

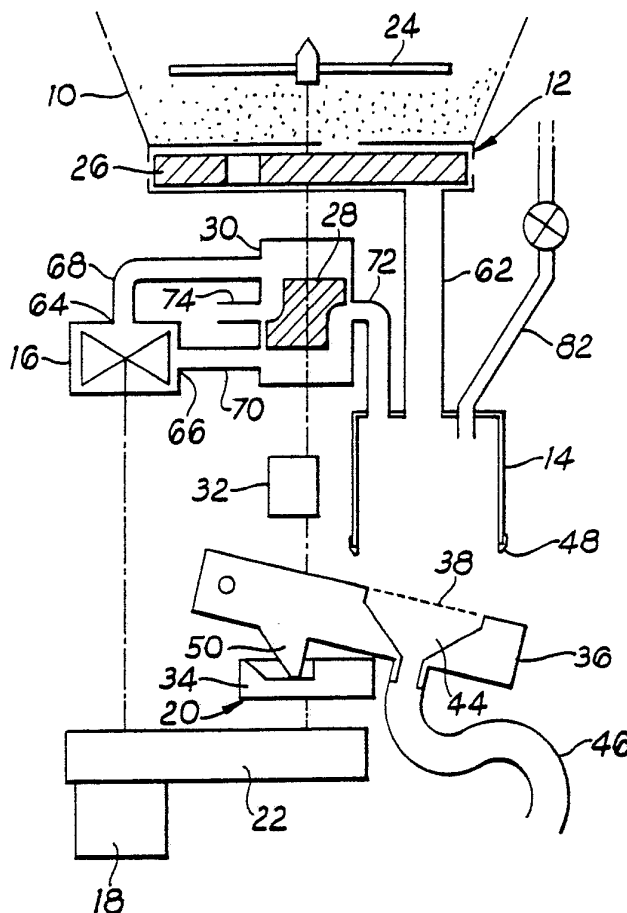
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

| | | | |
|--|-----------|---|--|
| INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT) | | (11) International Publication Number: WO 88/ 02612 (43) International Publication Date: 21 April 1988 (21.04.88) | |
| (51) International Patent Classification ⁴ : A47J 31/40, 31/32 | A1 | | |
| (21) International Application Number: PCT/GB87/00749 (22) International Filing Date: 19 October 1987 (19.10.87) (31) Priority Application Numbers: 8625009 8626699 (32) Priority Dates: 18 October 1986 (18.10.86) 7 November 1986 (07.11.86) (33) Priority Country: GB | | (81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB, GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US. Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> | |
| (71)(72) Applicant and Inventor: CARNEY, Peter, Andrew [GB/GB]; 39 Wellman Croft, Selly Oak, Birmingham B29 6NP (GB). (74) Agents: ROBERTSON, Bernard, C. et al.; GKN plc, Group Patents & Licensing Dept., P.O. Box 55, Ipsley House, Ipsley Church Lane, Redditch, Worcs. B98 0TL (GB). | | | |

(54) Title: APPARATUS FOR PREPARING AN INFUSION

(57) Abstract

Apparatus for preparing an infusion from a liquid and an infusible ingredient comprises an infusion chamber (14) with a body and a movable base (36) provided with a filter (38), a receiver (44) for receiving infusion through the filter, means (34) for moving the base between closed and open positions, an air pump (16) arranged either to draw air upwardly through the filter during infusion or to pressurize the infusion chamber for discharging the infused liquid through the filter, and a rotary control member (20) which is arranged to control both the means for moving the base between its closed and open positions and the operation of the air pump. The air pump preferably is associated with a rotary valve (30) which connects either the suction or pressure side of the pump to the infusion chamber. Also described is a dispensing device (12) for delivering the infusible ingredient to the chamber, and a wiper device (40) for removing spent infusible ingredient from the filter, both of which also are operated by the rotary control member (20).



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

| | | | | | |
|----|------------------------------|----|--|----|--------------------------|
| AT | Austria | FR | France | ML | Mali |
| AU | Australia | GA | Gabon | MR | Mauritania |
| BB | Barbados | GB | United Kingdom | MW | Malawi |
| BE | Belgium | HU | Hungary | NL | Netherlands |
| BG | Bulgaria | IT | Italy | NO | Norway |
| BJ | Benin | JP | Japan | RO | Romania |
| BR | Brazil | KP | Democratic People's Republic of Korea | SD | Sudan |
| CF | Central African Republic | KR | Republic of Korea | SE | Sweden |
| CG | Congo | LI | Liechtenstein | SN | Senegal |
| CH | Switzerland | LK | Sri Lanka | SU | Soviet Union |
| CM | Cameroon | LU | Luxembourg | TD | Chad |
| DE | Germany, Federal Republic of | MC | Monaco | TG | Togo |
| DK | Denmark | MG | Madagascar | US | United States of America |
| FI | Finland | | | | |

APPARATUS FOR PREPARING AN INFUSION

This invention relates to apparatus for preparing an infusion from a liquid and an infusible ingredient (such as tea or coffee). Apparatus according to the invention is suitable for use in beverage vending machines, or more generally for preparing beverages for domestic or commercial purposes.

There have been many proposals for designs of apparatus for preparing infusions, e.g. of tea or coffee. Such designs have in general been extremely complex, and accordingly it is the general object of the present invention to provide an infusion-preparing apparatus of decreased complexity, whilst, of course, providing a satisfactory performance. The particular features of the apparatus which give this result will be particularly pointed out in the following summary of the invention and detailed description of an embodiment thereof.

According to the present invention, we provide apparatus for preparing an infusion from a liquid and an infusible ingredient, comprising:-

an infusion chamber having a body and a base movable relative to the body between a position closing the infusion chamber and an open position, the chamber being able to receive the infusible ingredient and the liquid;

a filter in said base, permeable to liquid and impermeable to the infusible ingredient;

a receiver under the base for receiving infusion through the filter;

air pump means operable in a first mode to cause upward flow of air through the filter for agitation of the liquid during infusion, and in a second mode to

cause discharge of liquid infusion through the filter;
means for moving the base between its closed and
open positions, to permit removal of spent infusible
ingredient from the filter when the base is in its open
5 position;

and a rotary control member, rotatable about an
axis and arranged to control both the means for moving
the base and the operation of the air pump means as
between its first and second modes.

10 In its broadest aspect, the invention enables a
reduction in complexity of the apparatus by providing for
both the air pump means and the means for moving the base
to be operated by a rotary control member.

Preferably the air pump means comprises a pump
15 having a suction side and a pressure side, and valve
means, preferably rotary valve means operable by the
rotary control member to connect the suction side of the
pump to the chamber above the filter in the first mode,
and to connect the pressure side of the pump to the
20 chamber above the filter in the second mode.

A rotary valve can readily be arranged to be
operable from a rotary control member to connect the pump
in the two modes above described, firstly to draw air
upwardly through the filter to agitate the infusing
25 liquid and ingredient and secondly to pressurise the
chamber above the filter to a superatmospheric pressure,
thereby to expel the infusion through the filter into the
receiver whilst retaining spent infused ingredient on the
filter.

30 The means for moving the base conveniently
comprises a cam carried by the rotary control member and

operable upon the base, the base being pivotally mounted relative to the infusion chamber and being pivotable downwardly therefrom to its open position. To establish a liquid-tight seal between the base and chamber when the base is in its closed position, the chamber preferably carries a suitable sealing means at its lower edge.

Spent infusible ingredient is preferably removed from the filter by wiper means whilst the base is in its open position, and such wiper means is preferably operable by a further cam carried by the control member. For improved efficiency in wiping the filter, the wiper means may be spring biased to move from a starting position in a wiping direction to remove spent ingredient from the filter, and be movable by the further cam back to the starting position against such spring biasing.

Preferably the apparatus further comprises means for delivering infusible ingredient to the chamber, which means is also operated by the rotary control member.

