

PATENT SPECIFICATION

DRAWINGS ATTACHED

1,051,012

1,051,012



Date of Application and filing Complete Specification
March 2, 1964.

No. 8784/64.

Application made in France (No. 926660)
on March 4, 1963.

Complete Specification Published December 14, 1966.

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Index at Acceptance: Class A4, DB4.

Int. Cl.: A47-j 31/100

Apparatus for preparing and dispensing beverages from prefabricated cartridges and a liquid.

COMPLETE SPECIFICATION

I, ROLAND STASSE, a French citizen, of 23 Ter Avenue du Château, ~~Boug-la-Reine~~ (Department of Seine), France, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention relates to apparatus of the type used for producing a beverage by treatment, such as dilution, dissolution, lixivation, decoction or the like, by means of a liquid, of a product contained in a prefabricated cartridge for the purpose of dispensing the beverage thus obtained into a container, for example a tumbler or cup.

The hitherto known apparatus of the type broadly specified hereinabove are either simple dispensers of a drink ready for consumption which is enclosed in a tank (as in the case of the well-known orangeade dispensers) or devices wherein hot water under pressure flows through a mass of the product to be infused which is placed in a filter or in a cartridge (for instance as in coffee-making machines of the well-known "Italian" type).

Both types of drink dispensing apparatus have a common inconvenience: they are not capable of delivering different beverages in succession without requiring complete cleaning of at least the delivery section of the apparatus.

In these known apparatus the prepared drink flows through one or more nozzles or spouts forming an integral part of the apparatus. For instance in the case of a coffee-making machine the filter containing the ground coffee is provided, as a rule, with two spouts for filling two cups simultaneously. The preparation of tea by means of the same apparatus would require thorough preliminary cleaning of this filter and of the spouts attached thereto to avoid the mixing of residual coffee with the tea. It is obvious

that this cleaning operation is definitely precluded with so-called 'self-service' apparatus or those available for the members of communities, for example schools, workshops and hospitals.

It is therefore current practice to juxtapose several dispensers each intended for delivering a single type of beverage. This mode of dispensing beverages is objectionable from the hygienic point of view, for if a relatively long time period (for example overnight, or a week-end) elapses between two successive uses of the same apparatus certain organic residues may, due to fermentation, produce toxic substances which become incorporated in the beverages subsequently dispensed.

Under these conditions, there is added to the high investment cost due to the necessity of using a plurality of dispensers for the same plurality of different beverages the cost of the labour necessary for frequently cleaning the dispensers.

Cartridge-type apparatus as heretofore known have the same drawbacks.

It is the object of the present invention to provide an apparatus adapted to deliver different beverages in succession without allowing the beverage to come in contact with the apparatus.

In accordance with the invention there is provided apparatus for producing a beverage by the treatment with a liquid of a product enclosed in a prefabricated cartridge and for dispensing the produced beverage into a container, the apparatus comprising in combination two relatively movable parts one of which constitutes a cartridge holder having an outlet orifice of relatively large area and the other of which includes means adapted, upon relative movement of said parts towards one another, to perforate a cartridge carried by said cartridge holder and to supply liquid to the perforated cartridge, the said other part including for

(Price 4s. 6d.)

A47j 31/100
Bourg-la-Reine

residual

this purpose a perforating member and at least one liquid supply pipe, the apparatus further including at least one cartridge adapted to be carried by said cartridge holder, said cartridge being adapted for the formation therein, at the time of its use, with an outlet orifice of relatively small area coaxial with the outlet orifice of said cartridge holder so as to permit the direct outflow of beverage from said cartridge without contacting said cartridge holder.

