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(54) Beverage dispenser.

(57) The invention discloses a machine for dispensing carbonated liquid into a cup to provide a beverage. The carbonated liquid is dispensed from a tank to an outlet through a passage which comprises a section of curved elongated form (235) and having a progressively increasing cross section so that there will be a smooth reduction in carbonation between the tank and the outlet to avoid excessive foaming of the beverage as it issues from the outlet.

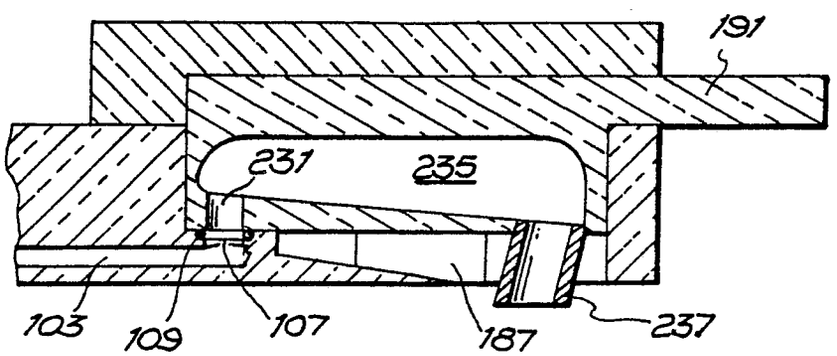

FIG. 7

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Beverage Dispenser

This invention relates to drink dispensers in general and more particularly to a dispenser for dispensing carbonated liquid, especially for carbonated beverages to be consumed in the home.

Consumers throughout the world consume large quantities of carbonated beverages. Typically, carbonated beverages which are consumed in the home are supplied to the consumer in either cans or bottles. Typically, cans are supplied in 0.33 cl sizes and bottles in sizes up to two litres. A carbonated beverage is made up of carbonated water to which there is mixed a juice or syrup. A good tasting beverage requires good water, the proper level of carbonation and the proper proportions between the syrup and carbonated water. Thus, in the production of bottles or cans of carbonated beverages under factory conditions the equipment used includes a carbonator for carbonating the water, a concentrate, i.e. a juice or syrup, dispenser for dispensing the concentrate in the proper quantities and mixing it with the carbonated water, and a filling device for filling it into the bottles. Also included is a chiller unit for chilling the water to be carbonated. Carbonation is carried out by bringing carbon dioxide and water into contact with each other in such a manner that the carbon dioxide disolves into the water. Typically the water is over carbonated since in the step of dispensing into the bottles or cans, a certain amount is lost. Systems can be operated in which the water and syrup are mixed prior to or after carbonation.

In addition to bottled and canned carbonated beverages, carbonated beverages are also dispensed at restaurants, and at soda fountains and the like. The devices used for such dispensing are known as post mix disensers, and include the same basic elements as one finds in a carbonation plant. In other words, they include means for chilling the water, carbonating equipment for carbonating the water, a juice or syrup dispenser for dispensing metered amounts of concentrate and a tap for dispensing the mixture of concentrate and water into a glass or cup. Typically, mixing of the concentrate and water is carried out at the tap.

It is felt that there is a need for domestic versions of such dispensers, because if carbonated beverages are purchased in cans, for example, each time a can is used the contents of the whole can must be consumed. Any of the beverage left over for any period of time will lose its carbonation. Large reclosable containers to some extent overcome this problem. However, even though these containers are reclosable, after a period of time, carbonated beverages in these containers will lose their carbonation. Thus, the ability to in effect make carbonated beverages in the quantities needed in the home would be great advantage.

As noted above, it is dispensible that the carbonated water should be dispensed at the correct level of carbonation to produce a satisfactory beverage and this invention is concerned with achieving this.

According to this invention there is provided a dispenser for carbonated liquid comprising:

i) a supply of carbonated liquid at above atmospheric pressure;

ii) an assembly comprising first and second relatively movable parts;

iii) an i in said assembly and coupled to said supply;

iv) an outlet from said assembly from which carbonated liquid may be dispensed;

v) a flow passage through said assembly and connecting said inlet and outlet;

vi) a valve in said flow passage and controlling flow of carbonated liquid through the flow passage depending upon relative movements of said parts;

vii) means for relatively moving said parts to control said valve;

characterised in that a length of said flow passage comprises an elongated curved expansion chamber of increasing cross section in a direction towards the outlet for reducing the pressure and velocity of carbonated liquid flowing into said chamber before it reaches said outlet so as to minimise loss of carbonation in the dispensed liquid.

This application is divided out of European Patent Application No. 83105694.4 in which is contained a full description of the machine illustrated in the accompanying drawings and reference is made to such European Patent Application No. 83105649.4 for specific details. However, in the following only certain drawings of the said European Patent Application have been included in this application and these drawings contain reference numerals indicating parts which are not described herein but which are fully described in said European Application. With the above in mind, an embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, wherein:-

Fig. 1 (Fig. 1 in said European Application) is a block diagram of the dispensing system of the present invention.

Fig. 2a (Fig. 2a in said European Application) is a front perspective view of a dispenser according to the present invention.

Fig. 2b (Fig. 2b in said European Application) is a rear perspective view of the dispenser of Fig. 2a.

Fig. 3 (Fig. 3 in said European Application) is a plan view of the dispenser according to Figs. 2a and 2b.

Fig. 4 (Fig. 4 in said European Application) is a plan view of the valve of Fig. 6 partially cut away showing the valve integral with a manifold.

Fig. 5 (Fig. 5 in said European Application) is a sectional elevation view of the pressure reducing valve of Fig. 4, the section being taken on line 5-5 in Fig. 4.

Fig. 6 (Fig. 6 in said European Application) is an exploded perspective view of a practical embodiment of a package or container and a rotary valve.

Figs. 6a, 6b and 6c (Figs. 6a, 6b, 6c in said European Application) are diagrammatic presentations illustrating the three possible positions of the valve of Fig. 6.

Fig. 7 (Fig. 9 in said European Application) is a section along the lines 9-9 of Fig. 4 illustrating the diluent flow channels.

