Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2084646 C 2002/09/17

(11)(21) 2 084 646

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(86) Date de dépôt PCT/PCT Filing Date: 1991/06/06
(87) Date publication PCT/PCT Publication Date: 1991/12/12
(45) Date de délivrance/Issue Date: 2002/09/17
(85) Entrée phase nationale/National Entry: 1992/12/04
(86) N° demande PCT/PCT Application No.: US 1991/003869
(87) N° publication PCT/PCT Publication No.: 1991/018826
(30) Priorités/Priorities: 1990/06/06 (534,601) US;
1990/12/27 (634,857) US

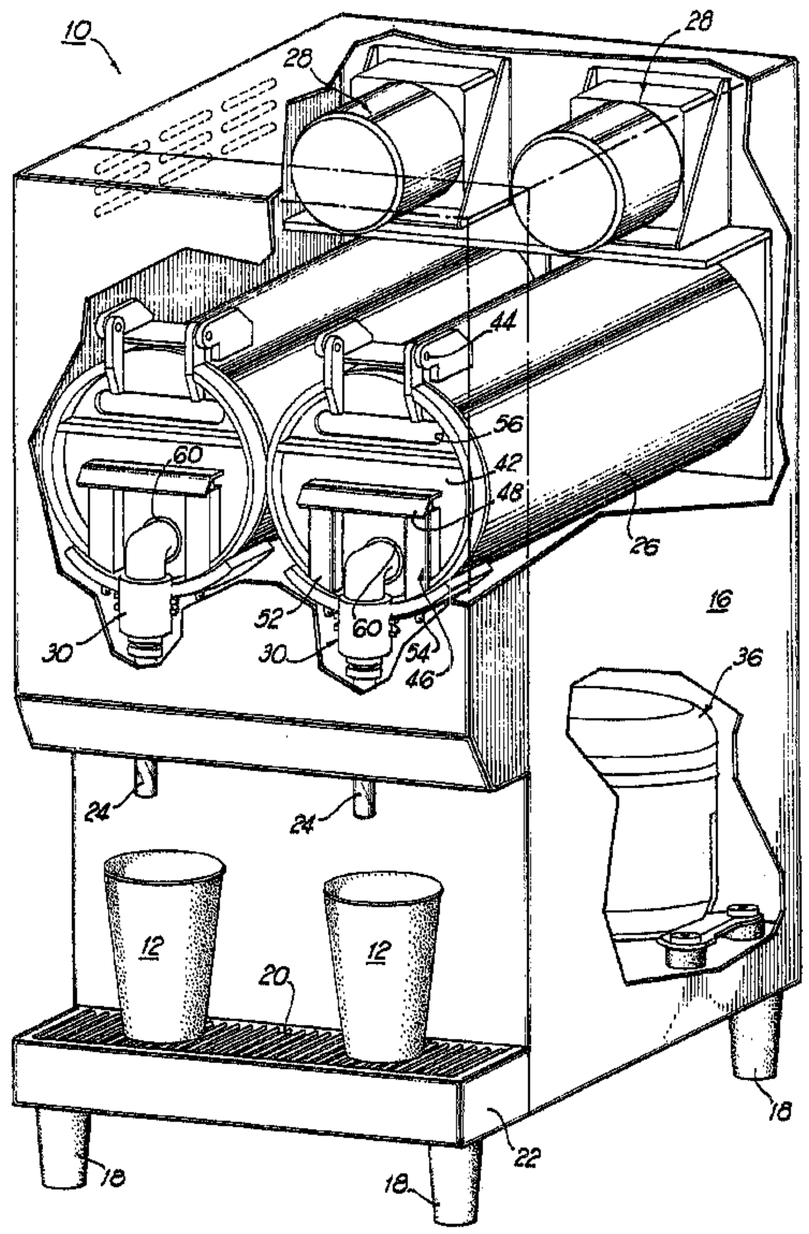
(51) Cl.Int.^{5}/Int.Cl.^{5} B67D 1/10, B67D 1/00, G01F 11/02

(72) Inventeurs/Inventors:
Richter, Simon J., US;
Kirschner, Jonathan, US;
Gatipon, Shawn B., US;
Heflin, Mark S., US

(73) Propriétaire/Owner:
Coca-Cola Company (The), US

(74) Agent: SIM & MCBURNEY

(54) Titre : DISTRIBUTEUR DE BOISSONS APRES MELANGE
(54) Title: POSTMIX BEVERAGE DISPENSING SYSTEM



(57) Abrégé/Abstract:
A postmix beverage dispensing system for dispensing a finished beverage directly from a pliable beverage concentrate at freezer temperatures, without the need for forcing the concentrate through a heat exchanger. The system preferably uses a single blow molded disposable concentrate package having the two parts of (1) a concentrate container, and (2) a metering pump and mixing nozzle. The concentrate container is placed in a canister and pressurized and a pump actuator is connected to the metering pump along with a pressurized water line. The dispenser requires no cleanup or sanitization and allows rapid flavor change. The invention includes an improved metering pump.

ABSTRACT OF THE DISCLOSURE

A postmix beverage dispensing system for dispensing a finished beverage directly from a pliable beverage concentrate at freezer temperatures, without the need for forcing the concentrate through a heat exchanger. The system preferably uses a single blow molded disposable concentrate package having the two parts of (1) a concentrate container, and (2) a metering pump and mixing nozzle. The concentrate container is placed in a canister and pressurized and a pump actuator is connected to the metering pump along with a pressurized water line. The dispenser requires no cleanup or sanitization and allows rapid flavor change. The invention includes an improved metering pump.

A

POSTMIX BEVERAGE DISPENSING SYSTEM

BACKGROUND OF THE INVENTION

1. Field of Invention

This invention relates to beverage dispensing and in a preferred embodiment to a postmix juice dispensing system for dispensing a finished beverage directly from a pliable concentrate at freezer temperatures.

2. Description of the Prior Art

Postmix juice dispensing systems are known. Orange juice concentrate, for example, is distributed frozen. Restaurants remove concentrate from the freezer and thaw the concentrate in a cooler prior to dispensing. The restaurant has to estimate its juice requirements at least two days in advance and place sufficient concentrate in its cooler. If the restaurant's estimates are incorrect or if someone forgets, the restaurant will run out of thawed concentrate. Also, there is often a limited amount of cooler space available for thawing orange juice concentrate. When a restaurant runs out of thawed concentrate, measures are sometimes taken to quickly thaw frozen concentrate and such measures often are inefficient and ineffective and also sometimes affect the taste of the resulting product. Orange juice concentrate has typically been 3+1 concentrate. The present invention is useful preferably with 5+1 concentrate, although it can be used with any desired ratio up to about 7.5+1. The reduced amount of water in 5+1 concentrate prevents a phase change or freezing, at typical freezer temperatures of -10°F to 0°F. The 5+1 concentrate at freezer temperatures does not readily flow by gravity. A container of 0°F product can be inverted and no product will flow out. Also, the product is so thick that a pump's suction cannot pull product from the container. However, the product is still pliable.

It is an object of the present invention to provide a postmix juice dispensing system for direct dispensing with 5+1 concentrate at freezer temperatures.

It is another object of the present invention to provide a direct dispensing postmix juice dispensing system for use with 5+1 concentrate at freezer temperatures in which the concentrate is placed in a pressurizable canister and the concentrate is pressurized to about 50 psig to force concentrate out of the bag.

It is an object of the present invention to provide a postmix beverage dispensing system in which a high quality beverage is dispensed directly from frozen concentrate.

It is another object of this invention to provide a postmix beverage dispenser in which all product contact surfaces are disposable, therefore eliminating the need to sanitize the dispenser.

It is a further object of this invention to provide a postmix beverage dispensing system which requires virtually no cleanup or sanitization.

It is another object of this invention to provide a postmix beverage dispenser which allows a rapid flavor change.

It is another object of this invention to provide a postmix beverage dispensing package for frozen concentrate.

It is a further object of this invention to provide a single blow mold concentrate package having two parts; one being the concentrate container capable of being pressurized in a canister by a driven piston and the other being a metering pump-mixing nozzle unit capable of pumping a metered quantity of concentrate when reciprocatingly moved by a metering pump actuator.

It is another object of this invention to provide an improved metering pump.

It is a further object of this invention to provide an improved metering pump which prevents premature movement of the piston and eliminates the need for close tolerances between the piston and the discharge valve.

It is another object of this invention to provide a metering pump in which the inlet opening of the discharge valve is full open throughout the dispensing portion of the metering cycle,

which improves metering efficiency by eliminating flow restrictions.

SUMMARY OF THE INVENTION

A postmix beverage dispensing system for dispensing a finished beverage directly from a pliable concentrate at freezer temperatures. The term "directly" is hereby defined for use in this application as meaning without forcing the concentrate through a heat exchanger. The term pliable is used in its normal meaning. A 5+1 orange juice concentrate (meaning that it is to be mixed 1 part concentrate to 5 parts of water to be reconstituted), for example, has a reduced amount of water such that at freezer temperatures it is pliable and although it will not readily flow by gravity or by a pump's suction, it will flow under pressure. The beverage dispensing system of this invention includes placing a concentrate container of pliable concentrate at freezer temperature into a canister, locking the door of the canister, and connecting a disposable unit comprising a metering pump and mixing nozzle to a discharge spout of the concentrate container extending through an opening in the canister. A pressurized water line is connected to the mixing nozzle and a pump actuator is attached to the pump. The concentrate is pressurized by a piston in the canister. When it is desired to dispense a beverage the pump actuator operates the pump to force metered quantities of concentrate into the mixing nozzle where it thoroughly mixes with water under pressure while flowing through a static mixer. The finished beverage is dispensed from the static mixer into a cup.