In order to afford a clearer understanding of this invention and of the manner in which it may be carried into effect, reference will now be made to the accompanying drawings which illustrate diagrammatically and by way of example some embodiments of the invention. In the drawings:

Figure 1 is a diagrammatical side-elevational view of apparatus for dispensing beverages, according to a first embodiment of the invention, shown with parts broken away;

Figure 2 is a part-sectional elevational view of a cartridge for use with the apparatus illustrated in figure 1;

Figure 3 is a fragmentary side elevational view showing another embodiment of the invention;

Figure 4 is a fragmentary side elevational view of another embodiment of the invention;

Figure 5 is a part-sectional view showing a further embodiment of the invention;

Figures 6, 7 and 8 are side elevational views showing three different forms of cartridge for use with the apparatus of this invention;

Figures 9a, 10a, 11a and 12a are plan views showing four different types of perforated discs for use in a cartridge;

Figures 9b, 10b, 11b and 12b are diametral sectional views of the discs shown in Figures 9a, 10a, 11a and 12a respectively;

Figures 9c, 10c, 11c and 12c illustrate the deformation produced in the said discs as a consequence of the passage of beverage therethrough.

The apparatus shown in Figures 1 to 5 comprises a movable upper body 1 adapted to be connected to a source of liquid under pressure, as a rule water, through a control valve 2, and a fixed lower body 3 constituting a cartridge holder adapted to support a cartridge 4.

The upper body 1 is provided with a perforating member 5 adapted to perforate the lid 6 of the cartridge 4 and with at least one nozzle or pipe for delivering liquid under pressure to the member 5 and thence through the aperture thereby formed in the cartridge.

The perforating member is tubular and acts at the same time as a liquid dispensing pipe, the liquid being ejected therefrom

through lateral orifices 5a, as shown in Figure 1.

Due to the relatively high pressure (of the order of 80 to 100 psi) of the liquid fed to the apparatus (mains water in the case of cold water, or hot-water in the case of a generator), some kind of reliable sealing gasket must be provided at the joint between the two bodies in order to avoid unpleasant splashes.

The cartridge 4 consists of a substantially frusto-conical enclosure, and its upper orifice is formed with an external flange 4a constituting a contact and sealing surface for a lid 6.

The flange 4a, the lid 6, or better still, their combined thicknesses, provide at no cost the aforesaid necessary sealing gasket, inasmuch as the latter is used only once.

The cartridge may be manufactured from very thin pressed metal sheet stock, but injection-moulded plastic may also be used. However, cartridge cost may be reduced by resorting to blown or, preferably, blown-stretched plastic permitting considerable reduction of the wall thickness of the cartridge (of the order of 0.008") whilst preserving a reasonable thickness of the flange 4a. In practice, the cartridge walls have a relatively low mechanical strength and in order to enable them to withstand the relatively high liquid pressure the lateral walls of the cartridge are caused to bear against the inner lateral wall of the cartridge carrier 3, the shapes and dimensions of the cartridge and cartridge holder being matched accordingly.

Preferably, the cartridge and cartridge holder configuration is substantially frusto-conical as shown, so as to facilitate on the one hand the dispersion of the liquid throughout the mass of the product contained in the cartridge and on the other hand the ejection of the cartridge after use. The cartridge may terminate downwardly in lip-like portions 4b, the joined edges of these portions 4b (see Figure 2) being adapted to be separated or forced away from each other by the liquid pressure.

In all cases it is desirable to use cartridges having an annular intermediate base or disc 4d (Figure 6) adapted to fit on an inner flange 3a of cartridge holder 3 which bounds the central orifice 3b thereof (Figure 5).

Thus, the cartridge is firmly supported both at the top and at the bottom.

The cartridge further comprises an inner perforated disc 7, to be described hereinafter, which acts as a pressure-reducing diaphragm by producing a loss of pressure by throttling, thus preventing the delivery of a liquid jet at an excessive pressure. This disc is disposed at right angles to the cartridge axis and at a level high enough to lie within the cartridge portion supported by

the cartridge holder so as to form between this disc and the outlet orifice a zone 4e acting as an expansion chamber.

Referring to Figure 6 it will be seen that this expansion chamber 4e constitutes a projection formed with a nipple 4f adapted to be cut or perforated either manually or mechanically to provide a delivery orifice coaxial with the orifice 3b of the cartridge holder.