Fig. 8 (Fig. 10 in said European Application) is a section along the lines 10-10 of Fig. 4 showing the valve of Figs. 4 and 6 in the dispensing condition.

Fig. 1 is a generalized block diagram of a beverage dispensing system. The system includes a water source 11. In more general terms, this is a source of diluent which is later mixed with a concentrate. Although it will, in most cases, be water, other diluents might be used. Shown in connection with the water source is an inlet 13. The inlet 13 may be an inlet which is plumbed into the plumbing of the location where the dispenser is used or may simply be an opening in the water tank which permits refilling. The water from the water source is shown passing through a heat exchanger 15. Shown associated with the heat exchanger 15 is a cooling unit 17 and a heating unit 18. Cooling can be supplied to the heat exchanger 15 by opening a valve 19 and heating or cooling will be associated directly with the water source or water tank 11. In general terms, the heat exchanger 15 and associated cooling 17 and heating 18 simply comprise means for adjusting the temperature of the diluent. At the outlet of the heat exchanger 15 is a carbonator 23. Carbonator 23 is supplied with carbon dioxide from a tank 25 through a reducing valve 26, a line 27, a manifold 29. When the carbonator is in use, carbonated water is supplied over line 33 to the manifold 29. The manifold 29 supplies this water or other diluent to dispensing valves 35 and 36 in accordance with the present invention. Still water is applied over a line 34 to a mixing valve 31 which has a second inlet supplied with carbonated water from line 33 and permits supplying to dispensing valve 36 any desired proportions or mixture of still and/or carbonated water. Also located at the dispensing valves 35 and 36 are containers 37 filled with a concentrate which is to be mixed with the diluent.

Supported on the base 43, is a tank of a pressurizing gas, e.g. a carbon dioxide tank 68 shown in the phantom. The carbon dioxide tank or bottle 68 is connected to a reducing valve 69 by means of a quick disconnect clamp 71 to permit ease of replacement of the carbon dioxide bottle 68 which may be a conventional commercial unit. Extending through the dividing wall 53 and secured to a bracket 73 thereon by means of screws or bolts 75 is a manifold 77 which will be described in detail below. The manifold 77 distributes the pressurizing gas and diluent, e.g. carbon dioxide and carbonated water. The front portion of the manifold 77 is visible on Fig. 2a. Integral with the manifold are two dispensing valves 79A and 79B to be described in detail below. Below valves 79A and 79B is a removable tray 82, retained magnetically for example, for catching any spillage.

Fig. 3 is a plan view of the dispenser of Figs. 2a and 2b with the covers 63 and 83 removed and the T-shaped centre section 45 also removed for clarity of presentation. In this view, the carbon dioxide bottle 68 is visible along with its quick disconnect clamp 71 and reducing valve 69. The reducing valve is semi-rigidly mounted and coupled by tubing 87 to the manifold 77. Portions of valves 79A and 79B which are molded integrally with the manifold are also shown. Also shown in cross section is the carbonator tank 61. The carbonator tank contains a coupling 89 which permits a quick disconnect with the manifold 77.

Reducing valve 69 reduces the carbon dioxide pressure to 40 psi. CO_2 at this pressure is fed through a passage 91 in the manifold 77 to the disconnect coupling 89. From that point it flows through tubing 90 to a restrictor 93, and thence to a diffuser 95. Carbonated water is removed from the carbonator tank through a line 97 extending to the bottom of tank 61 and leading to the coupling 89 whence it enters a passage 99 in the manifold. This passage connects with two smaller passages 101 and 103, which lead to outlets 105 and 107, in the portion of the valves which is integral with the manifold. At each of the outlets an O-ring seal 109 is provided.

The Manifold

The manifold 77 and the dispensing valves are shown in more detail in Fig. 4. At the inlet for carbon dioxide, a threaded fitting 125 is provided in the manifold. As illustrated, this communicates with a channel 127 which is connected directly to the passage 91. This is seen in more detail in Fig. 5 which is a cross section through the reducing valve. Inserted into appropriate bores 129 and 131 on the left side of the manifold 77, are tubular fittings 133 and 135. These are press fitted into their respective bores 129 and 131. Each contains, threaded therein, a check valve, i.e. a Schrader type valve, 137a and 137b respectively. The fittings 133 and 135 insert into the quick disconnect coupling 89 in the carbonator tank 61 and are sealed by O-rings 136. Within a bore 130 in the coupling 89, mating with the fitting 129, is disposed an anvil 139 followed by a check valve 141 which is blown open by carbon dioxide pressure from the line 91. In a bore 136 of the coupling 89 which mates with the fitting 135 is inserted another Schrader valve 143. The valve 143 abuts against the valve 137b opening both valves when the quick disconnect coupling 89 is attached to the manifold. Similarly, the anvil 139 opens the valve 137a. In this manner, when the carbonator is disconnected from the manifold, there is a check valve in both passages of the manifold and in both passages into the carbonator to prevent release of pressure. The coupling 89 also contains, at its inside, threaded bores 144 and 146 for connecting lines 90 and 97 of Fig. 3. The stub connections 104, 118 are for connection to a remote dispensing valve.

The construction of the dispensing valves 79A and 79B shown in Fig. 2a can best be understood first with reference to Figs. 6, 6a, 6b and 6c, in addition to Fig. 4. In the illustrated embodiment, each valve is made up of four basic parts. These include a base portion 181 which is molded as part of the manifold 77.

Since both valves are identical, only the right hand valve 79B will be described in detail, insofar as it concerns the present invention. The base portion 181 of the valve is a member containing a large cylindrical bore 182. At the bottom of this bore is located the inlet opening 121 for the carbon dioxide with its O-ring seal 123 and the inlet opening 107 for the diluent, e.g., carbonated water, with its O-ring seal 109. Also located in the base portion is a vent hole 183, an opening 185 through which the concentrate, e.g. a syrup, will be dispensed in a manner to be described below, and a drain passage 187 for the residue of diluent, e.g. carbonated water, after it has passed through the valve. Inserted into the bore 182 is a central rotatable valve member 189. It is supported within the bore 182 for rotation therein in response to operation of a handle 191 and seals against O-rings 109 and 123.