Two embodiments of means for delivering infusible ingredient to the chamber are described hereafter, both using the rotary control member to operate them. Thus in apparatus according to the invention, all or substantially all the essential operational functions of the apparatus may be controlled by the rotary control member, with the advantageous results of simplicity and improved reliability.

A single motor and associated gearing means may be provided, to give a first, slow speed, output driving the rotary control member, and a second, high speed, output driving the air pump means. As an optional feature, means for grinding the infusible ingredient prior to

delivery thereof to the infusion chamber may be provided, the grinding means being driven from the second output of the motor.

5 Preferably the rotary control member is rotatable about a vertical axis, which is most suited to the general arrangement of the apparatus which requires gravitational delivery and removal of the infusion and its ingredients to and from the infusion chamber.

10 The invention will now be described by way of example with reference to the accompanying drawings, of which:-

Figure 1 is a diagrammatic perspective view showing the main elements of apparatus according to the invention;

15 Figure 2 is an exploded view showing part of the apparatus of Figure 1, with some parts omitted for clarity;

Figure 3 is a diagrammatic elevation of the main elements of the apparatus, in one operative position thereof;

20

Figures 7, 8, and 9 are views as Figure 3 showing different operative conditions of the apparatus;

Figures 4, 5, 6, 10, 11 and 12 are diagrammatic perspective views of part of the apparatus in different operative positions;

25

Figure 13 is a timing diagram depicting the operating cycle of the apparatus;

Figure 14 is a diagrammatic elevation of a further embodiment of the apparatus;

Figure 15 is a diagrammatic perspective view of part of an alternative construction of part of the apparatus;

Figures 16 to 19 are partial views diagrammatically showing successive stages of operation of the part of Figure 15.

Referring firstly to Figures 1 and 2 of the drawings, apparatus for preparing an infusion comprises the main elements:

a storage container 10 for an infusible ingredient in particulate form, e.g. tea leaves or coffee grounds,
a dispenser 12 for the infusible ingredient,
an infusing chamber 14, having a movable base 36,
an air pump 16, e.g. a rotary blower, drivable directly from an electric motor 18,
and a rotary control member 20, having various elements assembled thereon as will be described hereafter, the control member 20 being drivable from the motor 18 by way of a reduction gearbox so that the member makes one complete revolution in a cycle of operation of the apparatus.

The control member 20 is provided, from top to bottom, with the following elements;

an agitator 24 in the ingredient container 10, to prevent the ingredient from settling,
a dispenser disc 26 in the ingredient dispenser 12, the detail and operation of which will be more fully described hereafter,
a rotary element 28 of a rotary valve 30 which

provides for connection of either the suction or pressure side of the pump 16 to be connected, by way of pipes 68, 70 and 72,

an upper cam 32 for operating the wiper to be
5 described hereafter,

and a lower cam 34 for moving the base 36 between a raised position in which it closes the bottom of the infusion chamber 14, and a lowered, open, position in which it is dropped away from the infusion chamber.

10 The control member 20 and the parts carried thereby, pump 16, and motor 18, are carried by a chassis plate or structure 22 which also contains the reduction gearing leading to the control member 20 from the motor 18. The base 36 is pivoted to such chassis plate. The
15 infusion chamber 14 is supported in a fixed position relative to such chassis plate by means not shown, e.g. a cabinet or frame structure of a vending machine. The ingredient container 10 is similarly supported.

The base 36 presents a flat upper surface to engage
20 the lower periphery of the infusion chamber 14 which carries a seal 48 to form a liquid-tight seal with the base 36. Within the area engaged by the infusion chamber 14, the base has a filter 38, permeable to liquid but impermeable to the infusible ingredient to be used.
25 Beneath filter 38, base 36 is formed with a tundish 44 to provide a receiver for liquid infusion passing downwardly through the filter 38, leading into a flexible pipe 46 for delivery of the infusion to a cup or other receptacle.

30 The cam 34 presents a cam surface in the direction along its rotational axis, engageable with a cam follower 50 provided beneath the base 36 for raising and lowering

the base.

The base 36 is further provided with a wiper arm 40, pivotally mounted thereon and movable in one direction under the action of a biasing spring 42, and in the opposite direction, against the action of biasing spring 42, by cam 32. The shape of the filter 38 may be part-annular, corresponding to the arcuate path of movement of the wiper arm 40. The wiper arm 40 has an extension 76, engageable with a stop 78 and a latching abutment 80, in the cycle of operation of the machine to be described hereafter. Cam 32 engages a cam follower portion 44 of the wiper arm 40.

The ingredient dispenser 12 comprises a dispenser disc 26 which is rotatable between closely fitting upper and lower walls 52, 54, the upper wall 52 forming the floor of the ingredient container 10 and having an aperture 58 therein. The disc 26 has a compartment 56 therein, and the lower wall 54 has an aperture 60 therein leading to an ingredient delivery duct 62 connected to the infusion chamber 14. Aperture 60 is out of alignment with aperture 58, so that in a complete revolution of disc 26 the compartment 56 will receive a quantity of ingredient by way of the aperture 58 when the compartment aligns with the aperture, the disc closing the aperture 58 in all its other positions. At a further rotational position of disc 26, compartment 56 will align with aperture 60 so that the ingredient contained in the compartment can fall into the infusion chamber 14 by way of duct 62, and the disc 26 closes the duct 62 at all its other rotational positions.

There is never any direct passage for airflow between the infusion chamber 14 and the ingredient in the

container 10. The possibility of the ingredient becoming damp through steam rising from chamber 14 is thus prevented. Agitator 24 ensures the ingredient will flow through aperture 58 to fill the compartment 56 when the compartment and aperture are aligned.

A pipe 82 provides for delivery of liquid, usually water at or near boiling point, to the infusion chamber 14 for making the infusion. A valve for controlling such liquid delivery may also be operated from the control member 20, although in the illustrated embodiment this is not so. Such operation could be mechanical, or electrical e.g. by a cam-operated microswitch.

With reference particularly to Figure 3, the air pump 16 has, as briefly referred to above, an outlet or pressure side 66 and an inlet or suction side 64. These are connected, by pipes 70, 68 respectively, to the body of the valve 30. The body further has an opening 74 leading to external atmosphere, and a pipe 72 leading to the top of the infusion chamber 14. In different positions of the valve element 28 as will be described hereafter, air pressure or suction is applied to the infusion chamber 14.

Further details and a cycle of operation of the apparatus will now be described. It will be assumed initially that the apparatus is generally in the condition shown in Figures 3 and 4, with the base 36 lowered to its open position away from the body of the infusion chamber 14 and the wiper 40 in a finishing position shown in Figure 4 wherein the extension 76 of the wiper arm 40 contacts the stop 78. At the same time the rotor 28 of the air valve is positioned so as to connect the outlet 66 of the air pump 16 to the infusion

chamber by way of duct pipe 72. Also the compartment 56 in the dispensing disc 26 is empty of infusible ingredient, and is not in alignment with the aperture 58.

When an operating cycle of the apparatus commences,
5 electric motor 18 runs to drive the air pump 16 and, by way of the reduction gearing, the rotary control member 20 at a relatively slow speed. Firstly, cam 32 engages the cam follower part 44 of the wiper arm 40, to move the wiper arm back against the force of biasing spring 42,
10 until the wiper arm reaches a position where it is clear of the filter 38 and its extension 76 is engageable behind the latching abutment 80. The cam 34 then moves the base 36, by way of cam follower 50, from its lowered, open, position shown in Figure 3 to its upper position
15 depicted in Figures 7, 8 and 9, wherein it closes the bottom of the infusion chamber 14 and comes into liquid-tight engagement with the seal 48. As the base 36 reaches such closed position, the extension 76 of the wiper arm 40 engages behind the latching abutment 80, as
20 shown in Figure 6 of the drawings. This holds the wiper arm in a starting position even after further rotation of control member 20 has disengaged cam 32 from the cam follower portion 44 of the wiper arm.