When it is time to replace an empty concentrate container with a full one, both the container and the integral unit including the metering pump and mixing nozzle are disposed of. Thus, because all product contact surfaces are disposable, the dispenser requires virtually no cleanup or sanitization, and a rapid flavor change can be made.

This invention also includes an improved metering pump having: (1) detent insured positive piston movement eliminating the need for close tolerances, and (2) full open valve inlet opening during the dispensing portion of the metering cycle whereby efficiency is increased by reducing flow restrictions out

of the pump; which occurs in the previous devices of this type in which the piston goes to the top of the chamber and the inlet opening in the valve is restricted to a smaller and smaller size.

Other aspects of this invention are as follows:

A postmix beverage dispenser comprising:

(a) a concentrate chamber therein for receiving a quantity of concentrate;

(b) said chamber having an opening for inserting concentrate into said concentrate chamber, a cover for closing said opening and a concentrate discharge opening.

(c) a disposable concentrate metering pump adjacent said concentrate discharge opening of said concentrate chamber and having an outlet for feeding metered quantities of concentrate therethrough;

(d) a disposable mixing nozzle adjacent said pump having an inlet connected to said pump outlet, a beverage dispensing outlet, and a water inlet port for receiving water to be mixed with concentrate;

(e) means for pressurizing any concentrate in said concentrate chamber and for forcing it directly into said metering pump without any intermediate heat exchanger;

(f) metering pump actuating means in said dispenser for actuating said pump to feed metered quantities of concentrate into said mixing nozzle;

(g) a water pump for pumping water under pressure into said mixing nozzle; and

(h) including a disposable concentrate container positioned in said concentrate chamber and wherein said metering pump actuating means is a permanent part of said dispenser and said concentrate container and said

metering pump and said mixing nozzle are easily removable from said dispenser and are disposable.

A method for dispensing a beverage directly from pliable concentrate at freezer temperatures comprising the steps of:

(a) inserting a disposable container of pliable concentrate at freezer temperature into a concentrate chamber of a beverage dispenser;

(b) providing said container with a concentrate outlet opening;

(c) providing a disposable concentrate pump including an inlet opening and a concentrate outlet opening immediately adjacent said container with said pump inlet opening connected to said container outlet opening;

(d) providing a disposable mixing nozzle having an inlet connected to said pump outlet opening, a beverage dispensing outlet, and a water inlet port for receiving water to be mixed with concentrate;

(e) pressurizing the concentrate in said container and forcing it to flow directly into said pump;

(f) pumping concentrate from said pump into said mixing nozzle;

(g) pumping water under pressure into said mixing nozzle to mix with said concentrate;

(h) discharging a beverage from said mixing nozzle; and

(i) including the step of disposing of said container, pump and mixing nozzle when said container is empty.

A two part disposable package for pliable beverage concentrate at freezer temperature comprising:

(a) a first part comprising a concentrate container with a discharge spout; and

(b) a second part comprising an integral pump and mixing nozzle including a pump housing having an inlet conduit, a pumping chamber and an outlet conduit, and a mixing nozzle including an inlet conduit communicating with said outlet conduit, a mixing chamber, a beverage discharge opening, and a pressurized water inlet upstream of said mixing chamber.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be more fully understood from the detailed description below when read in connection with the accompanying drawings wherein like reference numerals refer to like elements and wherein:

Fig. 1 is a partly broken-away front perspective view of a dispenser according to the present invention;

Fig. 2 is a partial front view showing the canister and pumping mechanism of the dispenser of Fig. 1;

Fig. 3 is a partly cross-sectional side view through the canister and pumping mechanism of the dispenser of Fig. 1;

Fig. 4 is a partly broken away perspective view of the pumping mechanism of the dispenser of Fig. 1;

Fig. 5 is a partly cross-sectional side view showing the water pump of the dispenser of Fig. 1;

Fig. 6 is a partly exploded perspective view of the concentrate container and of the metering pump and mixing nozzle used in the dispenser of Fig. 1;

Figs. 7A-7G are partly cross-sectional side views through the metering pump and mixing nozzle showing the operation thereof;

Fig. 8 is a partly broken away perspective view of the concentrate container and metering pump as they are packaged together;

Fig. 9 is a partly schematic side view of an alternate embodiment of this invention; and

Figs. 10A-10D are partly cross-sectional, partial side views through a preferred embodiment of a metering pump, showing the operation thereof.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference now to the drawings, the figures show a beverage dispenser 10 according to the present invention for dispensing a beverage, such as orange juice, into a cup 12. The

dispenser 10 mixes water with concentrate which is supplied in a concentrate container 14 (see Figs. 3 and 6) and which is at freezer temperature (such as in the range of from about -10°F to +5°F). The container 14 is taken directly from the freezer and inserted into the dispenser 10 without the need for thawing. The dispenser 10 can immediately proceed to dispense beverages from this frozen concentrate.

The dispenser 10 includes a housing 16 on legs 18, a cup support 20, a drip tray 22, and a pair of dispensing nozzles 24. The dispenser 10 is a two flavor dispenser, however, a dispenser according to this invention can include any desired number of dispensing mechanisms for dispensing one, two, three or more different beverages. Because each of the dispensing mechanisms are the same, only one will be described herein.

The dispenser 10 includes a canister 26 for holding a concentrate container 14, pressurizing means 28 for pressurizing the concentrate in the canister, a disposable combination metering pump and mixing nozzle 30, a metering pump actuating means 32, and a water pump 34 for pumping water to the mixing nozzle for mixing with the concentrate to produce the beverage. The dispenser 10 also includes a refrigeration system 36.

The canister 26 and the pressurizing means 28 will now be described. Referring to Figs. 1-3, the canister 26 is preferably a stainless steel cylinder enclosing a concentrate chamber and having an opening through which a concentrate container 14 is inserted into the chamber 38. After the concentrate container 14 is inserted into the chamber 38, a cover 42 is closed and locked. The cover 42 is hingedly connected to the canister by means of a hinge 44 and also includes a lock 46. The lock includes a handle 48 connected to a pair of pins which extend through a pair of supports 52 connected to the cover 42 and project through a stationary plate 54 adjacent to the cover 42. It is noted that the cover 42 preferably includes an opening 56 therein to accommodate a handle 58 on the concentrate container 14. The cover 42 also includes an opening 60 to accommodate a discharge spout 62 of the container 14. The refrigeration system 36 includes a cooling jacket 37 around each canister for keeping the canister 26 at a desired temperature selected from the range of

from about 0°F to 40°F. The refrigeration system 36 also includes a water bath 176 (see Fig. 5).

The other end of the concentrate chamber 38 is formed by a piston 64 of the pressurizing means 28. The pressurizing means 28 include a motor 66, a gear box 68, a belt 70 extending between a pair of pulleys 72 and 74, a screw-threaded rod 76, and an internally screw-threaded collar 78 connected to the piston 64. Connected to the collar is an arm 80 having a key-way slot therein associated with a rod 82 to prevent the collar 78 from turning with the screw-threaded rod 76 so that rotation of the rod 76 will cause linear movement of the piston 64. The piston 64 preferably applies about 40 psig of force on the concentrate.

The concentrate metering pump and mixing nozzle unit 30 will now be described. The pump and nozzle unit 30 is a single integral and disposable unit which comes with the concentrate container 14 and which after depletion of the concentrate in the container 14 is disposed of along with the concentrate container. In this way, all of the product contact surfaces are disposed of, which provides the dispenser 10 with the important advantage of requiring virtually no cleanup or sanitization. The pump and nozzle unit 30 is made up of the three separate pieces of a pump housing 90, an annular piston 92 and a valve and mixing nozzle 94. The pump housing 90 is L-shaped in configuration and includes an inlet conduit 96 and a concentrate pumping chamber 98. The annular piston 92 is captured for reciprocating movement inside of the pumping chamber 98. The valve and mixing nozzle 94 are slideably movable inside of the annular piston 92 and includes a valve opening 100 and a concentrate discharge conduit 102 which communicates with the valve opening and through which concentrate is forced from the pumping chamber 98 into the mixing nozzle 104, which preferably includes a static mixer 106. The valve and mixing nozzle 94 include a pair of spaced apart flanges 108 in which the yoke 134 of a metering pump actuating means fits to cause vertical reciprocating movement of the valve and mixing nozzle to create the pumping action of the metering pump, as shown in Figs. 7A-7G. Fig. 7A shows the top dead center position which is the start/stop position. Fig. 7B shows the downward movement of the valve and closing of the valve opening 100. Fig.

7C shows the valve engaging the piston 92 such that further downward movement of the valve also moves the piston down opening and enlarging the pumping chamber 98, as shown further in Fig. 7D. Fig. 7E shows the upward movement of the valve closing the intake to the pumping chamber 98. Fig. 7F shows the further upward movement opening the valve opening 100 and the contact with the piston 92 after which further upward movement as shown in Fig. 7G compresses the pumping chamber, forcing concentrate through the valve opening 100 and out of the mixing nozzle 94.

The pump housing 90 also includes a pair of spaced apart flanges 116 in-between which a stationary plate fits to hold the housing 90 stationary.

The mixing nozzle portion of the valve and mixing nozzle unit member 94 includes an inlet port 110, a beverage dispensing outlet 112 and a water inlet port 114 for receiving pressurized water pumped to the mixing nozzle 94 from the water pump 34.