As explained in European Application No. 83105649.4, the dispensing valve performs three separate functions, one of which is causing the simultaneous dispensing of concentrate and diluent. The present invention is concerned with the dispensing of the diluent, carbonated water. In the position of the valve shown in Fig. 6c, which is the dispensing position in which concentrate and diluent flow from the machine, handle 191 is all the way to the right, and an inlet opening 231 in central valve member 189 is aligned with the opening 107 to permit a flow of diluent, e.g. carbonated water, through and out of the valve. This corresponds to the cross section of Fig. 7 and 8. Movement of the handle 191 to the right takes place against the biasing force of a spring 233 which is arranged to return the handle 191 to its middle position.

The passages for the carbonated water in this position, i.e. the position also shown in Fig. 6c, is illustrated by Fig. 7. Shown is the passage 103 which communicates with the opening 107 which is surrounded by the O-ring seal 109, sealing against the rotary valve member 189 and communicating with the passage 231 therein. The diluent thus flows into a pressure reducing chamber 235, and thence out of a spout 237, which is carried by member 189. It will be appreciated that spout 237 therefore moves with member 189 and because it projects under the base 181 the base is provided with a lobe cut-out 237A (Fig. 4) to permit the spout so to move. The spout is directed at an angle to cause mixing of the diluent and concentrate in a manner to be seen more clearly below in connection with Fig. 8. Chamber 235 is designed for minimum agitation of the diluent to prevent excessive loss of carbon dioxide, in that as will be understood from a consideration of Figs. 4 and 9 chamber 235 is of curved elongated form and is of increasing cross section from the inlet 231 to the outlet 237. An adequate flow of diluent is maintained, and that with a predetermined diluent pressure, the outlet flow rate is sufficient to obtain the necessary mixing with the concentrate without excessive foaming. When the handle 191 returns to the position shown in Fig. 6b, the passage 231 overlies the drain passage 187 which has a downward slope. Thus, any diluent remaining in chamber 235 can drain into a glass or cup placed below.

Claims

1. A dispenser for carbonated liquid comprising:

i) a supply of carbonated liquid (11) at above atmospheric pressure;

ii) an assembly comprising first and second relatively movable parts (189, 181);

iii) an i (135) in said assembly and coupled to said supply (11);

iv) an outlet (237) from said assembly from which carbonated liquid may be dispensed;

v) a flow passage (99, 103, 235, 237) through said assembly and connecting said inlet (135) and outlet (237);

vi) a valve (107, 109) in said flow passage and controlling flow of carbonated liquid through the flow passage depending upon relative movements of said parts;

vii) means (191) for relatively moving said parts to control said valve (107, 109);

characterised in that a length (235) of said flow passage comprises an elongated curved expansion chamber of increasing cross section in a direction towards the outlet (237) for reducing the pressure and velocity of carbonated liquid flowing into said chamber before it reaches said outlet (237) so as to minimise loss of carbonation in the dispensed liquid.

2. A dispenser according to Claim 1, characterised in that said relatively movable parts comprise a holder (181) having a cylindrical bore (182), and a rotatable disc (189) rotatably contained in said bore.

3. A dispenser according to Claim 1, characterised in that the said expansion chamber (235) is in said rotatable disc (189).

4. A dispenser according to Claim 3, characterised in that said expansion chamber extends around the disc (189) by an extent to subtend an angle of approximately 90°.

5. A dispenser according to any of Claims 2 to 4, characterised in that the said valve (107, 109) comprises an aperture (107) in said holder (182), an aperture (231) in the disc (189), and an O-ring seal (109).

6. A dispenser according to any of Claims 2 to 4, characterised in that the said means (191) for relatively moving the said holder (181) and disc (189) comprises a lever (191) integral with the disc (189).

