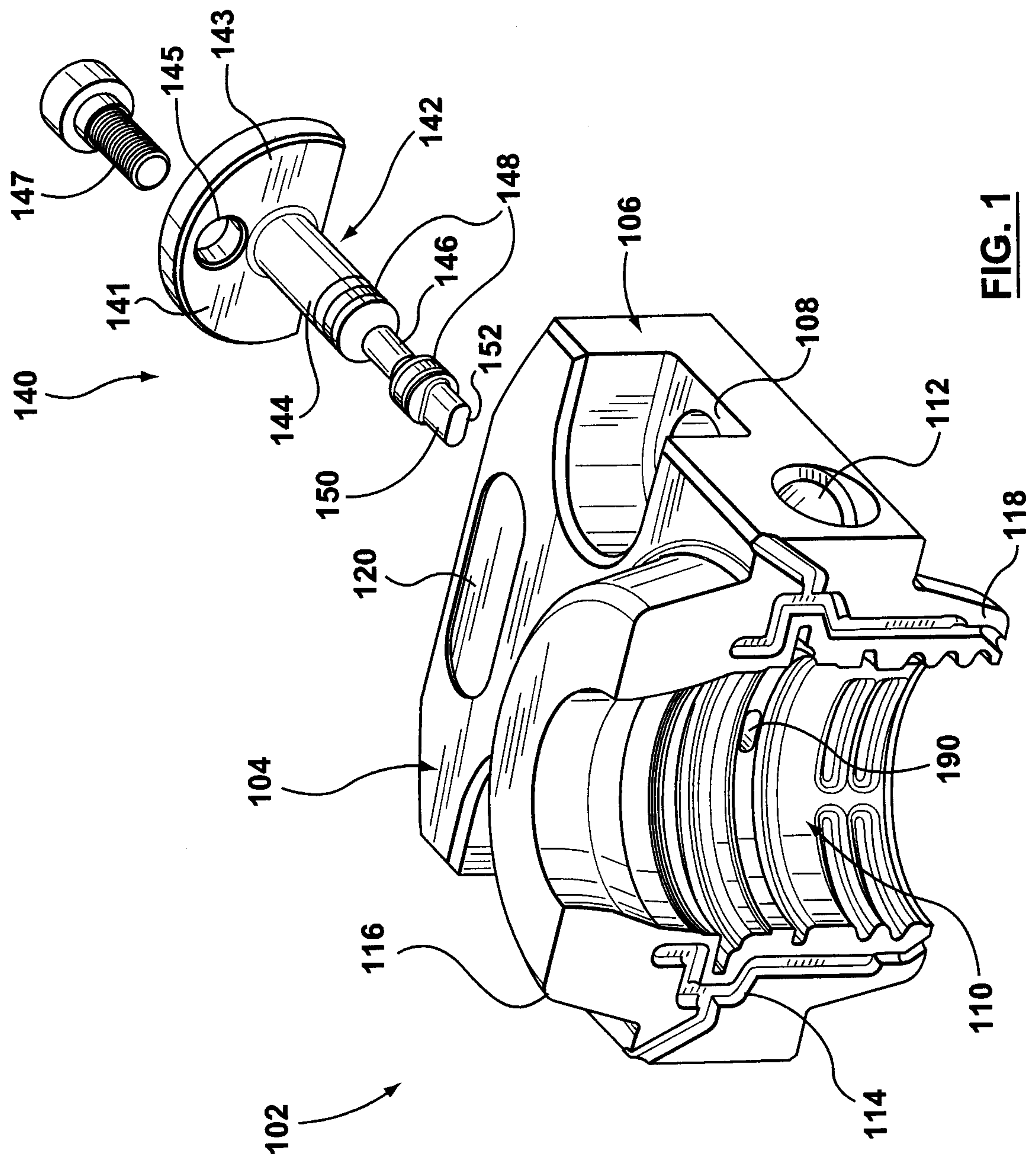


FIG. 1