Whilst this has been happening, the rotary air
25 valve element 28 has moved to a position shown in Figure 7, wherein the inlet or suction side of the air pump is connected to the infusion chamber whilst the outlet or pressure side 66 of the air pump is connected to opening 74 in the body of the valve 30, leading to external
30 atmosphere. Also, dispensing disc 26 has moved to cause compartment 56 therein to pass beneath the aperture 58 so that the compartment fills with ingredient.

As shown in Figure 7, the next occurrence is that compartment 56 in the dispensing disc 26 aligns with aperture 60 so that the ingredient can fall through duct 62 into the infusion chamber 14, to lie on the filter 38 at the bottom thereof. Continuing rotation of the control member 20 moves the dispensing disc to close the duct 62, and the position shown in Figure 8 is reached. The water valve in the pipe 82 is then opened to deliver a predetermined quantity of water to the infusion chamber so that infusion of the ingredient in the water commences. During infusion, extraction of air from the infusion chamber by the pump 16 causes bubbling of air upwardly through the infusing mixture above the filter 38, thereby to assist the infusion process. The upward flow of air through the filter 38 prevents any downward flow of liquid therethrough. Such air reaches the space beneath the filter 38 through the pipe 46.

Referring now to Figure 9 of the drawings, after sufficient time has elapsed for an infusion of adequate strength to be prepared, the valve member 28 continuing its rotational movement reaches the position shown in this figure of the drawings, wherein the outlet 66 of the air pump 16 is connected to the infusion chamber 14 and the inlet of the air pump is connected to external atmosphere. The raised air pressure in the infusion chamber 14 forces the liquid infusion through the filter 38 and out through the pipe 46, leaving the spent infusible ingredient on the filter 38 as indicated at 84 in Figure 10 of the drawings.

Continuing rotation of the control member 20 and cam 34 carried thereby brings the cam 34 to a position wherein the base 36 falls away from the infusion chamber 14 to its open position, as first referred to in relation

to Figure 3. As now shown in Figure 11, followed by Figure 12, such movement of the base releases the wiper arm 40 from the latching abutment 80 so that, under the influence of spring 42, the wiper arm moves rapidly across the filter to wipe the surface thereof and throw the spent ingredient 84 from the filter into a suitable receptacle, not shown. The extension 76 of the wiper arm 40 hits the stop 78, so that the wiper arm stops abruptly and the spent ingredient has little or no tendency to adhere thereto.

This completes the operating cycle of the apparatus, the rotary control member 20 having executed one complete revolution. A suitable switching mechanism would then switch off the motor 18, the apparatus remaining in its starting condition ready for another cycle as above described.

The timing of the above occurrences in a complete operating cycle is illustrated diagrammatically in Figure 13, related to a single revolution of the control member 20 through 360 degrees. Blocks 90 and 92 represent the periods when the outlet of the air pump is connected to the infusion chamber 14, and block 94 represents the period when the inlet 64 of the air pump 16 is connected to the brewing chamber 14. Lines 96 and 98 represent the position respectively of the base 36 and the wiper arm 40. At the start of a cycle the base 36 remains in its lowered position for a short time while the wiper arm 40 moves from its Figure 4 to its Figure 5 position. Base 36 is then raised to the position where it remains during supply of ingredient and water, infusion, and filtration of the infused liquid. Base 36 then drops to its lowered position, whereafter the wiper arm 40 rapidly moves under the influence of spring 42 to remove spent ingredient

from the filter.

A possible modification of the invention is shown in Figure 14. Whilst the basically the same as the embodiment described in Figures 1 to 13, this is intended to store the infusible ingredient in the form of larger particles e.g. coffee beans 112 which require grinding before infusion can take place. Therefore the dispensing disc 26 is arranged to discharge the ingredient into a grinder 110, from which the ground ingredient can be supplied to the infusion chamber by way of a duct 118. Grinder 110 is driven directly from electric motor 18 by way of shaft 116, which also drives the air pump 16. Other components of the apparatus are identified by the same reference numerals as used above. The apparatus of Figure 14 would follow an operating cycle substantially the same as that above described, except that allowance would have to be made for the time taken to grind the infusible ingredient before it is introduced into the infusion chamber.

Referring now to Figure 15 of the drawings this shows, in a diagrammatic, partially broken-away, perspective view a further embodiment of means for delivering infusible ingredient to the infusion chamber of the apparatus. This comprises the main elements of a storage container 210 for the ingredient, a paddle member 212 rotatable in the storage container about a vertical axis, and a movable shutter 214 which operates in the floor 216 of the storage container, in association with a duct 232 for delivery of the ingredient from the container. The paddle member 212 is rotatable about a vertical axis by means of driving shaft extending through the floor 216 of the storage container and connected to a

hub part 218 of the paddle member. The driving shaft is preferably an upward extension of the rotary control member 20 in the apparatus above described.

5 The paddle member 212 comprises a dispensing paddle 222 extending from the hub, the paddle 222 having a vertical wall 224 and an upper horizontal wall 226. On the opposite side of the hub, an agitator 220 extends to prevent the ingredient from settling as the paddle member rotates.

10 The shutter 214 is pivotable about a horizontal axis 228 to close an aperture 230 in the floor 216. The shutter is able to be raised to open the aperture 230 by means of a solenoid 234 acting through a lever 236 connectd to the shutter, and a spring 238 is provided to
15 lower the shutter to close the aperture 230 when the solenoid is de-activated. A seal 242, shown in Figures 16 to 19, is provided to ensure effective sealing of the aperture 230 when the shutter is lowered.

20 The operating cycle of the apparatus of Figure 15 will now be described with reference to Figures 16 to 19 of the drawings. It is to be appreciated that if the paddle member 212 is connected to the rotary control member 20 of the entire apparatus according to the invention it undergoes one revolution in a complete
25 operating cycle of the apparatus and the parts of the ingredient-delivering apparatus would be so disposed as to come into the correct relative positions to operate to deliver ingredient to the infusion chamber at the correct time in the overall sequence of operations.

30 Figure 16 represents an initial condition, wherein the shutter 214 is lowered to close the aperture 230,

engaging the seal 242. The paddle 222 is approaching the shutter in the direction indicated by the arrows in the drawing, and the vertical wall 224 of the paddle 222 displaces the particulate ingredient (240) before it.

5 Shortly after the leading edge of the horizontal upper wall 226 of the paddle has passed over the edge of the shutter 214, the solenoid 234 is energised to raise the shutter 214 (Figure 17). As the paddle continues its movement, ingredient beneath the horizontal wall 226 and
10 ahead of the vertical wall 224 is displaced under the shutter 214, and downwardly through aperture 230 into duct 232. The shutter is held in its raised position until the vertical wall of the paddle has almost reached it, Figure 18, whereupon the solenoid 234 is
15 de-activated and the shutter is lowered by spring 238 to close the aperture 230. The paddle can then pass over the shutter, Figure 19, to continue its revolution to its starting position. The seal 242 is arranged so that as the shutter is lowered the edge of the shutter scrapes any
20 particles of ingredient from the seal to ensure an airtight or substantially airtight closure of the aperture 230.

 The quantity of ingredient dispensed is dependent on the time for which the shutter 214 is raised. The
25 shutter is preferably raised after the leading edge of the horizontal wall of the paddle has passed over the first part of the shutter, and with the shutter raised the flow of ingredient through the aperture 230 is approximately constant so that the quantity of ingredient
30 dispensed is approximately proportional to the length of time for which the shutter is raised. Control of the shutter by its solenoid 234 enables adjustment to be made in respect of the length of time for which the shutter is

raised. It would, however, alternatively be possible for the shutter to be operated mechanically from the rotary control member of the apparatus although adjustment of the quantity of ingredient dispensed would not be so easy to effect.

The upper horizontal wall 226 of the paddle could be omitted, and instead the ingredient container could have a fixed horizontal wall extending over the general region of the shutter 214. Such a horizontal wall prevents uncontrolled flow of ingredient through the aperture 230, and ensures that ingredient being pushed ahead of the paddle will actually pass through the aperture 230.