The metering pump actuating means 32 will now be described. This actuating means includes a motor 120 and a slider crank mechanism 122. The mechanism 122 includes a vertically sliding plate 124. Connected to the vertical plate is a first horizontal plate having a large cutout 128 to accommodate the pump and nozzle unit 30 without touching it, a water passage block 130 connected to the plate 126, and a second horizontal plate 132 connected to the block 130 and having a yoke 134 to be received in between the pair of spaced apart flanges 108 on the valve and mixing nozzle 94. The water block 130 includes a water passageway 136 therein connected at one end to a water line 138 leading from the water pump 34 and at the other end being connected to a coupling 140 defining the water inlet port to the mixing nozzle. The vertically reciprocating elements ride on a pair of spaced apart rods 142 in bushings 144.

The slider crank mechanism preferably has a positive stop device shown in Fig. 2 and including a stop arm 146 pivoted at 148 and held in a disengaged position as shown in the right in Fig. 2 by a spring 150. If it is desired to effect a positive stop, then a solenoid 152 is energized, which will cause the stop arm 146 to pivot to the position shown in the left in Fig. 2 to engage the slider crank mechanism to effectuate a positive stop.

The water pump will now be described with reference to Fig. 5. Fig. 5 shows the water pump 34 with a piston 160 which includes a reduced diameter section 162 which extends through a hole in the horizontal plate 126. There is a predetermined amount of play between movement of the plate and the piston because while the metering pump requires about three-fourths inch of movement for its pumping action, the water pump requires much less, preferably about one-fourth inch of movement. As shown in Fig. 5, water enters into a pumping valve 164 through an inlet line 166. The pumping valve includes two check valves 168 and 170 and a flow control 172. Water flows from the pumping valve through a heat exchange line 174 located in a water bath 176 and then to the water block 130 described above. A water line 178 extends from the pumping valve 164 to the water pump 34. It will be seen from Fig. 5 that one stroke of the water pump draws water into the water pump from the pumping valve and on the pressure stroke forces water through the pumping valve to the water block 130.

The dispenser 10 will have several delays. When a new container 14 is inserted the dispenser will pressurize first, delaying pumping action. Next the pump motor will start, allowing for water pressure to be established then the pumping action will begin and the water solenoid will open which dispenses a finished beverage. Thereafter, each time a drink is dispensed the screw jack motor 120 which pressurizes the concentrate will begin about one second prior to the pumping action and water solenoid opening. A proximity switch (see Fig. 2) is used to inform the system about the number of strokes made by the pumping mechanism.

Fig. 8 shows a package including a corrugated box containing four disposable concentrate containers 14 and four pump and nozzle units 30. As noted previously, both the concentrate container and the pump and nozzle unit 30 are disposable after use. Of course, the concentrate containers can be delivered in other sizes, types and arrangements of boxes and shipping crates other than the one shown in Fig. 8.

Fig. 9 shows an alternate embodiment of the present invention in which a canister 190, having a refrigeration jacket

192 is arranged vertically above the pump and nozzle 30. The canister 190 includes a cover 194 which is locked thereto and which includes an opening 196 therethrough. The cover includes a coupling for attachment to a pneumatic line for pressurizing the concentrate chamber 202 inside of the canister 190. This is an alternate method for forcing the concentrate from the concentrate container into the metering pump and mixing nozzle.

Figs. 10A-10D, show a preferred embodiment of a metering pump 300, similar to that shown in Fig. 7. The metering pump 300 differs from that shown in Fig. 7 in including detent insured positive stops for the piston 302. The reason is to require extra force to move the piston. This is important because since the discharge valve 304 causes the piston to move, it might do so prematurely if friction between the valve and the piston were greater than that between the piston and the housing 306. This improvement eliminates the need to have close tolerances and reduces the chance of improper volumetric metering.

It is noted that the pump 300 also allows the inlet opening 308 in the valve to remain full open throughout the dispensing portion of the metering cycle. This provides the advantage over known metering pumps of this type in which the piston goes all the way to the top of the pumping chamber 310 of improving control of the metering of the fluid by eliminating the flow restrictions through an inlet opening of decreasing area as the piston approaches the top of the chamber.

The metering pump 300 includes the stationary housing 306, the volumetric piston 302 mounted for reciprocating movement inside of the housing 306, and the discharge valve 304 mounted for reciprocating movement inside of the piston 302. The stationary housing 306 includes a liquid pumping chamber 310 therein and a liquid inlet passageway 312 in communication with the pumping chamber 310. The piston 302 is annular in shape and is mounted for reciprocating movement inside of the housing 306 and is in sliding engagement with the housing. The piston has an axially extending cylindrical valve chamber 314 therein. The discharge valve 304 is cylindrical and is mounted for reciprocating movement inside the valve chamber 314 of the piston 302. The valve 304 includes a liquid passageway 316

therethrough including a diametrical passageway 318 with inlet openings 308 on opposite sides of the discharge valve 304. The inlet openings 308 are spaced-apart from a proximal end of the valve 304. The passageway 316 also includes an axial passageway 322 connected to the diametrical passageway and extending from the diametrical passageway to a distal end of the valve 304 where the passageway 316 has its outlet end. The discharge valve 304 includes first and second axially spaced-apart piston moving means for causing the piston 302 to move only when both (1) the discharge valve 304 is moving and (2) one of said moving means is in contact with said piston. The piston 302 has a top dead center position shown in Fig. 7A and Fig. 10C wherein the piston stops short of a top wall of the pumping chamber 310 leaving an upper portion 330 of the pumping chamber 310. The discharge valve 304 is in its top dead center position when the piston is also in its top dead center position and the inlet openings 308 are located in the upper portion 308 of the pumping chamber 310, whereby the inlet openings 308 remain full open throughout the dispensing portion of the metering cycle.

The first and second piston moving means can be seen both in Fig. 7 and in Fig. 10. The first piston moving means includes a bottom shoulder 332 of the valve which contacts an annular ring 334 of the piston, and the second piston moving means includes a shoulder 336 on the valve which contacts a bottom end 337 of the piston 302.

The housing 306 includes a pair of spaced apart annular o-ring grooves 340 and 342, and the piston 302 includes an annular o-ring 344 on its outer surface (preferably molded as an integral portion of the piston 302) to require that additional force be used to move the piston. The o-ring grooves and the o-ring are located such that the o-ring mates with one of the grooves at each of the top dead center and bottom dead center positions of the piston. The friction between the valve 304 and the piston 302 is thus insufficient to cause the piston to move, such that the piston will move only when contacted by one of said piston moving means on said valve.

Fig. 10C shows the top dead center position and Fig. 10A shows the bottom dead center position. Fig. 10B shows the valve moving up and just starting to contact the piston, whereby further upward valve movement will cause the piston to move and the o-ring 344 to come out of the o-ring groove 342. Fig. 10D shows the valve having moved down and just contacting the piston whereby further downward valve movement will cause the piston to move.

While the preferred embodiment of this invention has been described above in detail, it is to be understood that variations and modifications can be made therein without departing from the spirit and scope of the present invention. For example, any desired system for applying pressure to the concentrate to force it into the metering pump can be used. It is not essential that it be mechanical or pneumatic and if it is, it is not essential that the specific system described above be used. Also, other arrangements for actuating the metering pump can be used and they do not need to be mechanical and even if mechanical they do not need to be the specific arrangement shown above. Other arrangements of metering and other mixing systems can be used. The metering pump and mixing nozzle do not have to be part of the same single integral unit. While the preferred embodiment of this invention is for use with juices, such as orange juice, it is not limited thereto. Other concentrate containers can be used in place of the specific construction described above.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. **A postmix beverage dispenser comprising:**

(a) a concentrate chamber therein for receiving a quantity of concentrate;

(b) said chamber having an opening for inserting concentrate into said concentrate chamber, a cover for closing said opening and a concentrate discharge opening.

(c) a disposable concentrate metering pump adjacent said concentrate discharge opening of said concentrate chamber and having an outlet for feeding metered quantities of concentrate therethrough;

(d) a disposable mixing nozzle adjacent said pump having an inlet connected to said pump outlet, a beverage dispensing outlet, and a water inlet port for receiving water to be mixed with concentrate;

(e) means for pressurizing any concentrate in said concentrate chamber and for forcing it directly into said metering pump without any intermediate heat exchanger;

(f) metering pump actuating means in said dispenser for actuating said pump to feed metered quantities of concentrate into said mixing nozzle;

(g) a water pump for pumping water under pressure into said mixing nozzle; and

(h) including a disposable concentrate container positioned in said concentrate chamber and wherein said metering pump actuating means is a permanent part of said dispenser and said concentrate container and said metering pump and said mixing nozzle are easily removable from said dispenser and are disposable.

2. The apparatus as recited in claim 1 wherein said concentrate metering pump and said mixing nozzle are one integral unit.

3. The apparatus as recited in claim 1 wherein said concentrate metering pump and mixing nozzle are one integral unit and wherein the connection between said dispenser and said one integral unit consists solely of said metering pump having a pair

means including a reciprocating yoke and wherein said yoke is slideably received between said pair of driving flanges.

4. The apparatus as recited in claim 1 wherein said concentrate discharge opening is a hole in said cover and including a concentrate container positioned in said concentrate chamber and having a discharge spout extending through said concentrate discharge opening.

5. The apparatus as recited in claim 1 including means for refrigerating said concentrate chamber.

6. The apparatus as recited in claim 5 wherein said refrigerating means includes a refrigerating coil surrounding said concentrate chamber for maintaining said concentrate chamber at freezer temperature.

7. The apparatus as recited in claim 1 wherein said concentrate pressurizing means includes a slideable piston and a motor for forcing said piston against said concentrate container.