In the cartridge illustrated in Figure 7 the expansion chamber 4e may initially be perforated, the perforation being sealed by a patch 4g adhering to the lower face of said chamber 4e.

The expansion chamber of the cartridge illustrated in Figure 8 is not closed at its base, the sealing patch 4g being cemented on the disc 7 or base 4d, either on the upper face or on the lower face thereof, according to the type of holes formed therein.

Regardless of the design of cartridge selected (Figures 2, 6, 7 or 8) the coaxial arrangement of the outlet orifices 4g, 3f of the cartridge and of the cartridge holder, respectively, permits the beverage flowing from the cartridge to enter the tumbler or cup 11 without making any contact between the liquid and the cartridge holder.

This result is obtained *a fortiori* when the lips 4b (Figure 2) of the nipple 4f of the cartridge project through the orifice 3f of said cartridge holder and are therefore at a lower level than the base 3a thereof. Under these conditions, it is possible, by placing cartridges 4 containing different products in the cartridge holder 3, to obtain as desired different types of beverage without any risk of mixing different products whilst safeguarding all hygienic requirements.

The apparatus illustrated in Figure 1 comprises a fixed lower body 3 constituting the cartridge holder, and a movable upper body 1 pivotally mounted by means of links 12 on a wall plate 13 integral with the body 3, whereby the movable body 1 may be moved away from the cartridge holder.

The body 1 supports the perforating member 5 as well as one or more liquid feed pipes or nozzles (for example one pipe for hot water and another pipe for cold water), all the feed pipes or nozzles being controlled by means of a common multi-way cock or valve 2. The arrangement may also comprise a plurality of cocks or valves 2 connected through flexible lines to the sources of liquids. Preferably, the liquids are fed in succession to the cartridge through a common duct consisting of the interior of the tubular perforating member 5, and in this case a multi-way cock 2 is used.

This apparatus is completed by a spring-loaded hook 18 adapted to lock the two bodies of the apparatus together during the use thereof.

The apparatus illustrated in Figure 3 is substantially the reverse of the arrangement shown in Figure 1 in that the body 101 which carries the perforating member 105 is stationary and is supported by the bracket 102, and the body 103 constituting the cartridge holder is adapted to turn about a horizontal axis 104 from the empty-cartridge ejection position shown in chain-dotted lines to the position shown in full lines.

For this purpose the body 103 of the cartridge holder is rigid with a lever 106 fulcrumed at 104 on the bracket 102 and provided with a handle 107 adapted to revolve about a shaft carrying on the one hand a locking device 118 adapted to engage a cam face of body 101 and on the other hand a cutter 108. After the filled cartridge 4 has been placed in the apparatus the upward movement of lever 106 causes the cartridge lid to engage the base of body 101 and be perforated, the rotation of the handle 107 first causing the cutter 108 to cut off the nipple 4f and then locking the two bodies together.

After the beverage has been dispensed, the handle 107 is operated to unlock the bodies from one another and then to move the lever 106 downwardly, so as to bring the spent cartridge near the lower portion of the bracket 102 where an ejector 109 passing through a hole 103b engages the bottom 4d of the cartridge and ejects it. This apparatus is particularly suitable for skilled users, that is, members of a community using the apparatus every day or frequently.

A simpler apparatus suitable for example for home or family use is shown in Figure 5. This apparatus comprises a cartridge holder 203 provided with a handle 207. This cartridge holder is adapted to be secured on a fixed body 201 in the fashion of the well-known Italian coffee-making machines, that is, by means of a bayonet joint. In this embodiment of the invention the cartridge, which is of the type illustrated in Figure 6, has a nipple 4f to be cut manually.

In the case of apparatus for public use e.g. public transport, railway stations, halls, the operation of the apparatus must be more automatic in order to preclude any wrong handling thereof.

The apparatus illustrated in Figure 4 meets this requirement.