Various modifications in this ingredient dispensing apparatus may be made. For example, the shutter could be pivotable about another axis, or could be slidable between its open and closed positions, and could be operated by means other than the solenoid and lever illustrated. The paddle and shutter could be provided with complementary cam formations so that if the shutter is still in its raised position when the paddle reaches it, the shutter will be moved by the cam formations to its lowered position. The paddle may be arranged to hold the shutter down at all times other than when the shutter is open, to seal effectively against a raised pressure in the duct 232, e.g. during the time when infused liquid is being discharged from the infusion chamber.

It will further be appreciated that modifications may be made in the overall apparatus hereinbefore described without departing from the broadest scope of the invention. For example, an air valve of different form from the rotary valve 30 could be used, e.g. an

arrangement of poppet valves controlling suitable valve passages and such poppet valves may be operable by cams provided on the rotary control member 20. An alternative arrangement of wiper 40 and its operating cam could be
5 utilised. In the ingredient dispenser, the quantity of ingredient dispensed in each cycle could be varied by providing for adjustment of the cross-sectional area of the aperture 58. Although it is preferable that the rotary control member 20 is driven by the motor 18 which
10 also drives the air pump, through a suitable reduction gearing, it would be possible to use a separate means for driving these elements whilst still retaining the advantage of a single rotary control member controlling substantially all the operations of the apparatus.

CLAIMS

1. Apparatus for preparing an infusion from a liquid and an infusible ingredient, comprising:-

an infusion chamber (14) having a body and a base (36) movable relative to the body between a position closing the infusion chamber and an open position, the chamber being able to receive the infusible ingredient and the liquid;

a filter (38) in said base, permeable to liquid and impermeable to the infusible ingredient;

a receiver (44) under the base for receiving infusion through the filter;

air pump means (16) operable in a first mode to cause upward flow of air through the filter (38) for agitation of the liquid during infusion, and in a second mode to cause discharge of liquid infusion through the filter;

means (34) for moving the base between its closed and open positions, to permit removal of spent infusible ingredient from the filter when the base is in its open position;

and a rotary control member (20), rotatable about an axis and arranged to control both the means for moving the base and the operation of the air pump means as between its first and second modes.

2. Apparatus according to Claim 1 wherein said air pump means comprises a pump having a suction side (64) and a pressure side (66), and rotary valve means (30) operable by said control member to connect the suction side of the pump to the chamber (14) above the filter in the first mode, and to connect the pressure side of the pump to the chamber above the filter in the second mode.

3. Apparatus according to Claim 1 or Claim 2 wherein the means for moving the base comprises a cam carried by the control member and operable upon the base.
4. Apparatus according to any one of the preceding
5 claims wherein the base is pivotally mounted relative to the infusion chamber and is pivotable downwardly therefrom to its open position.
5. Apparatus according to Claim 4 wherein the chamber has a lower edge carrying sealing means to engage the
10 base and establish a liquid-tight seal therewith when the base is in its closed position.
6. Apparatus according to any one of the preceding claims further comprising wiper means operable to remove spent infusible ingredient from the filter when the base
15 is in its open position.
7. Apparatus according to Claim 6 wherein the wiper means is operable by a further cam carried by the control member.
8. Apparatus according to Claim 7 wherein the wiper
20 means is pivotally mounted on the base, and is spring biased to move from a starting position to remove spent ingredient from the filter and is movable by the further cam back to the starting position against the spring biasing, the wiper means being latched in its starting
25 position while the base is in its closed position and released to move therefrom when the base moves to its open position.
9. Apparatus according to any one of the preceding claims comprising means for delivering infusible

ingredient to the chamber which means is also operated by the control member.

10. Apparatus according to Claim 9 wherein the means for delivering infusible ingredient to the chamber comprises:-

a storage container for the ingredient, having a base with an aperture therein;

a dispensing member carried by the control member and rotatable therewith beneath the base, and having a compartment able to receive a predetermined quantity of ingredient through said aperture when the dispensing member is in a position wherein the compartment is in alignment with said aperture, the dispensing member closing said aperture in all other positions;

and a member beneath the dispensing member, affording a delivery passage for delivery of ingredient to the infusion chamber when the dispensing member is in a position to align the compartment therein with the delivery passage, and arranged to retain ingredient in the compartment when the dispensing member is in all other positions.

11. Apparatus according to Claim 10 wherein the dispensing member closes the delivery passage when the compartment in the dispensing member does not align with the delivery passage.

12. Apparatus according to Claim 10 or Claim 11 wherein the control member further carries an agitator for ingredient in the storage container therefor.

13. Apparatus according to Claim 9 wherein the means for delivering infusible ingredient to the infusion chamber comprises:-

a storage container for the ingredient, having an aperture leading to the chamber;

paddle means carried by the control member and rotatable in the container;

5 and a closure element movable between a closed position wherein it closes the aperture in the storage container, and an open position wherein it opens the aperture and ingredient displaced by the paddle means passes therethrough.

10 14. Apparatus according to Claim 13 wherein the aperture is in a base wall of the storage container, and a duct extends downwardly therefrom to the infusion chamber.

15 15. Apparatus according to any of the preceding claims, comprising a single motor and gearing means providing a first, slow speed, output driving the rotary control member, and a second, high speed, output driving the air pump means.

20 16. Apparatus according to Claim 15 further comprising means for grinding the infusible ingredient prior to delivery thereof to the chamber, the grinding means being driven from said second output of the motor.

25 17. Apparatus according to any of the preceding claims wherein the rotary control member is rotatable about a vertical axis.

18. Apparatus according to any one of the preceding claims, comprising valve means operable by the rotary control member for controlling delivery of liquid to the chamber.