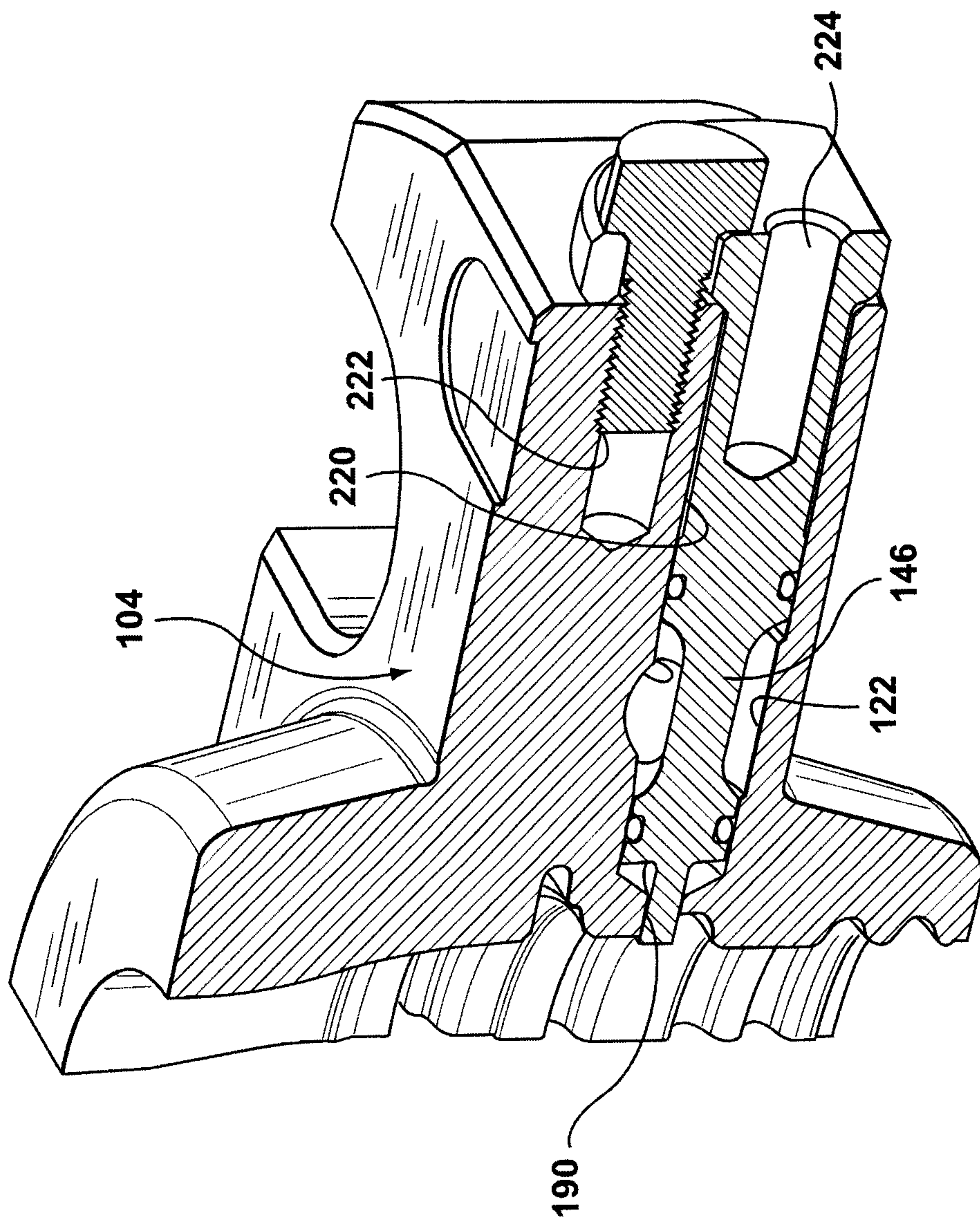


FIG. 2