The body 303 which constitutes the cartridge holder is mounted for horizontal sliding movement in relation to a body 301, a handle 307 facilitating this movement. The perforating member 305 which also acts as a liquid feed duct is mounted for vertical sliding movement, its stem 305b being rigid with the armature of an electromagnet 304 and being connected to a solenoid-operated multi-way valve 302 adapted to connect the duct to any one of a plurality of sources of

liquid under pressure, whether hot or cold. The stem 305b also carries an annular member 305c on which at least two spring-loaded locking members 318 are pivoted.

5 The apparatus also includes a push-button switch 315 included in an electrical circuit. When the body 303 is pulled out from the body 301 a new cartridge 4 can be placed therein. The switch 315 is then open but is
10 ready to close the energizing circuit of electromagnet 304, and the assembly 305, 305a, 305b, 305c and 318 is pulled upwards by a tension spring 316. A leftward thrust exerted by the user on the handle 307 causes
15 the body 303 to slide horizontally in relation to the body 301 and the nipple 4f is cut by a fixed cutter 308 while the cartridge is kept by the guide 301; upon completion of this stroke the body 303 depresses the push-
20 button of switch 315, thus closing the energizing circuit of electromagnet 304 and solenoid-operated valve 302, for example through the medium of time delay relays (not shown).

25 The assembly 305, 318 is thus lowered and the cartridge lid 6 is perforated, the liquid flowing into the cartridge, and the locking members 318 engage the underside of cartridge 4 through suitable notches formed in
30 the body 303, due to the bevelled portion of the hook-shaped heads 318a of said locking members. By pulling the handle 307 to the right, as seen in the figure, the electromagnet circuit is broken and the spring 316
35 moves the assembly 305, 318 upwardly together with the empty cartridge, until the heel portions 318b of locking members 318 engage fixed cams 317 and are moved against the resistance of springs 319, thus
40 moving the hook portions 318a radially apart and allowing the empty cartridge to fall onto a deflector 301e adapted to direct it toward a disposal bin or the like, whereupon the cycle of operation of the apparatus
45 may be repeated.

Of course, as far as the supply of liquid to the apparatus is concerned, the apparatus illustrated in fragmentary views in Figures 3, 4 and 5 may be arranged as described in
50 connection with Figure 1.

The perforated disc 7 plays an important part in obtaining the desired result, on the one hand by creating a pressure drop capable of retarding the outflow through the orifice
55 4g, not only in order to avoid unpleasant splashes but also for adequately proportioning the rate of flow through this orifice as a function of the time required for treating the basic product in order to obtain the
60 desired quality of beverage; if desired it may also act as a filter.

Figures 9a, 9b and 9c each illustrate a disc 7 formed with a central slot for dissolving fine powdered products (orange
65 powder, lemon powder, etc.). It will be

noted that the deformation of the disc in use is moderate.

Figures 10a, 10b and 10c show a disc 7 formed with two parallel slots, as required for dissolving coagulating powders (such as
70 cocoa, milk, etc.), the central portion 7b between the slots tending to be slightly deformed due to the viscosity of the liquid.

Figures 11a, 11b and 11c show a disc 7 formed with a pair of crossed slots providing
75 four corners 7c adapted to be spread apart under the liquid pressure to permit the passage of lumps or like solid elements contained in the beverage (for example herbs for seasoning, mushrooms or meat.)

In contrast, the disc 7 illustrated in Figures 12a, 12b and 12c is formed with a multiplicity of small perforations 7d in the fashion
80 of a sieve. This disc is adapted to become concave under the liquid pressure and is intended more particularly for infusions, lixivations and decoctions (coffee, tea, lime-blossom tea, etc.).