1/12

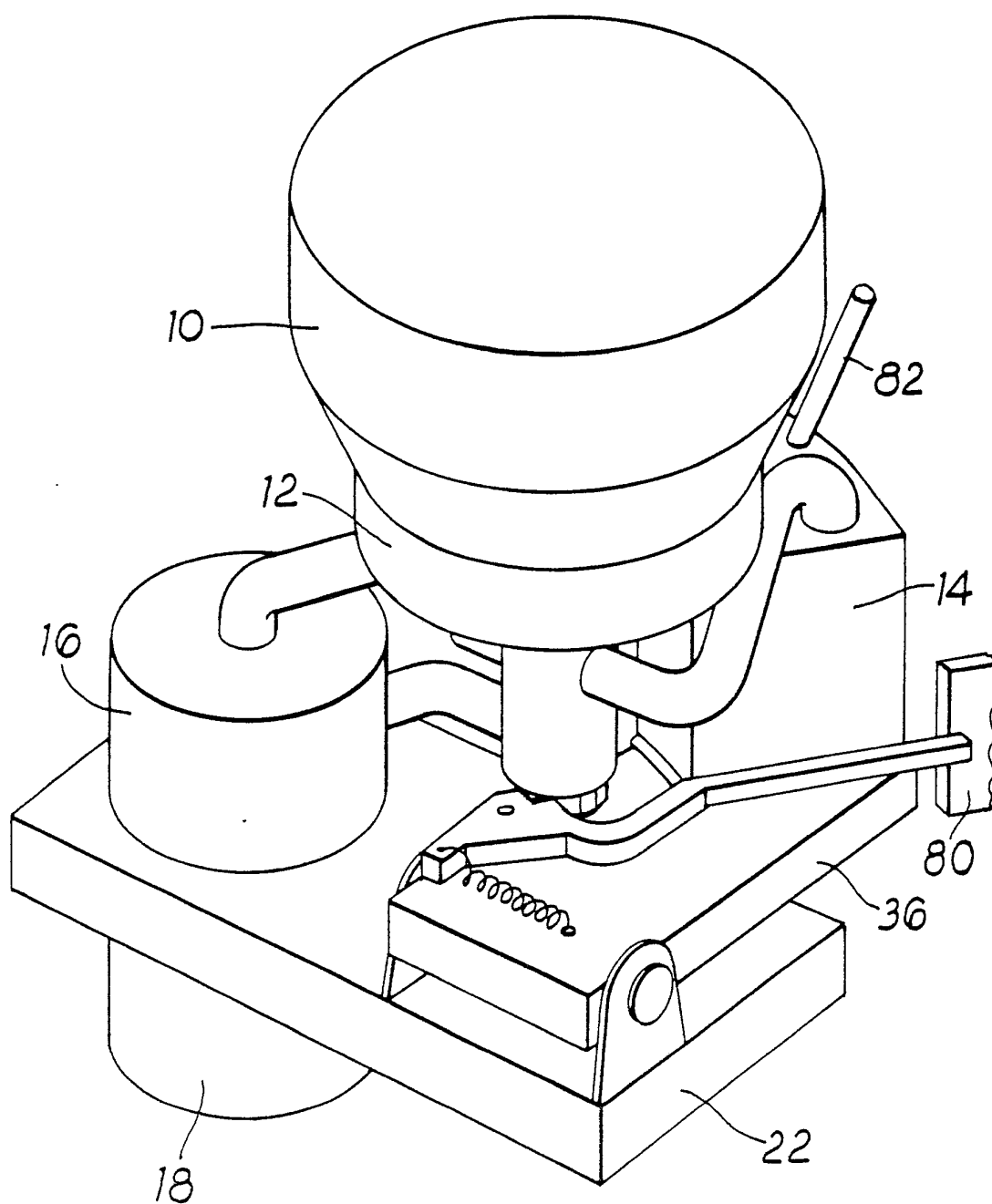
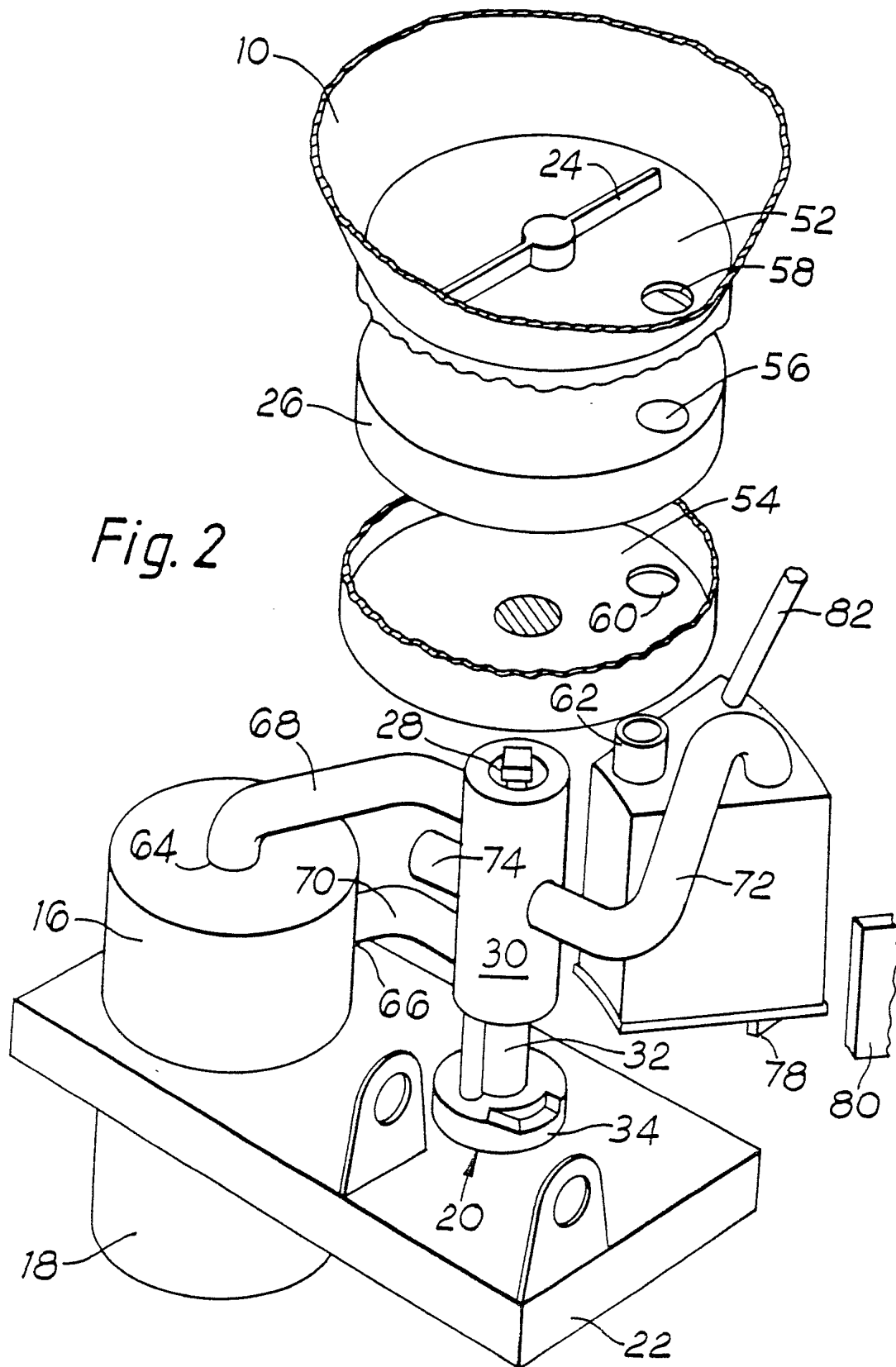