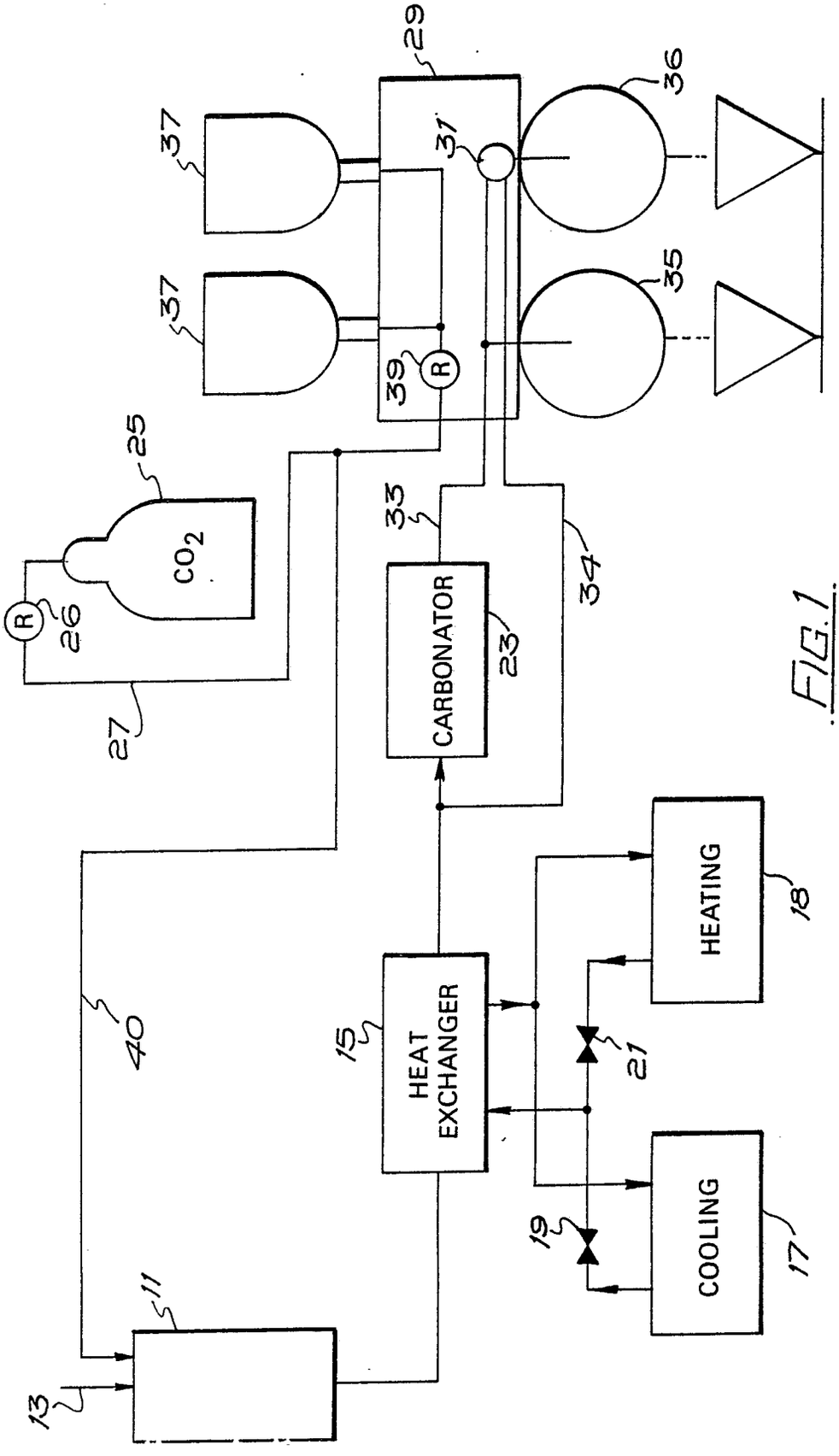
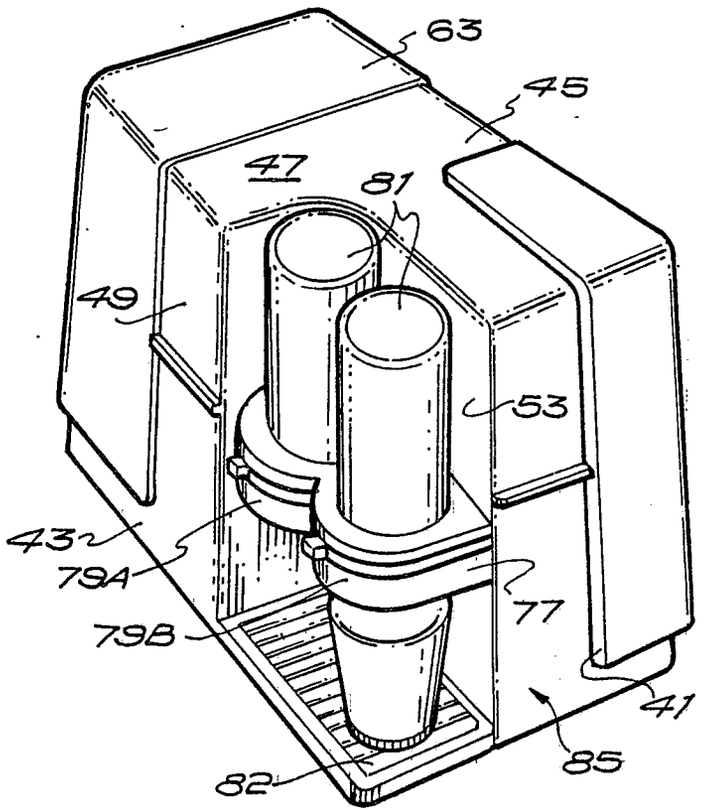

29
36
37
31
37
35
39
R
25
CO_2
R
26
27
33
34
CARBONATOR
23
HEATING
18
40
15
HEAT
EXCHANGER
21
19
COOLING
17
11
13

FIG. 1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47
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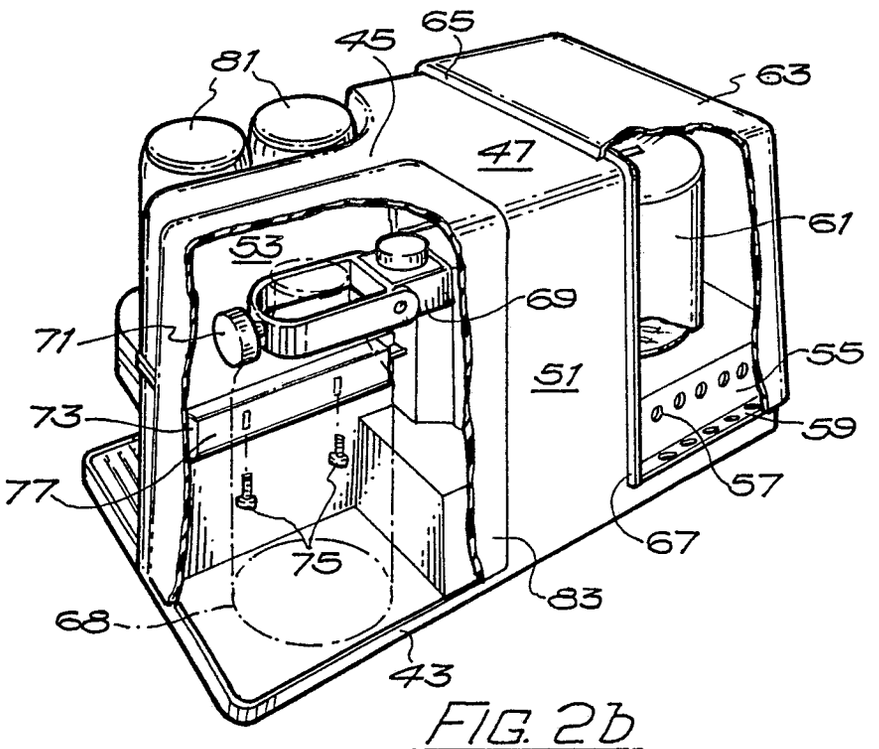
79A
77
79B
41
85
82