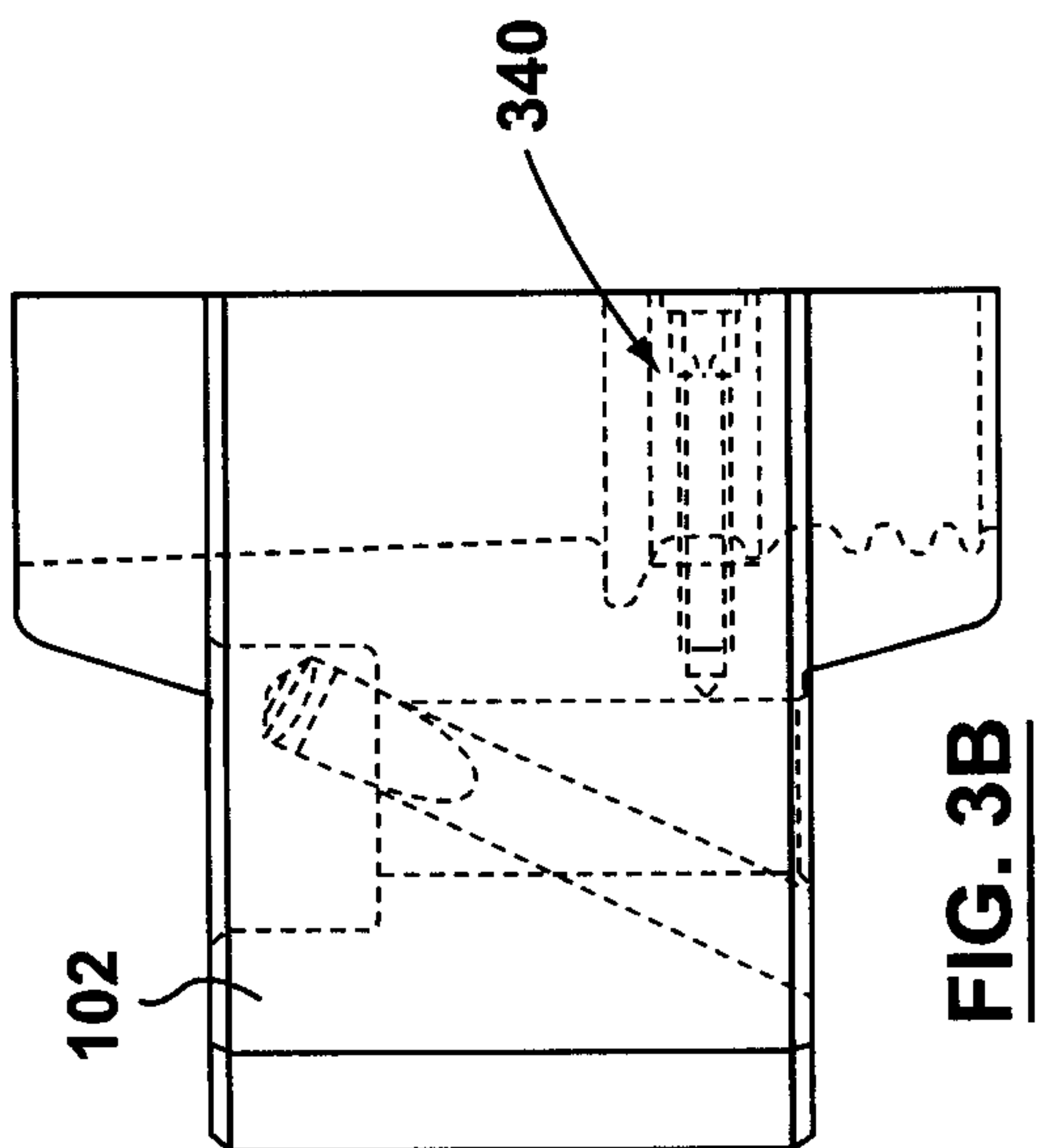


FIG. 3B