Fig.1

SUBSTITUTE SHEET

2/12



3/12

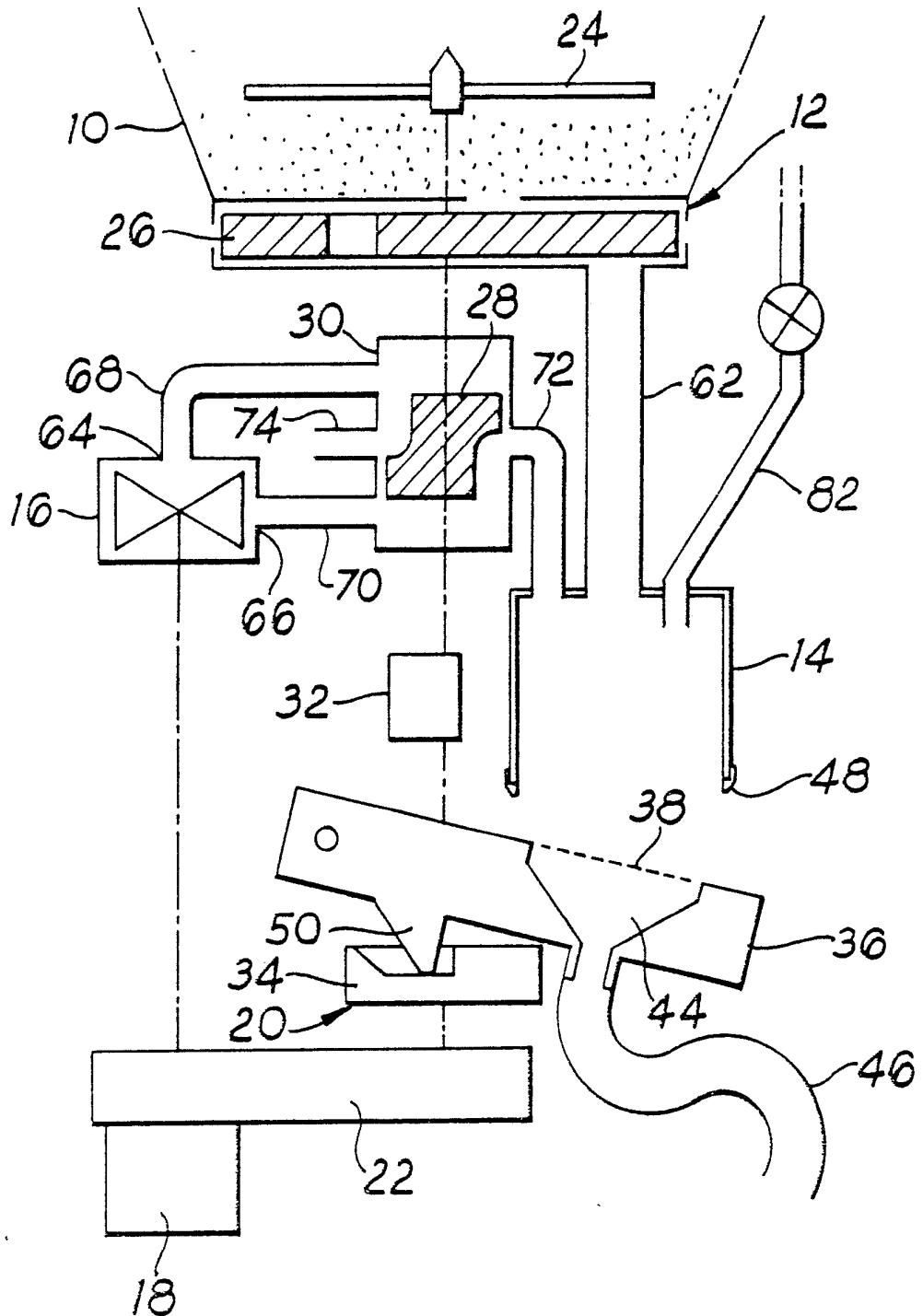
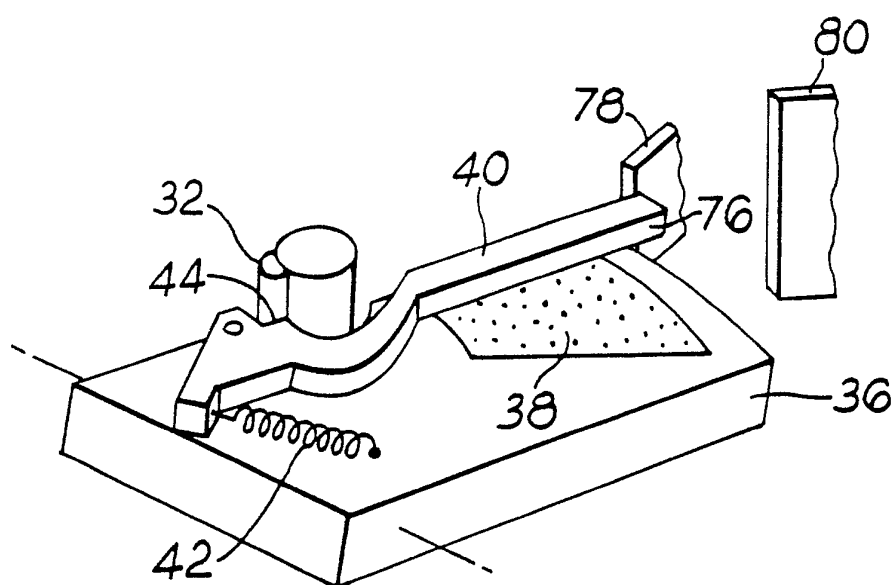
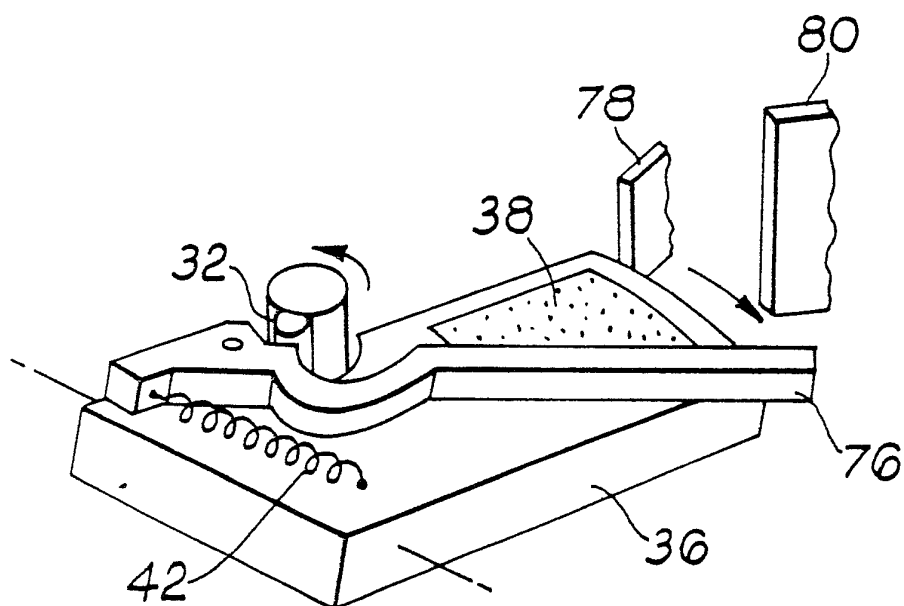


Fig. 3

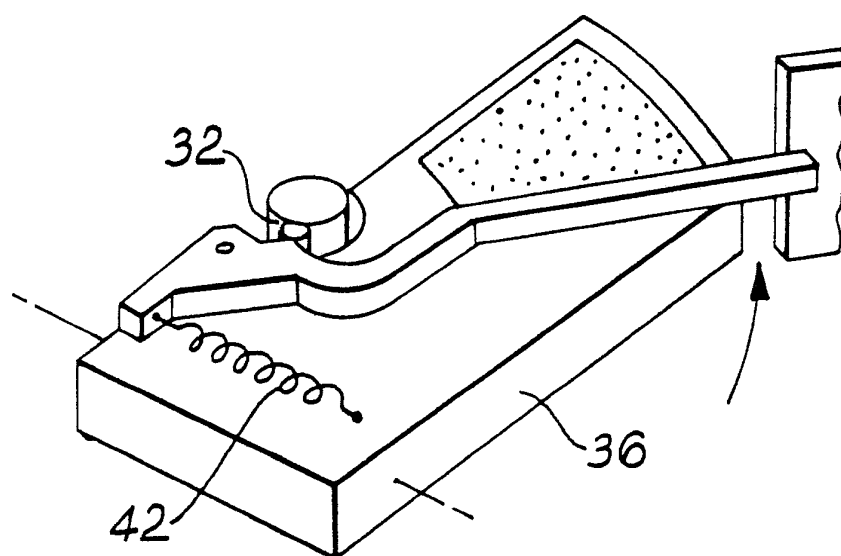
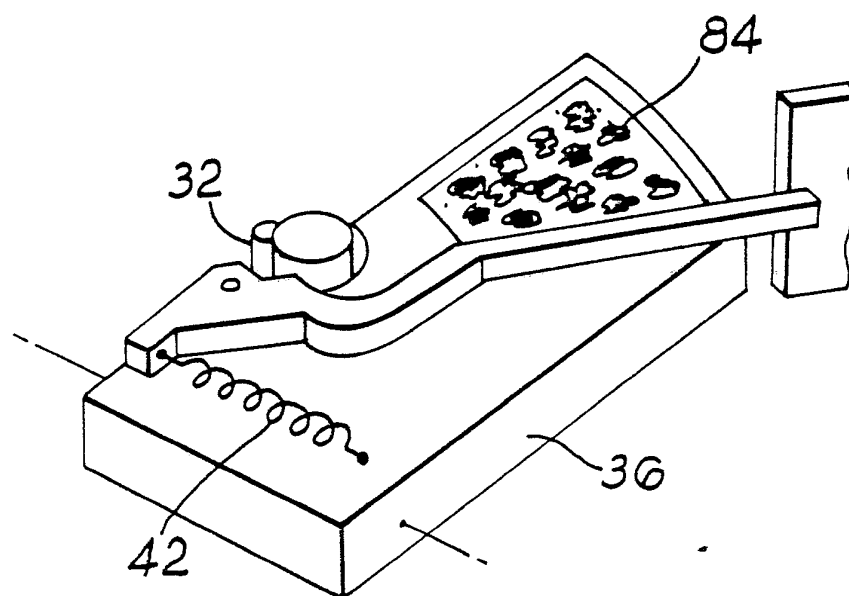
SUBSTITUTE SHEET