FIG. 2a


65
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81
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77
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75
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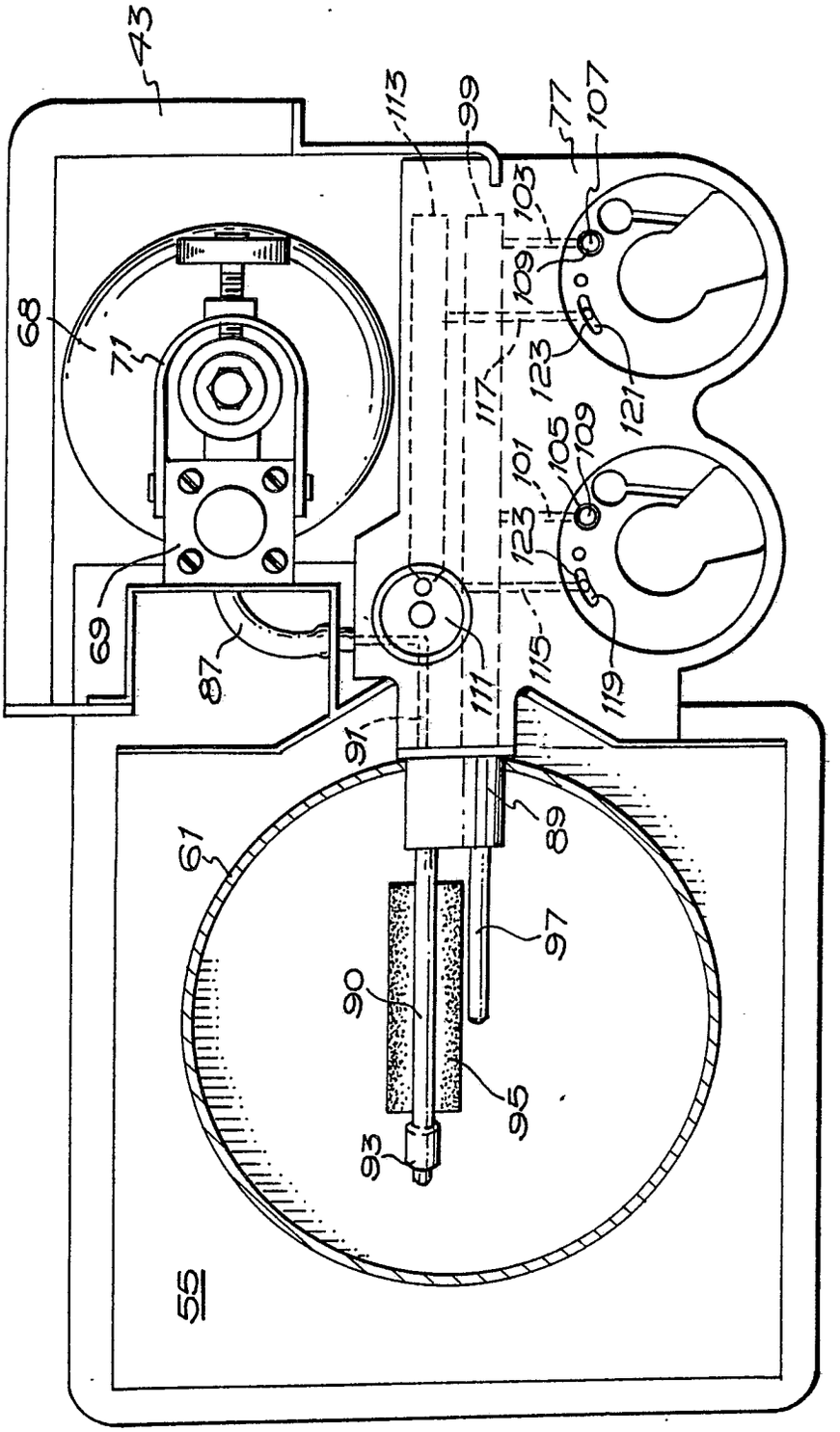
FIG. 2b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113
99
77
107
103
109
68
71
123
117
121
101
105
109
123
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87
111
115
119
91
89
61
97
90
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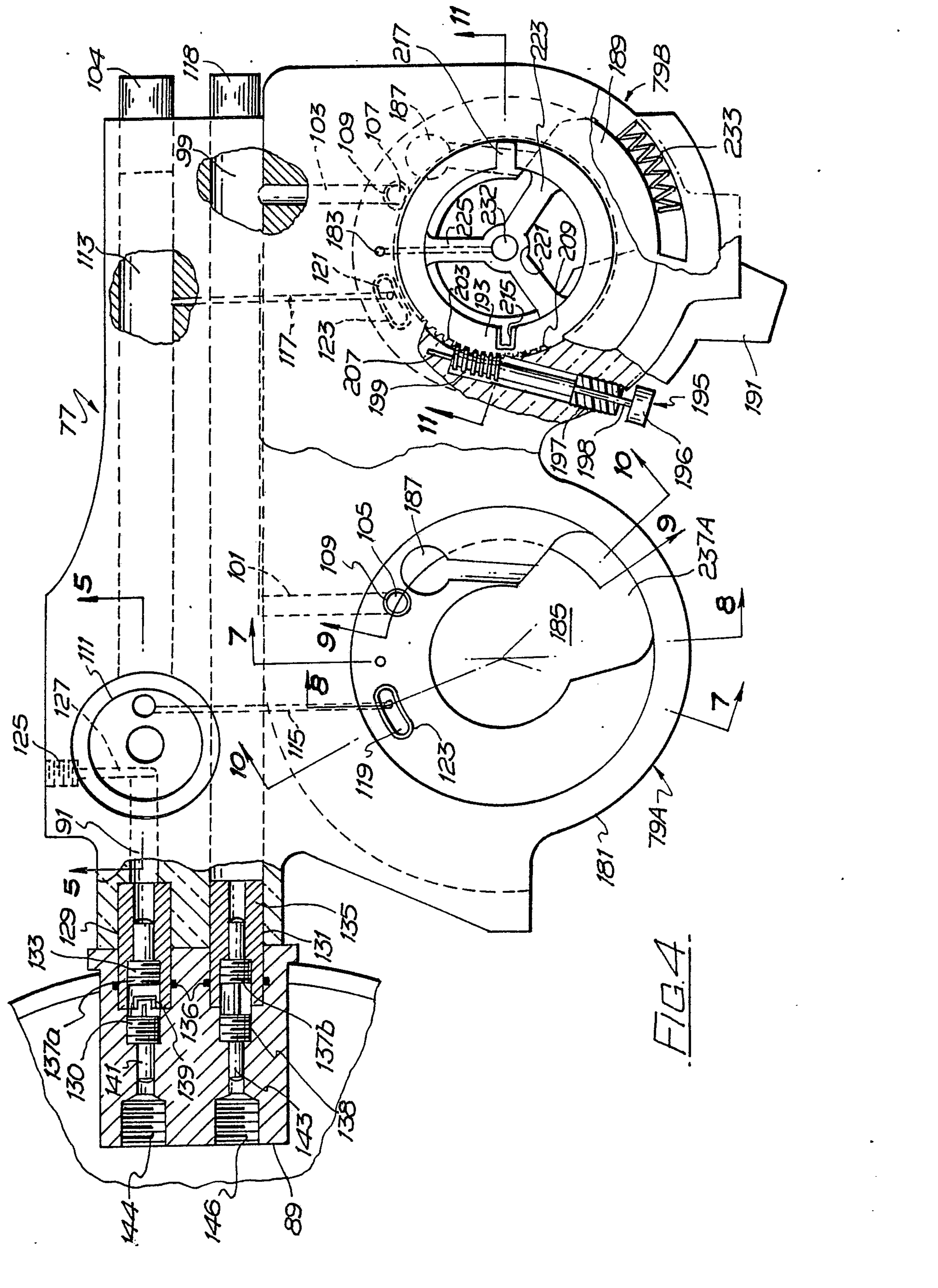
93
55