WHAT I CLAIM IS:

1. Apparatus for producing a beverage
90 by the treatment with a liquid of a product enclosed in a prefabricated cartridge and for dispensing the produced beverage into a container, the apparatus comprising in combination two relatively movable parts one of
95 which constitutes a cartridge holder having an outlet orifice of relatively large area and the other of which includes means adapted, upon relative movement of said parts towards one another, to perforate a cartridge
100 carried by said cartridge holder and to supply liquid to the perforated cartridge, the said other part including for this purpose a perforating member and at least one liquid supply pipe, the apparatus further including
105 at least one cartridge adapted to be carried by said cartridge holder, said cartridge being adapted for the formation therein, at the time of its use, with an outlet orifice of relatively small area coaxial with the outlet
110 orifice of said cartridge holder so as to permit the direct outflow of beverage from said cartridge without contacting said cartridge holder.

2. Apparatus according to claim 1
115 wherein said cartridge is shaped so that when placed on said cartridge holder the portion in which said orifice of relatively small area is to be formed projects through
120 said orifice of relatively large area.

3. Apparatus according to claim 1 or 2
125 wherein said cartridge is divided into two compartments by a perforated inner disc acting as a pressure reducing device, one compartment constituting the container proper for the said product and the other compartment being arranged to communicate with the outlet orifice of the cartridge when formed and to act as an expansion



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50 connection with Figure 1.

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55 4g, not only in order to avoid unpleasant splashes but also for adequately proportioning the rate of flow through this orifice as a function of the time required for treating the basic product in order to obtain the
60 desired quality of beverage; if desired it may also act as a filter.

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WHAT I CLAIM IS:

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95 which constitutes a cartridge holder having an outlet orifice of relatively large area and the other of which includes means adapted, upon relative movement of said parts towards one another, to perforate a cartridge
100 carried by said cartridge holder and to supply liquid to the perforated cartridge, the said other part including for this purpose a perforating member and at least one liquid supply pipe, the apparatus further including
105 at least one cartridge adapted to be carried by said cartridge holder, said cartridge being adapted for the formation therein, at the time of its use, with an outlet orifice of relatively small area coaxial with the outlet
110 orifice of said cartridge holder so as to permit the direct outflow of beverage from said cartridge without contacting said cartridge holder.

2. Apparatus according to claim 1
115 wherein said cartridge is shaped so that when placed on said cartridge holder the portion in which said orifice of relatively small area is to be formed projects through said orifice of relatively large area.
120

3. Apparatus according to claim 1 or 2 wherein said cartridge is divided into two compartments by a perforated inner disc acting as a pressure reducing device, one compartment constituting the container
125 proper for the said product and the other compartment being arranged to communicate with the outlet orifice of the cartridge when formed and to act as an expansion

chamber.

4. Apparatus according to claim 3 wherein the shapes, dimensions and arrangement of the perforations formed in said disc are a function of the pressure reduction corresponding to the necessary time of treatment of the product by the liquid.

5. Apparatus according to claim 3 or 4, wherein the perforations in said disc consist of separate slots.

6. Apparatus according to claim 3 or 4 wherein the perforations in said disc consist of convergent slots.

7. Apparatus according to claim 3 or 4 wherein the perforations in said disc consist of a multiplicity of holes.

8. Apparatus according to claim 1 wherein the part constituting said cartridge holder is separate from the other of said parts.

9. Apparatus according to claim 1 wherein the part constituting said cartridge holder is pivotally mounted on the other of said parts.

10. Apparatus according to claim 1 wherein the part constituting said cartridge holder is mounted for horizontal sliding movement in relation to the other of said parts.

11. Apparatus according to claim 10 including power means for actuating said perforating member and said pipe to reciprocate them relative to said cartridge holder, said power means being responsive to electrical devices controlled by means of a push-button micro-switch disposed in the

path of the cartridge holder and adapted to be actuated thereby.

12. Apparatus according to claim 11 wherein said push-button micro-switch is also adapted to control the energizing circuit of a solenoid-operated valve included in said liquid feed pipe.

13. Apparatus according to claim 12 wherein time relay means are inserted in the circuit of said power means and said solenoid operated valve.

14. Apparatus for producing a beverage, substantially as described hereinabove with reference to the accompanying drawings.

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