4/12

*Fig. 4**Fig. 5*

SUBSTITUTE SHEET

5/12

*Fig. 6**Fig. 10*

SUBSTITUTE SHEET

6/12

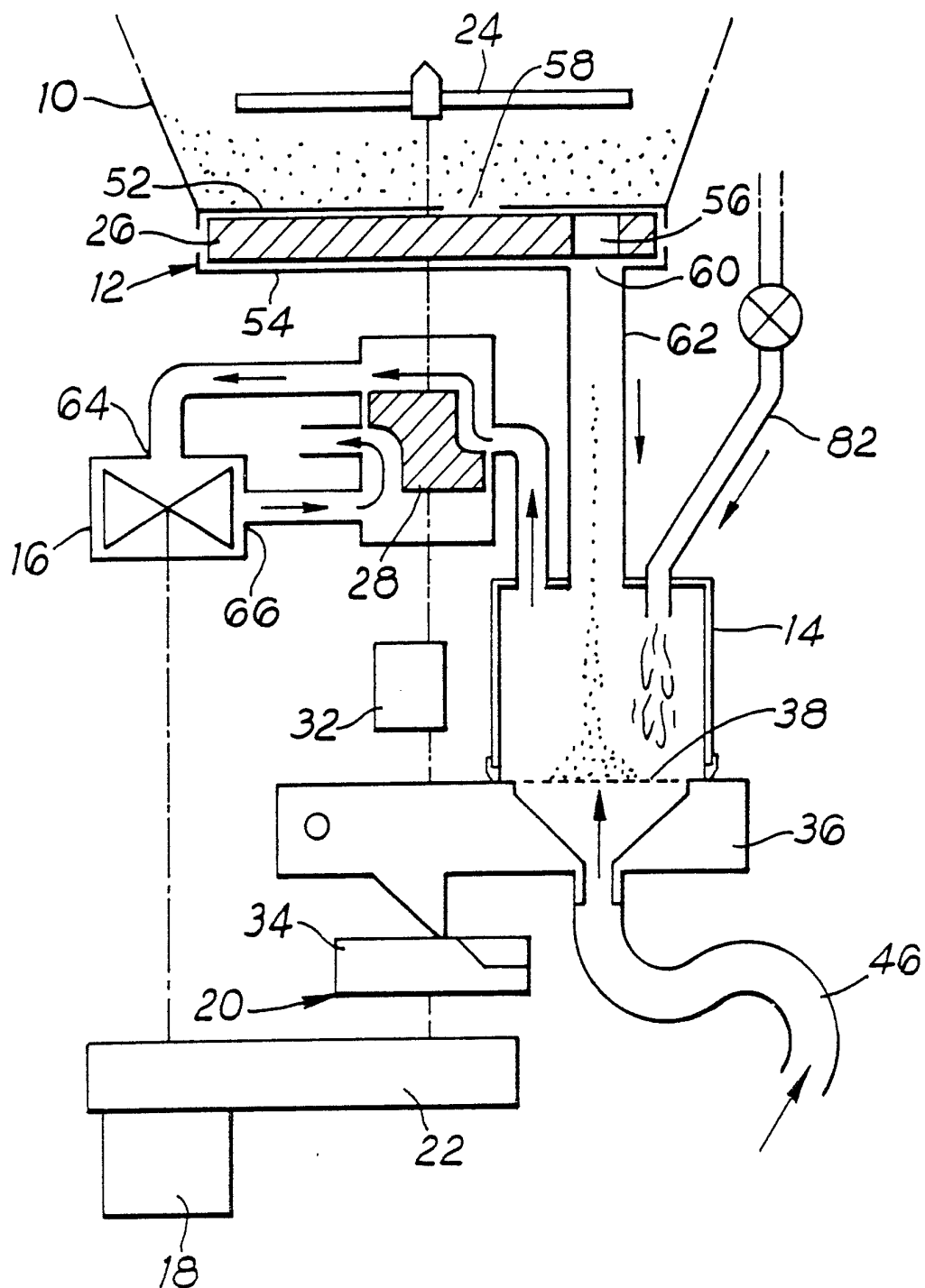
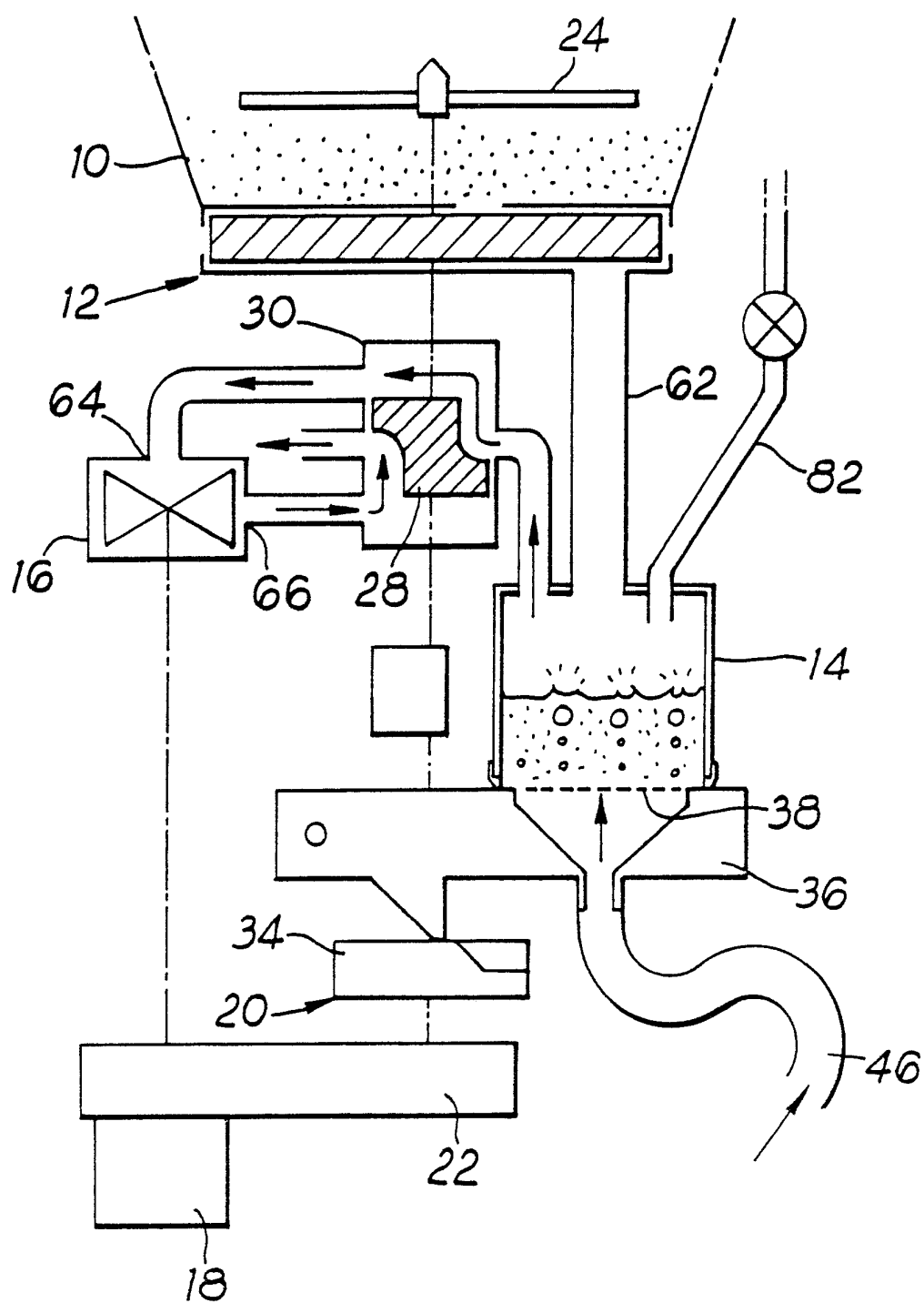