FIG. 3.


104
118
99
113
103
109
107
187
217
11
223
189
79B
233
232
225
221
209
183
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203
193
215
123
117
207
199
77
195
191
197
198
196
10
9
237A
185
105
101
8
7
5
111
127
125
115
119
91
181
79A
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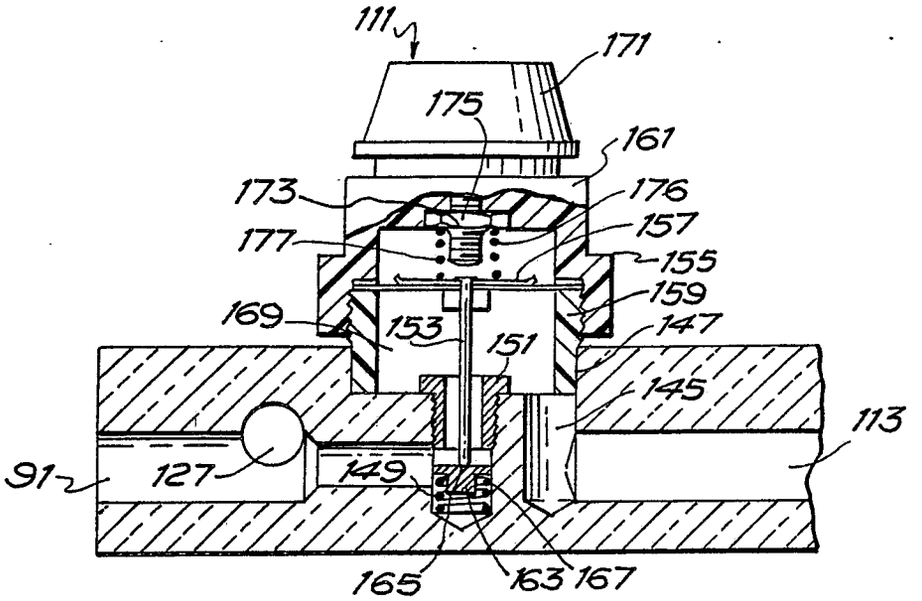
133
135
131
136
137a
130
141
139
137b
143
138
144
146
89

FIG.4


111
171
175
161
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177
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169
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151
147
145
113
91
127
149
165
163
167