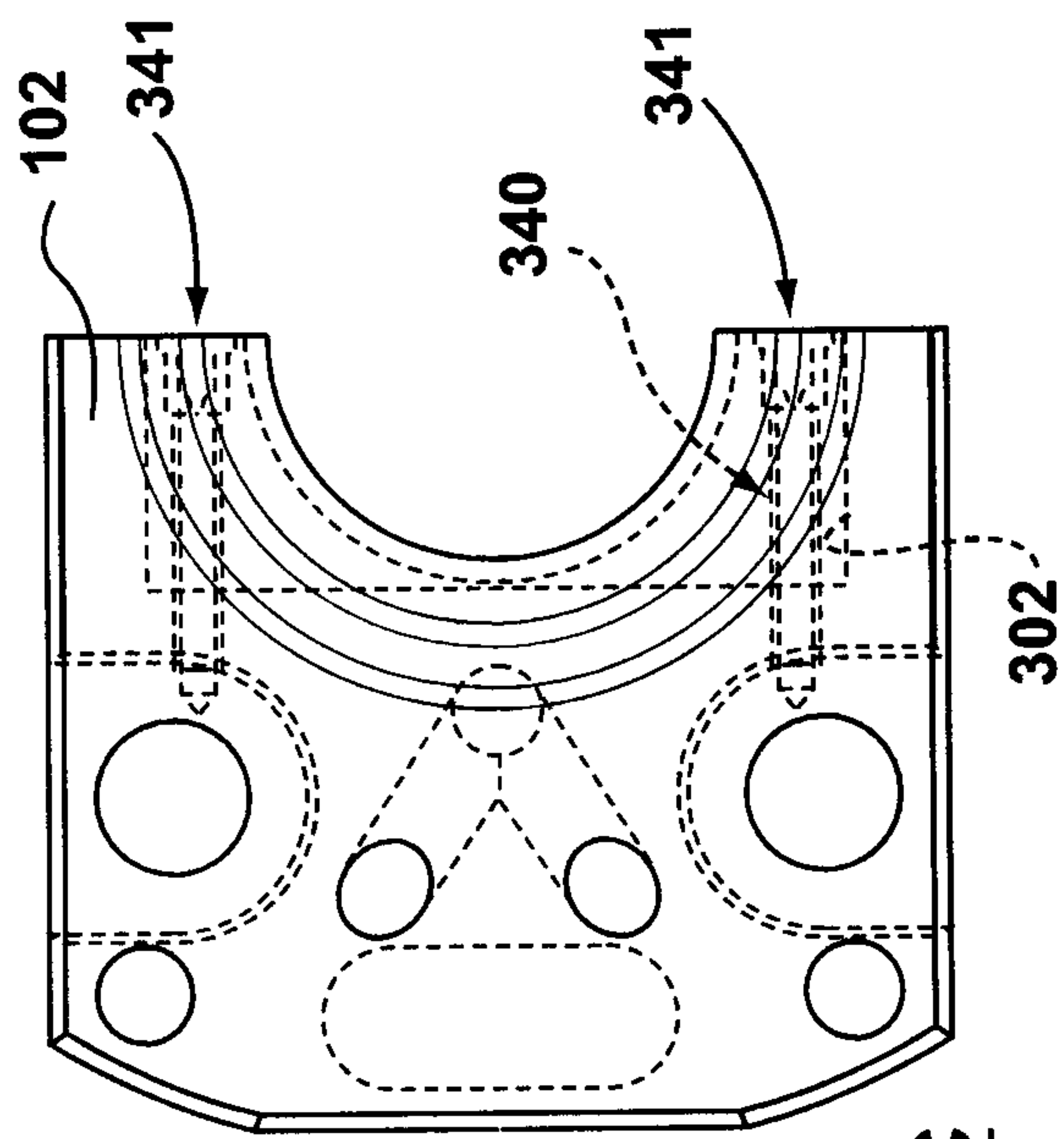


FIG. 3C