8. The apparatus as recited in claim 7 wherein said concentrate container includes a cup-shaped container with a separate lid and wherein said piston is in contact with said lid for forcing said lid into said cup-shaped container.

9. The apparatus as recited in claim 8 including a screw-threaded rod connected to said motor and an internally threaded collar on said rod and connected to said piston for moving said piston when said motor rotates said rod.

10. The apparatus as recited in claim 1 wherein said concentrate metering pump includes a stationary housing having said inlet conduit and said concentrate pumping chamber therein, said piston being an annular piston captured within said housing for reciprocating movement inside of said concentrate pumping chamber, and said discharge valve being slideably positioned inside of said annular piston for reciprocating movement therein,

moving said piston in one direction and a second flange for contact and moving said piston in the other direction when said valve is reciprocatingly moved and with a predetermined amount of lost motion therebetween.

11. The apparatus as recited in claim 1 wherein said metering pump actuating means includes a motor, first drive means driven by said motor for reciprocatingly moving said pump piston and a second drive means driven by said motor for driving said water pump.

12. The apparatus as recited in claim 1 wherein said mixing nozzle includes a static mixer downstream from said water inlet port.

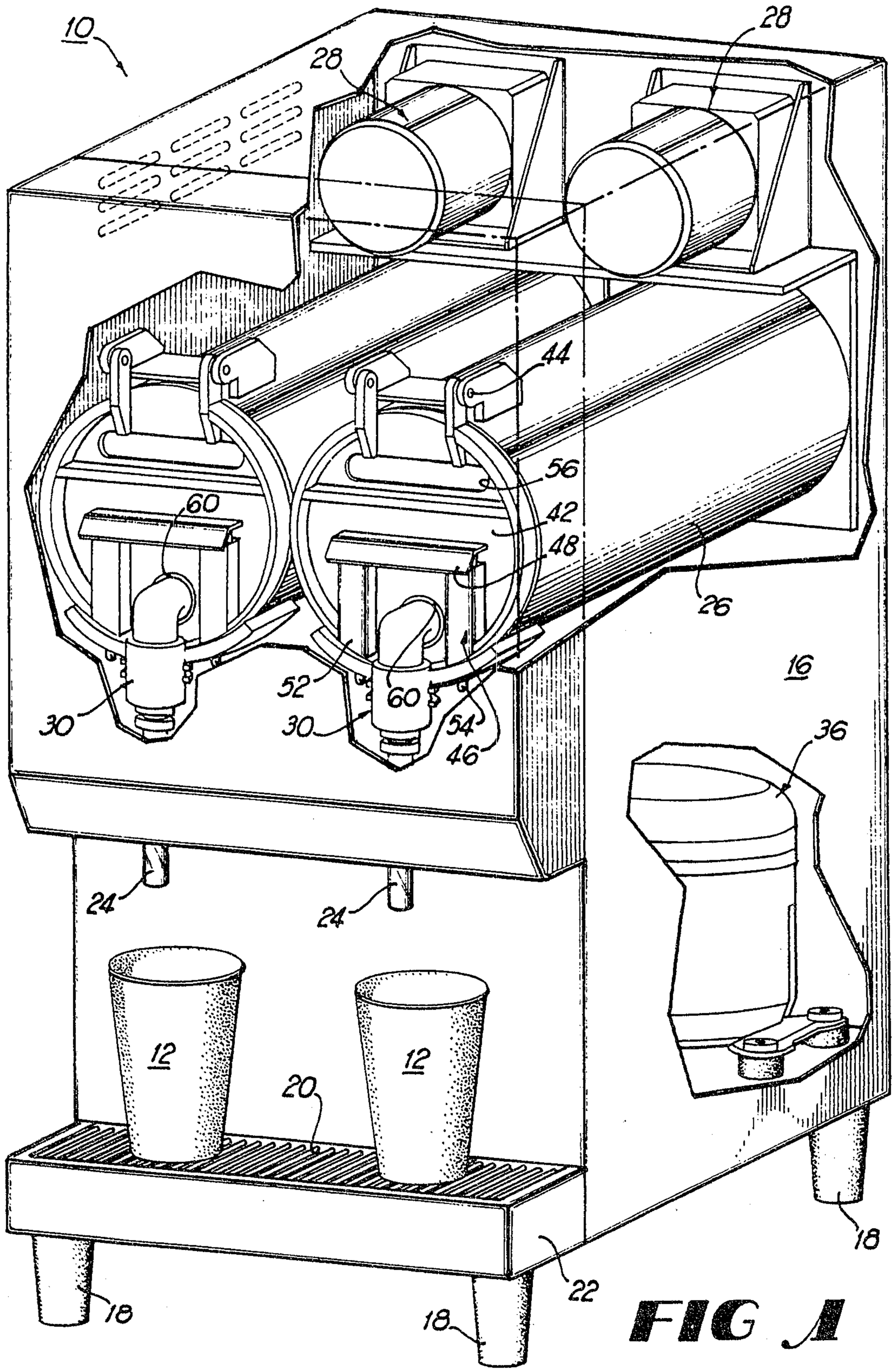

10
28
28
44
56
60
42
48
26
16
52
60
30
30
54
46
36
24
24
12
12
20
18
18
22
18

FIG 1

2084646

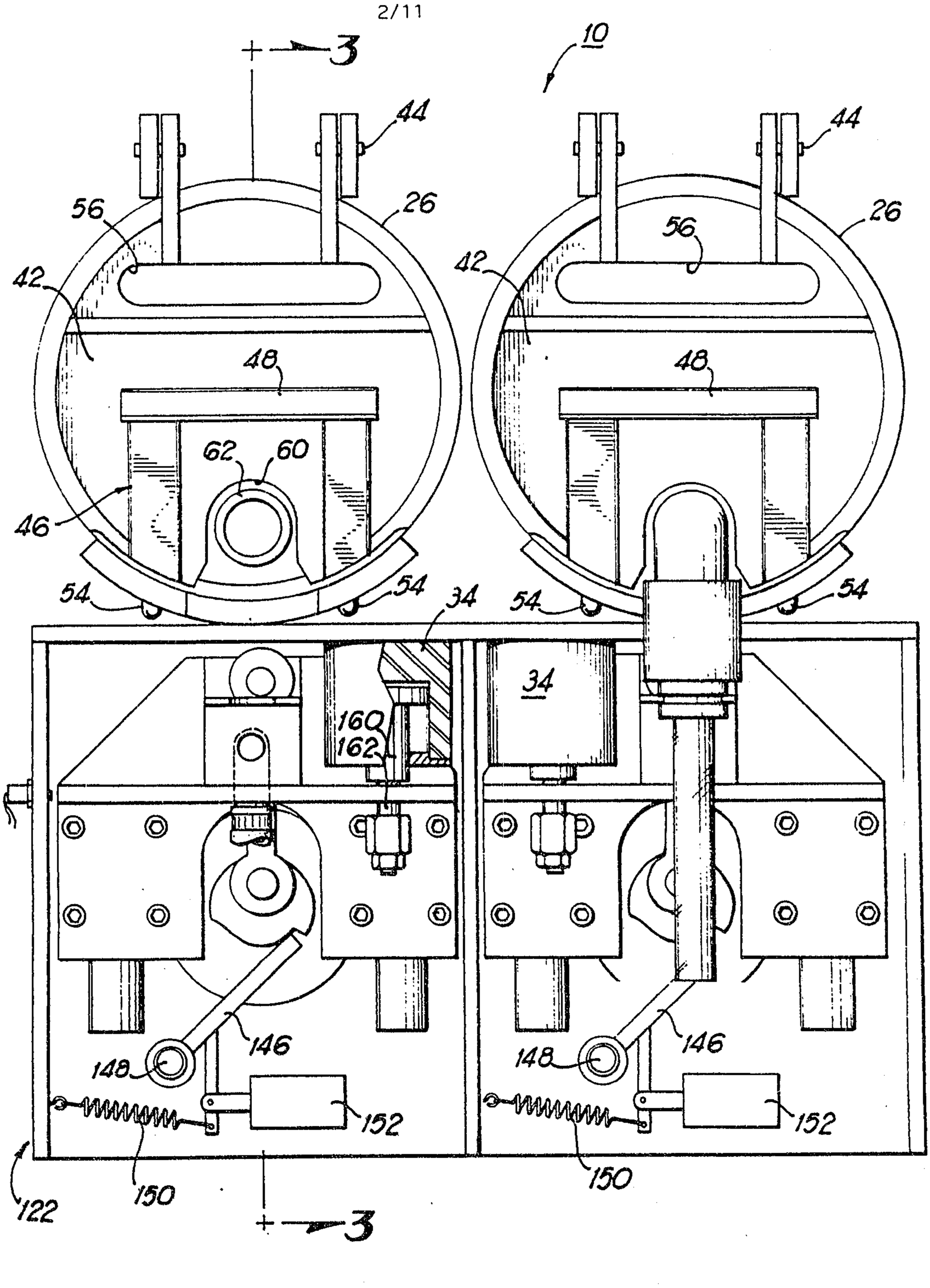


FIG 2

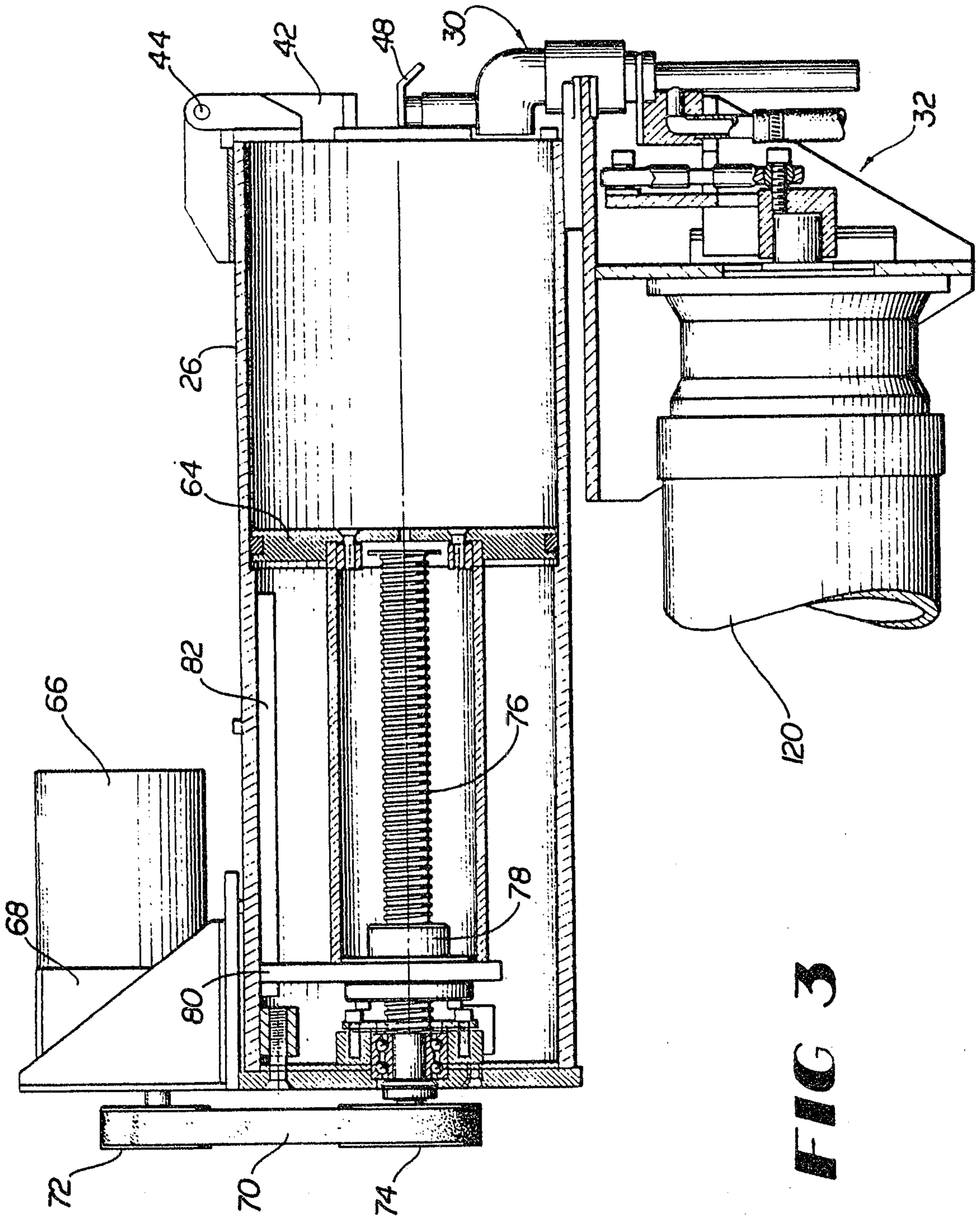


FIG 3

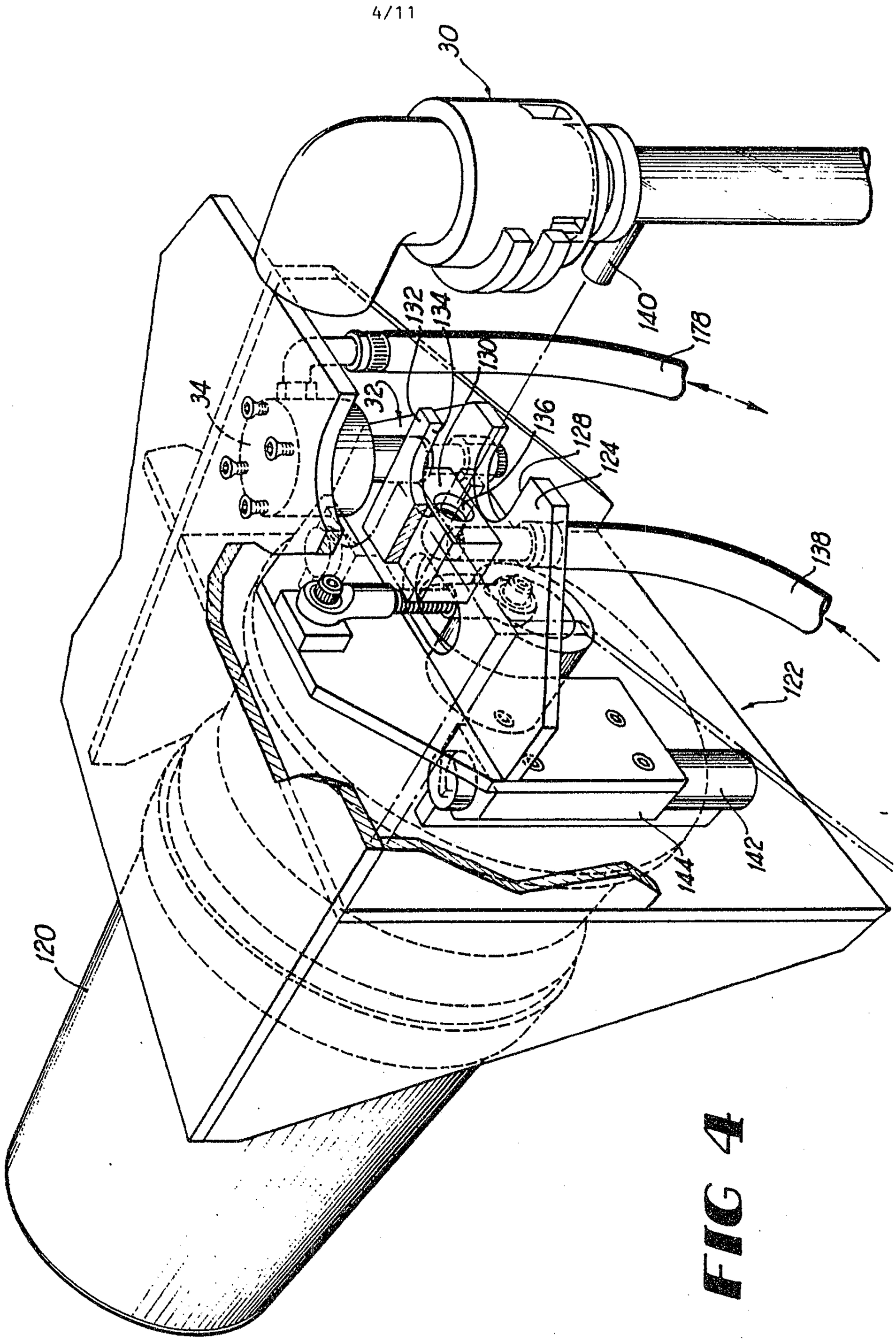


FIG 4

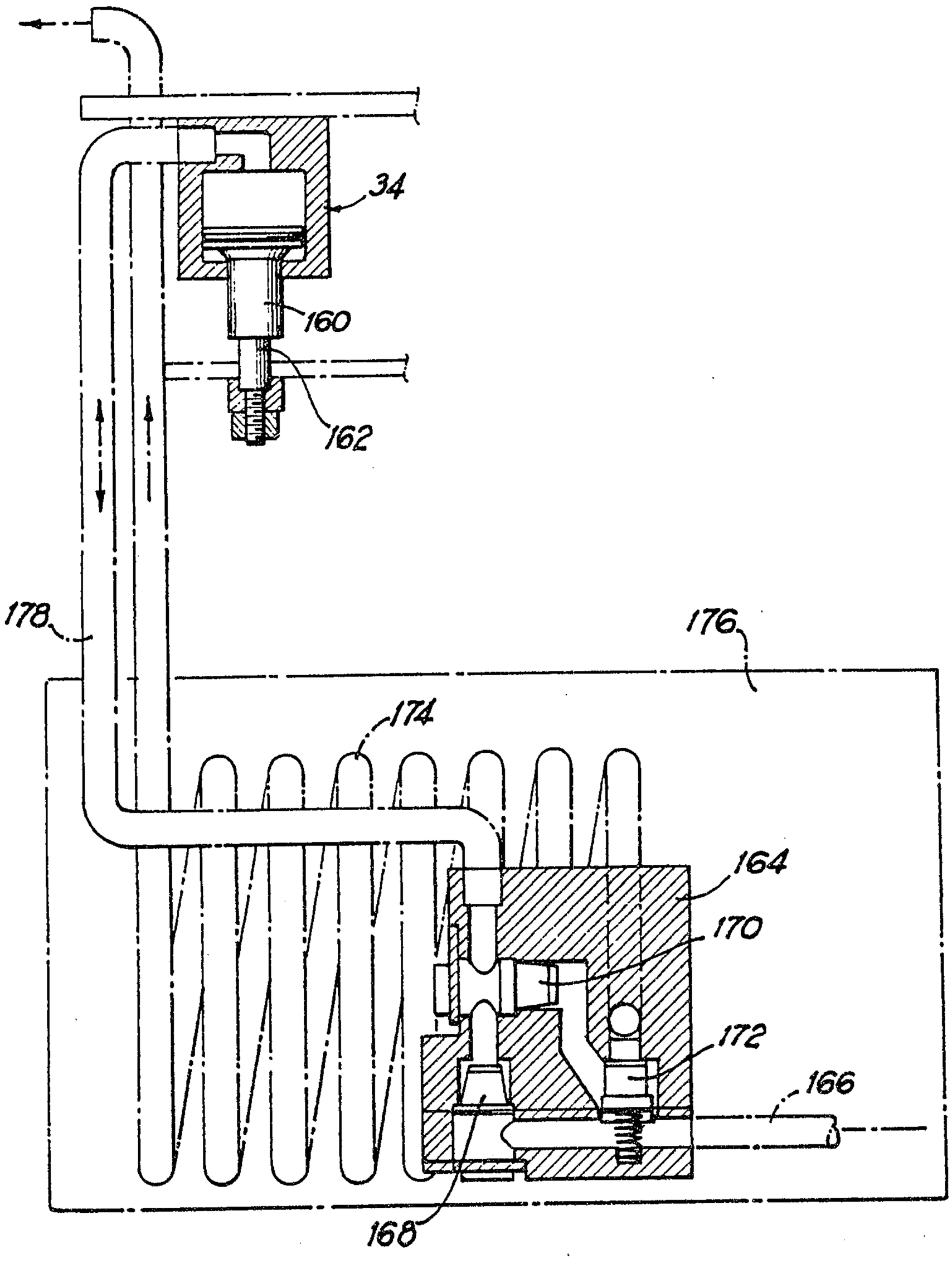


FIG 5