FIG. 5

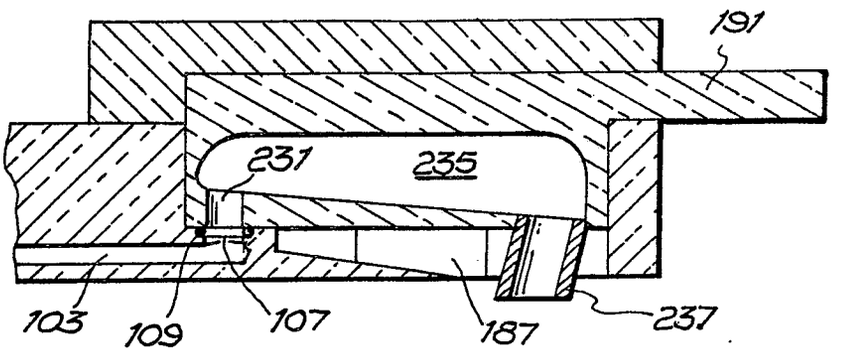
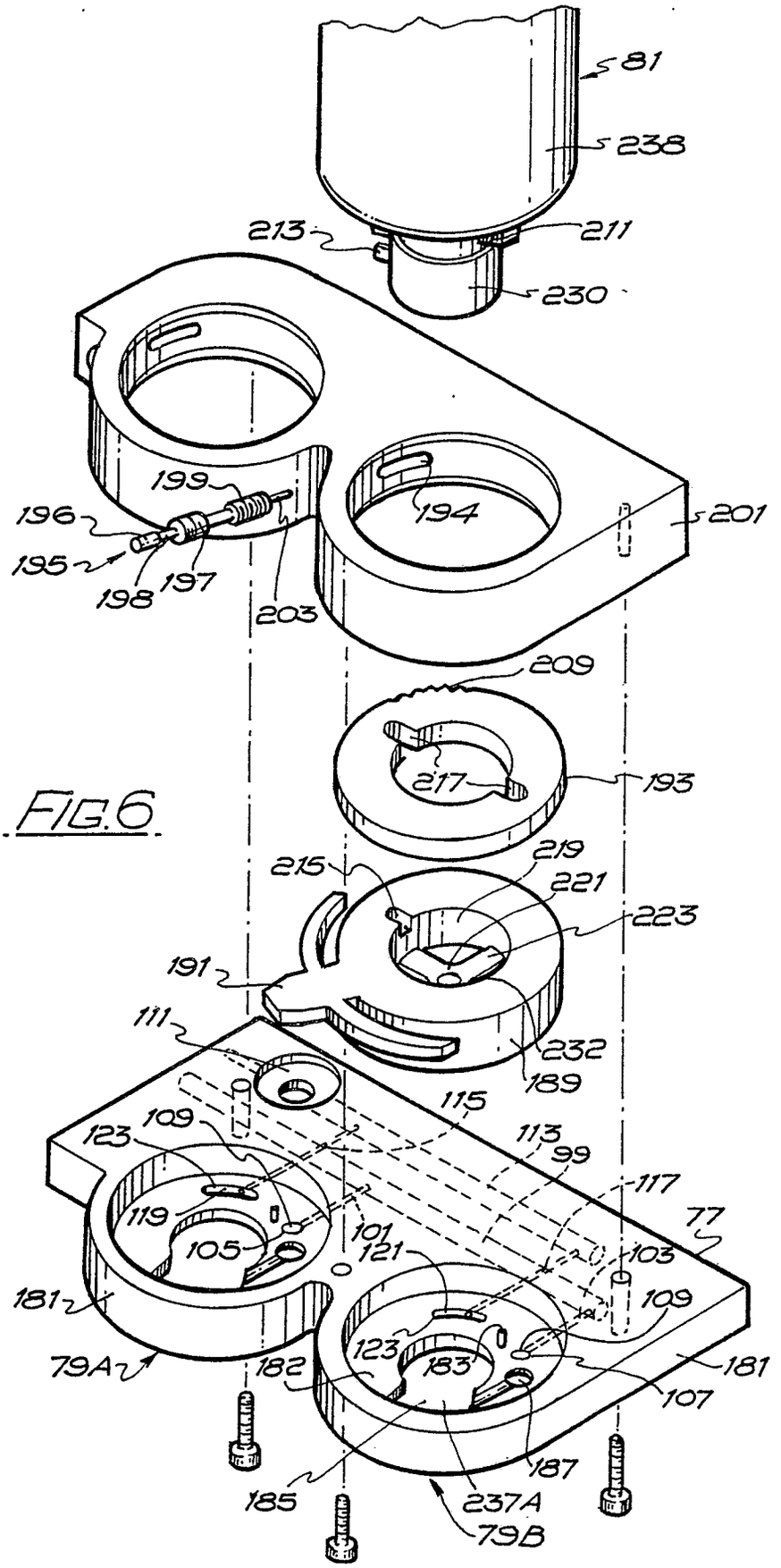

191
231
235
103
109
107
187
237

FIG. 7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238
213
211
230
199
196
195
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194
201
203
209
217
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111
232
189
115
113
99
109
123
117
119
101
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77
181
109
123
183
181
79A
182
107
187
185
237A
79B