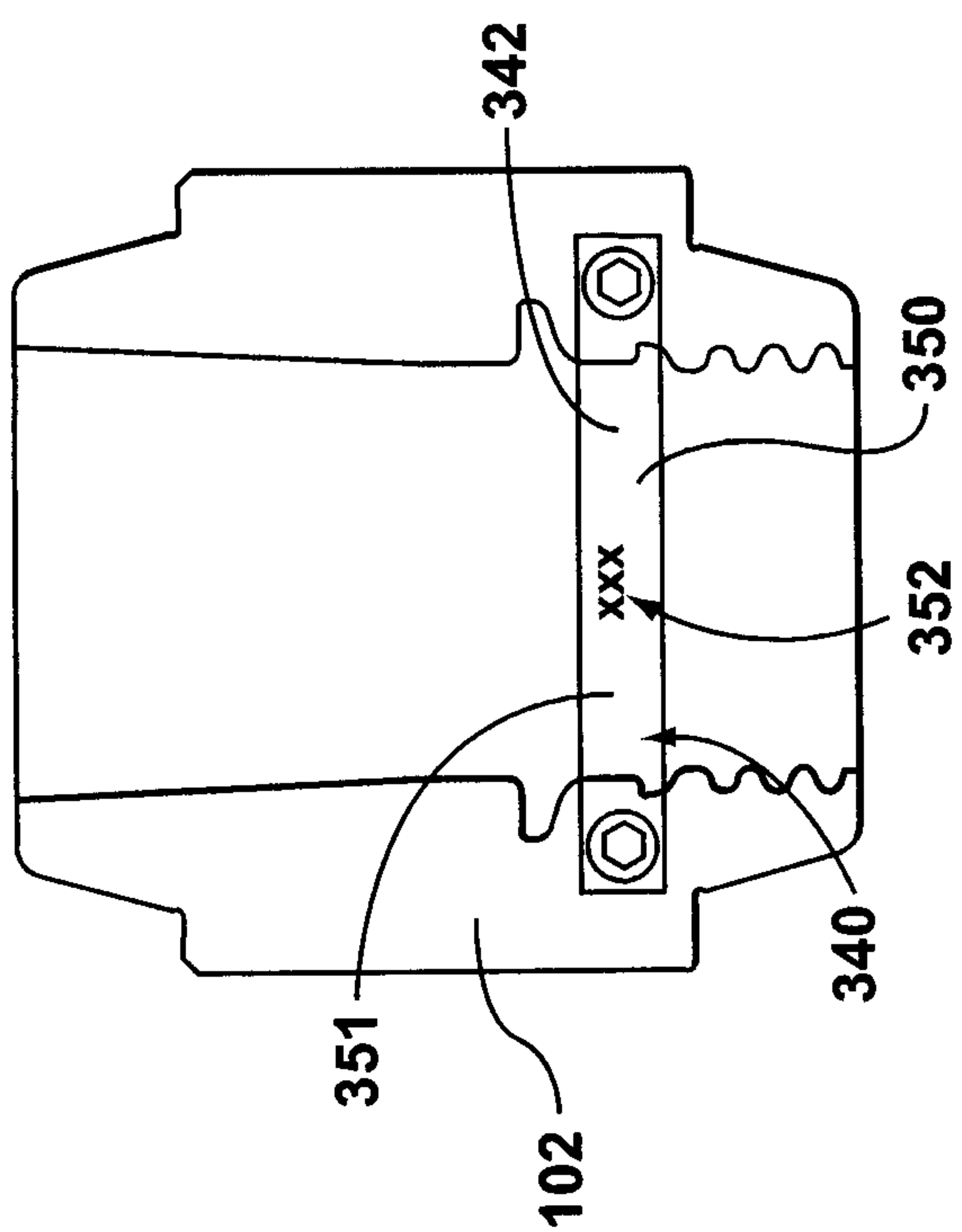


FIG. 3A