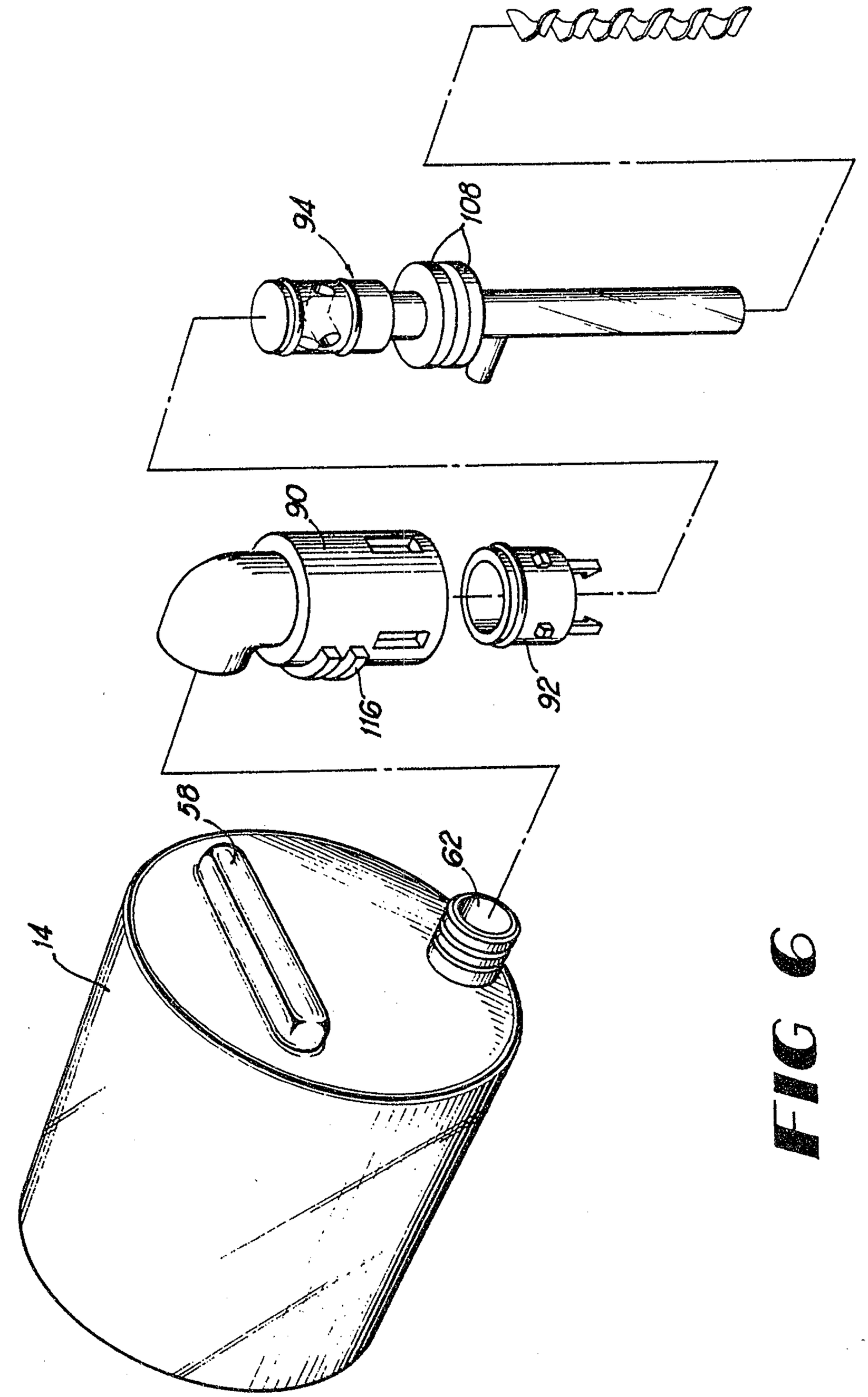


FIG 6

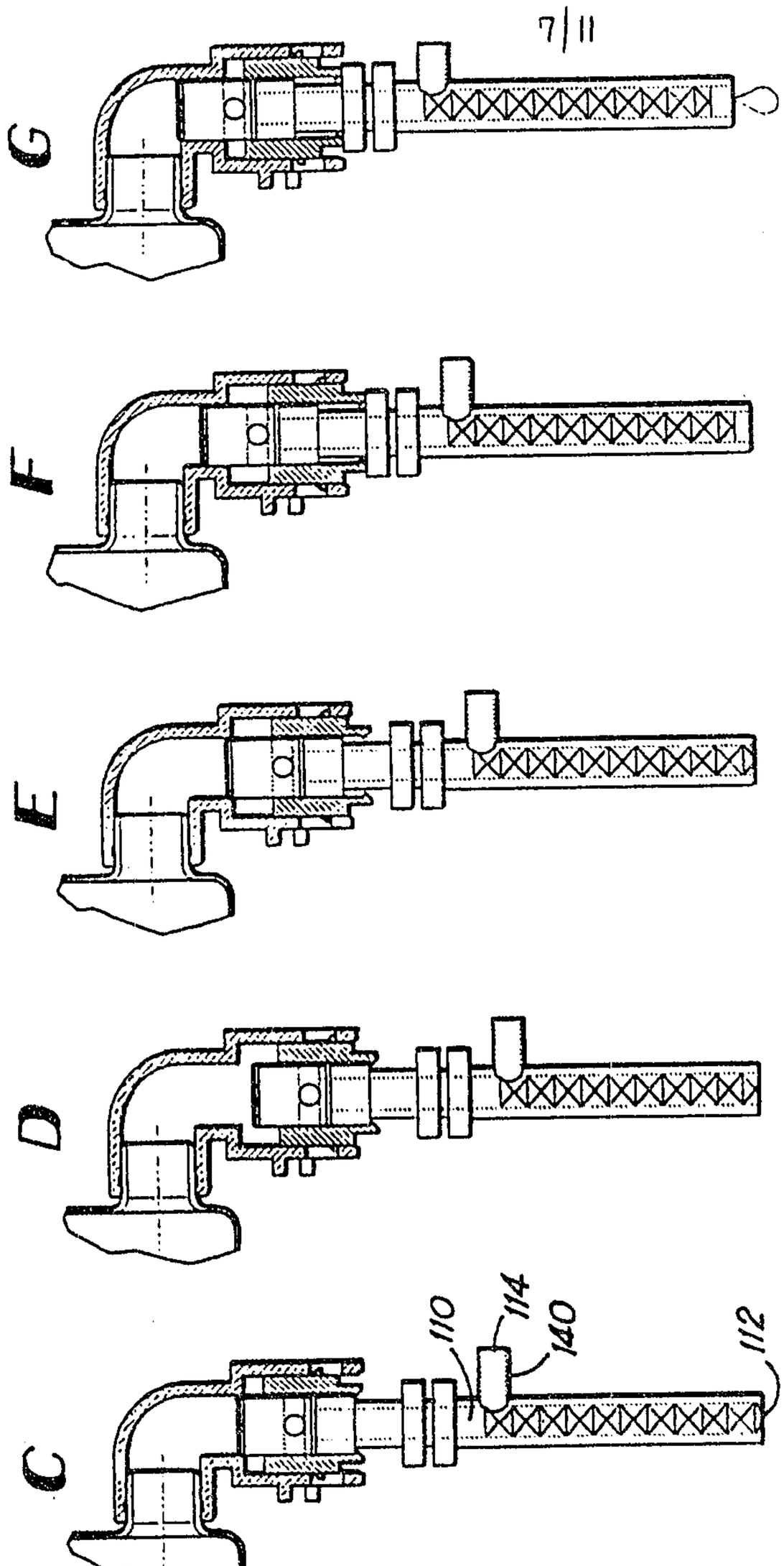


FIG 7

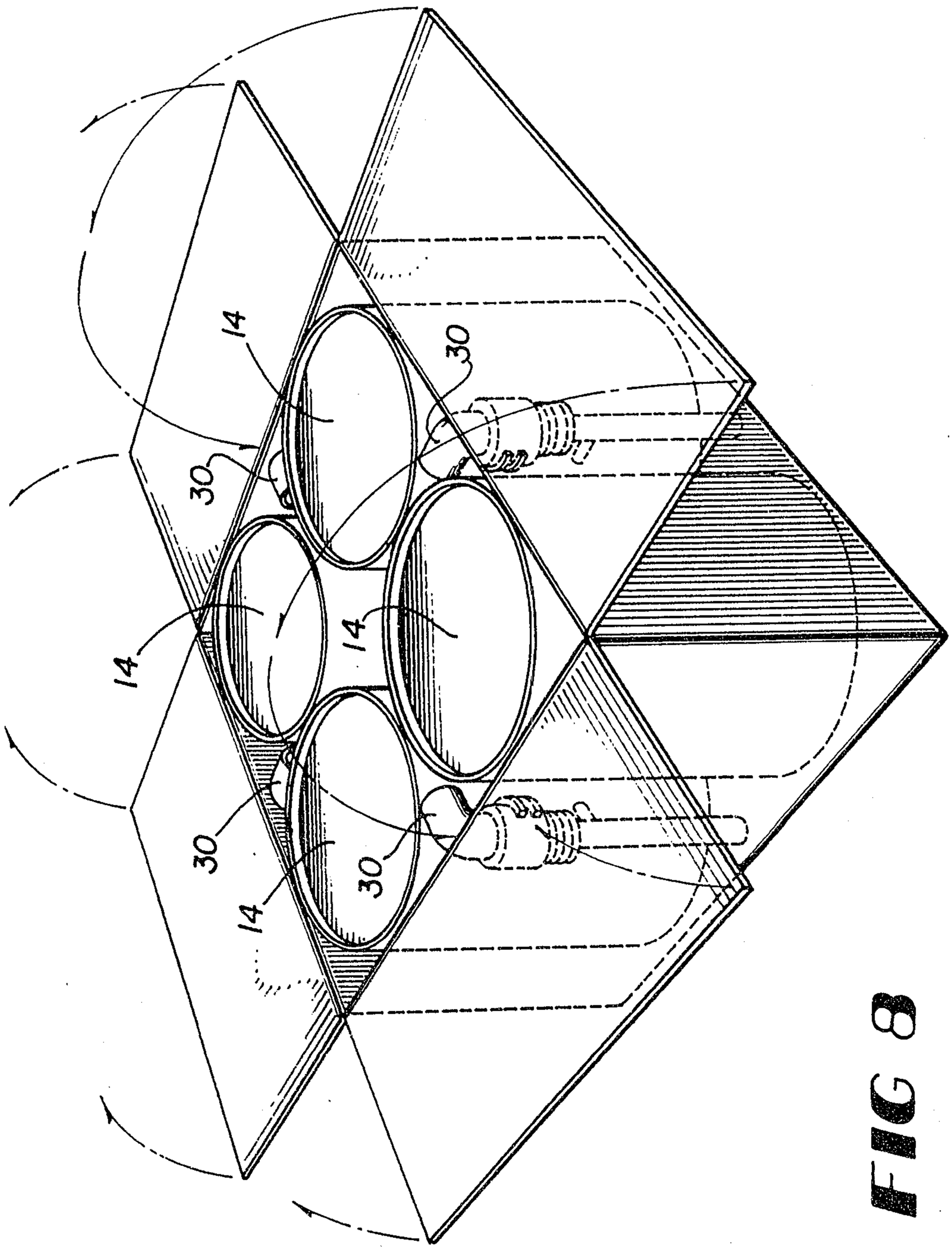


FIG 8

2084646

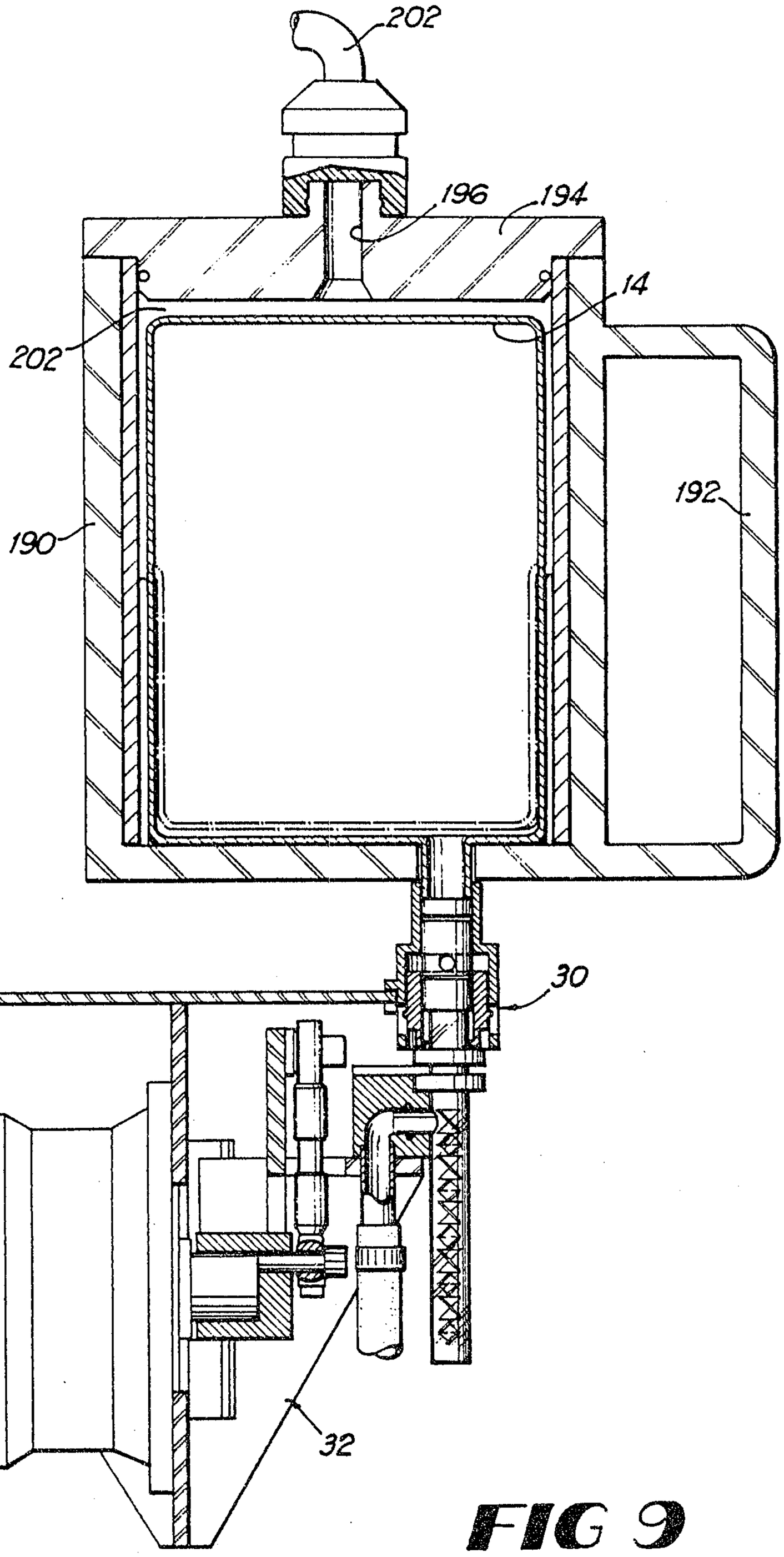


FIG 9

2084646

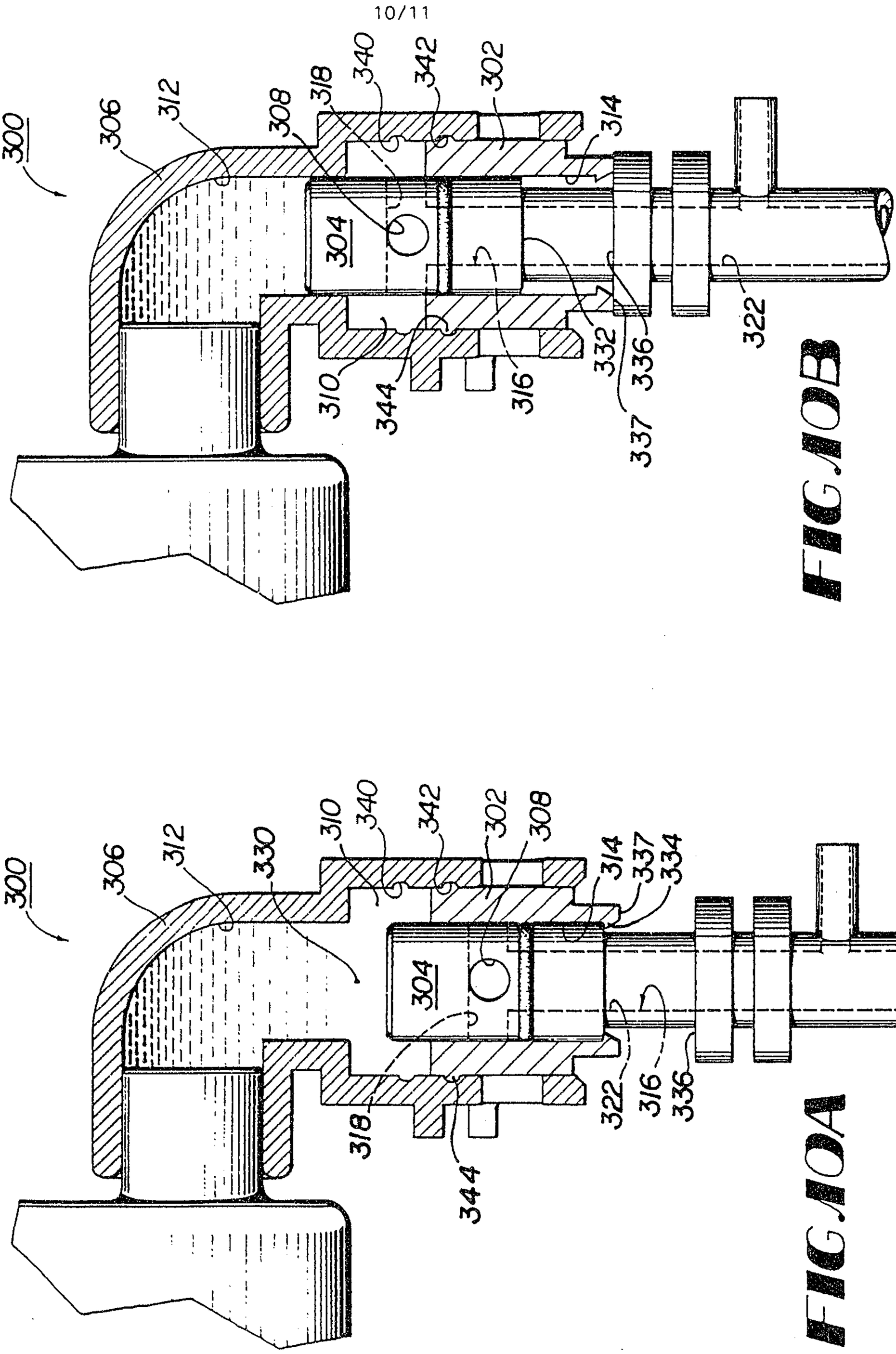


FIG 10B

FIG 10A

2084646

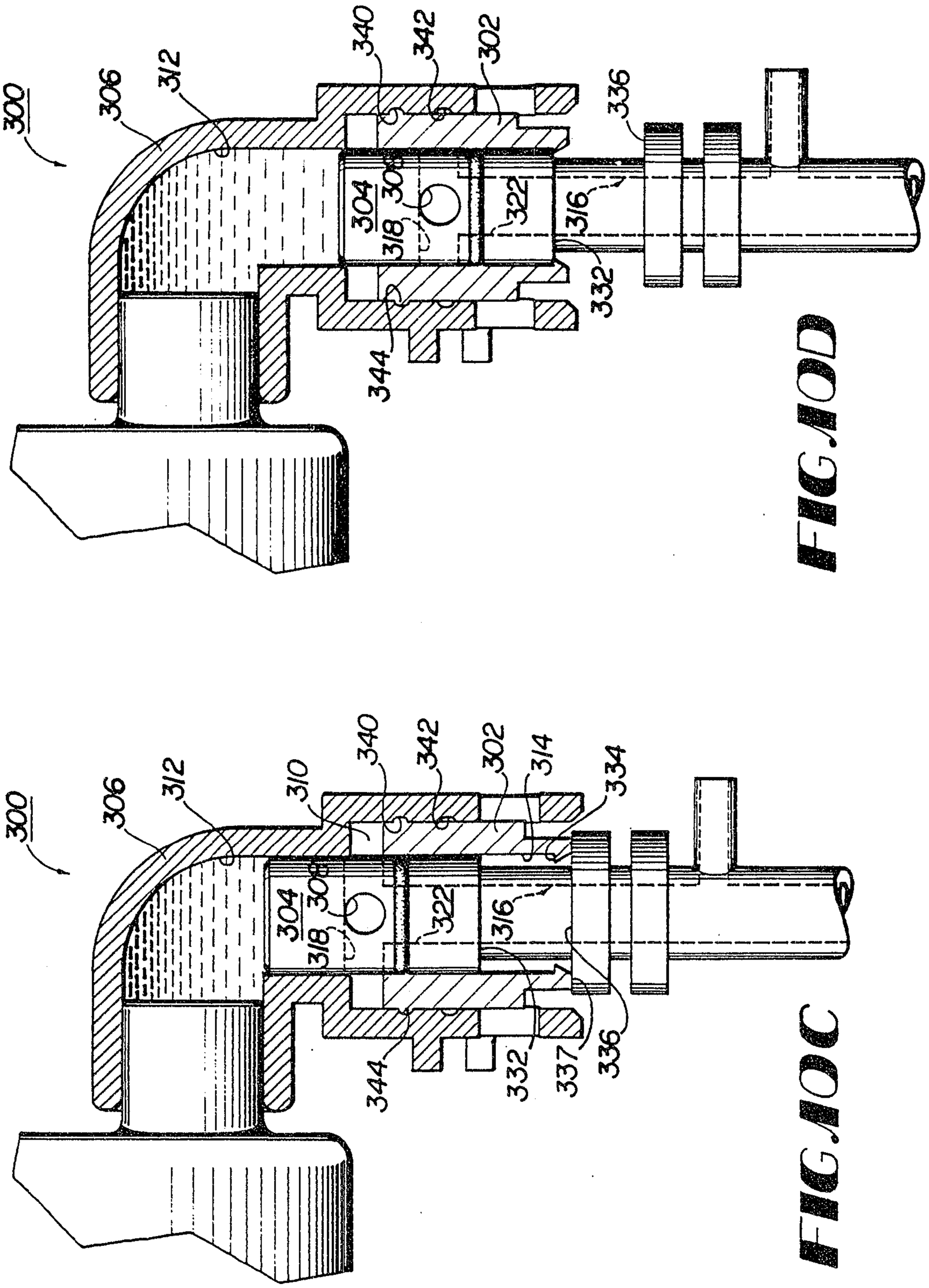
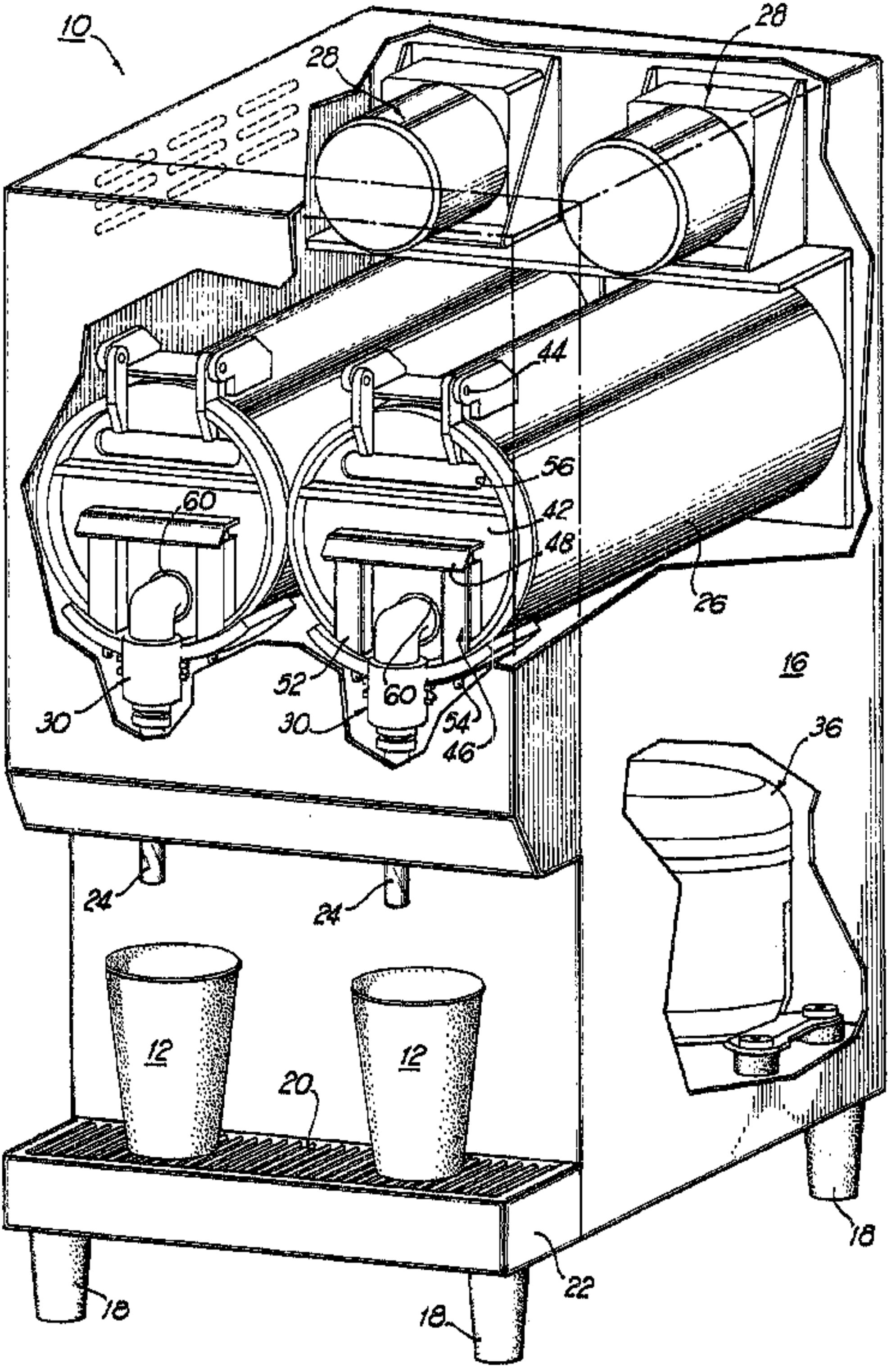


FIG.10D

FIG.10C


10
28
28
44
56
42
48
60
60
52
30
30
54
46
25
16
36
24
24
12
12
20
18
18
22
18