FIG.6

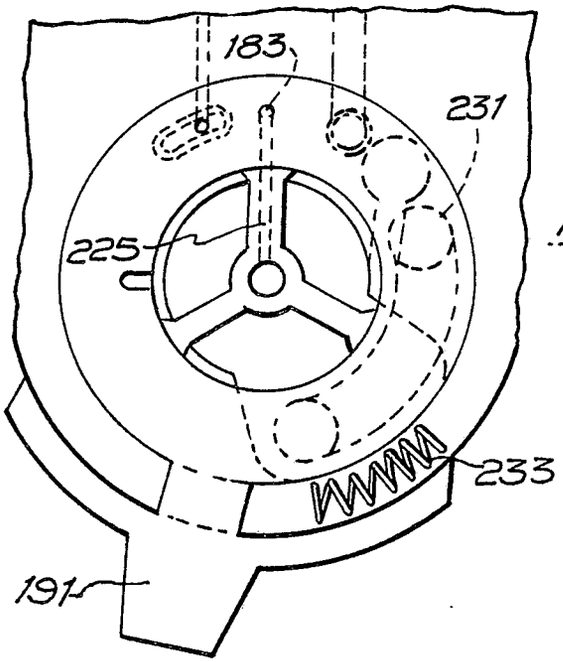


FIG. 6a

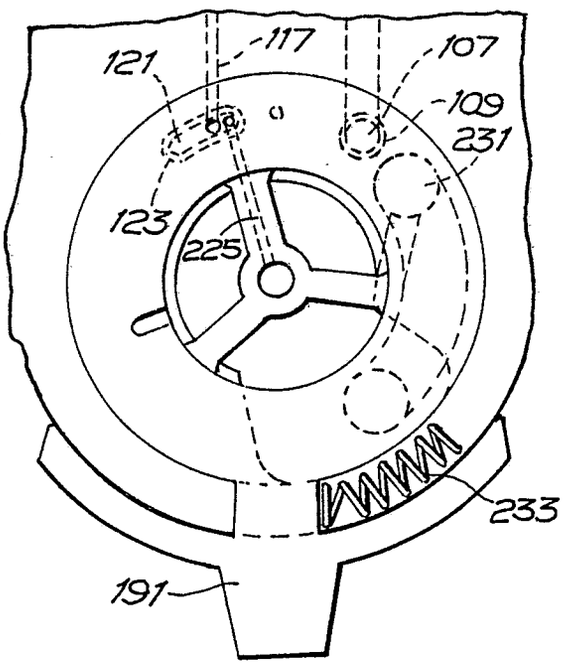


FIG. 6b

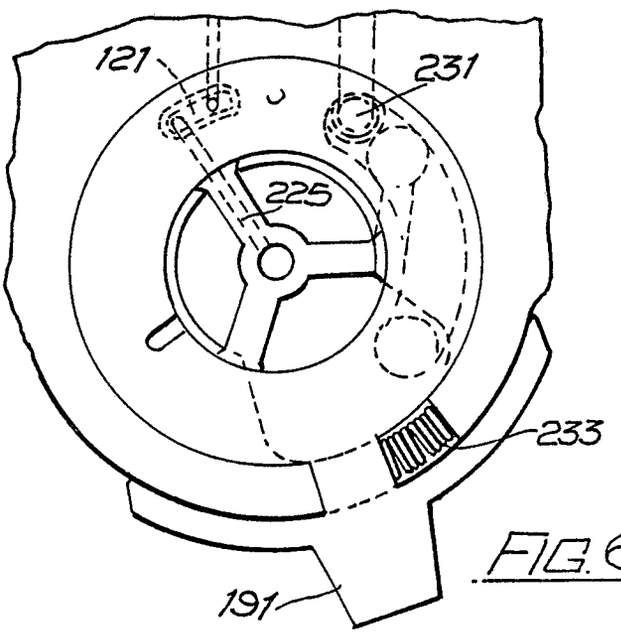
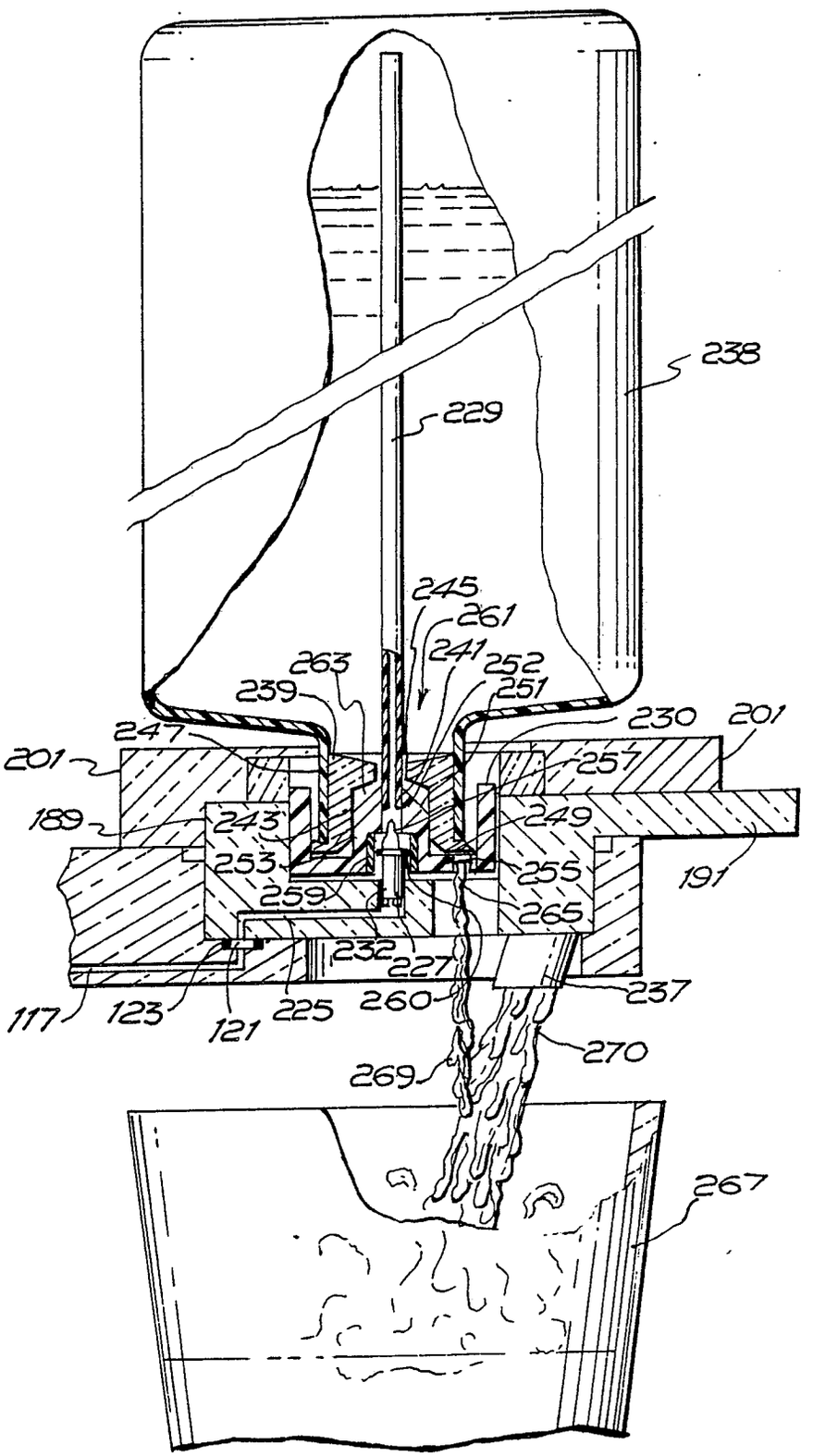


FIG. 6c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261
241
252
263
239
251
247
230
201
201
257
189
243
249
253
255
191
259
265
232
227
237
117
123
121
225
260
270
269
267

FIG. 8

European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 87 10 9913

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	GB-A-1 213 276 (EARDLEY) * Page 2, lines 58-77; page 3, lines 25-74; figures 6-8 *	1-6	B 67 D 1/00 B 67 D 1/14
X	DE-B-1 182 549 (BOOTH) * Figures 1,2; column 5, lines 3-62 *	1	
A	US-A-2 537 119 (BAUERLEIN)		
A	US-A-3 510 104 (WILSON et al.)		
A	US-A-2 989 243 (TURAK)		TECHNICAL FIELDS SEARCHED (Int. Cl.4) B 67 D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	14-10-1987	DEUTSCH J.P.M.

CATEGORY OF CITED DOCUMENTS

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