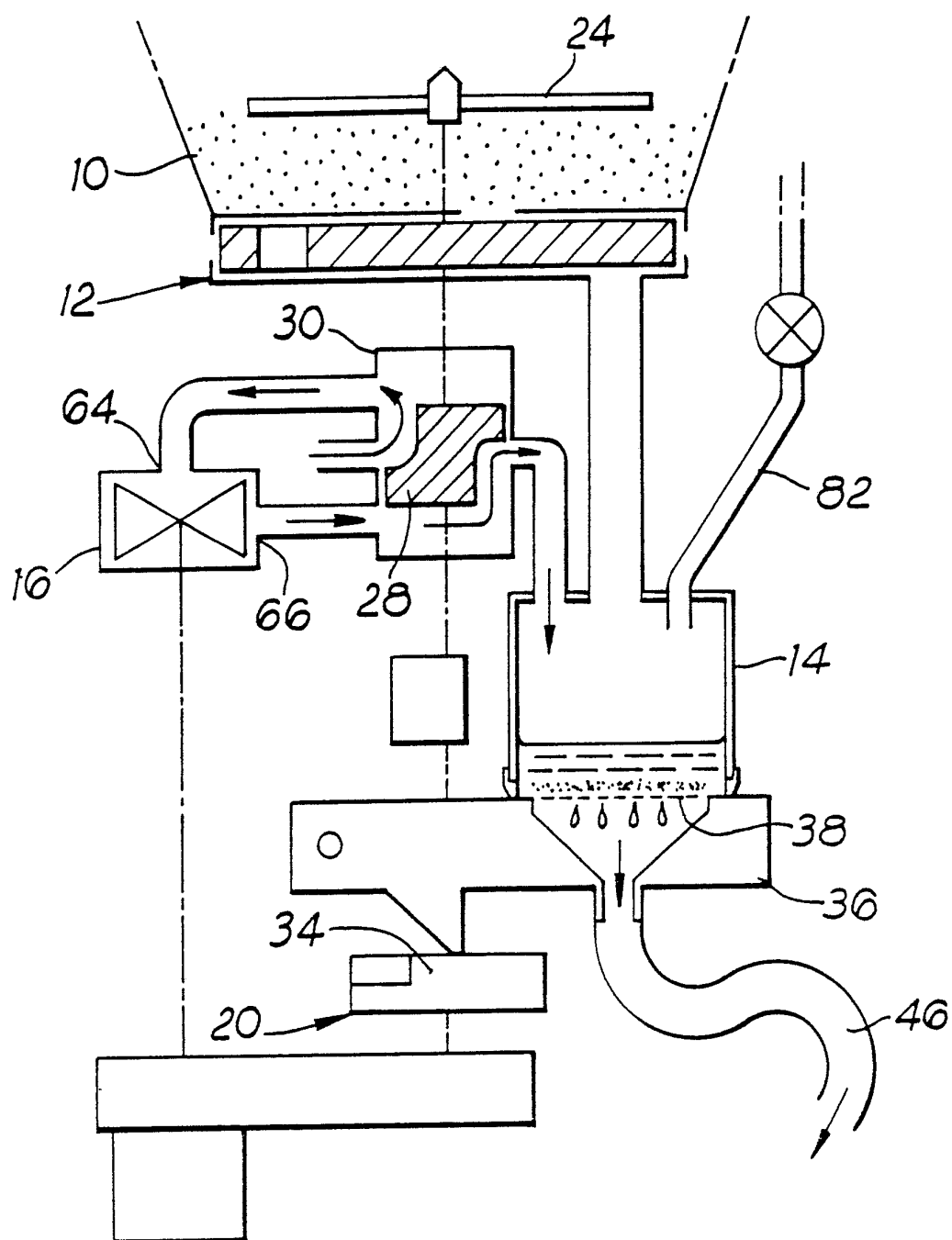
Fig. 7

7/12

*Fig. 8*

SUBSTITUTE SHEET

8/12

*Fig. 9*

SUBSTITUTE SHEET

9/12

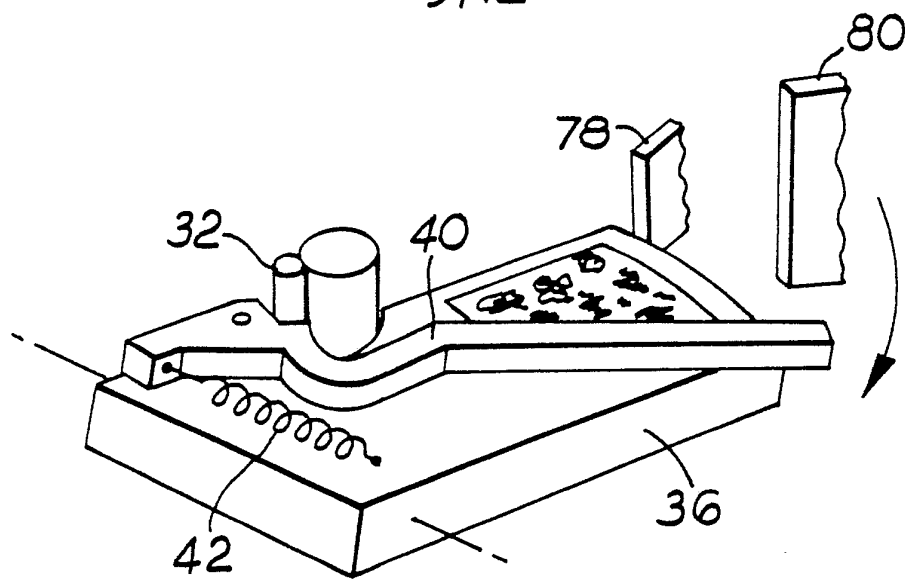


Fig. 11

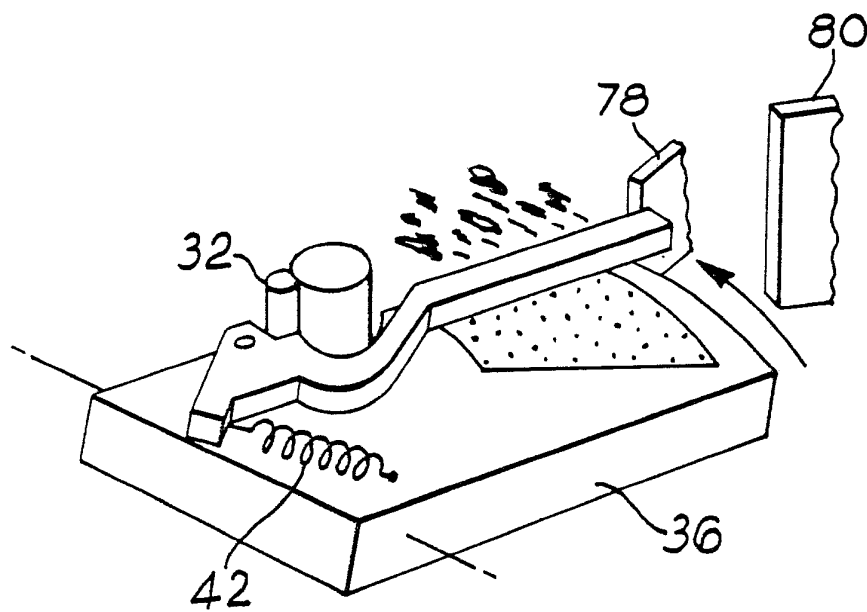


Fig. 12

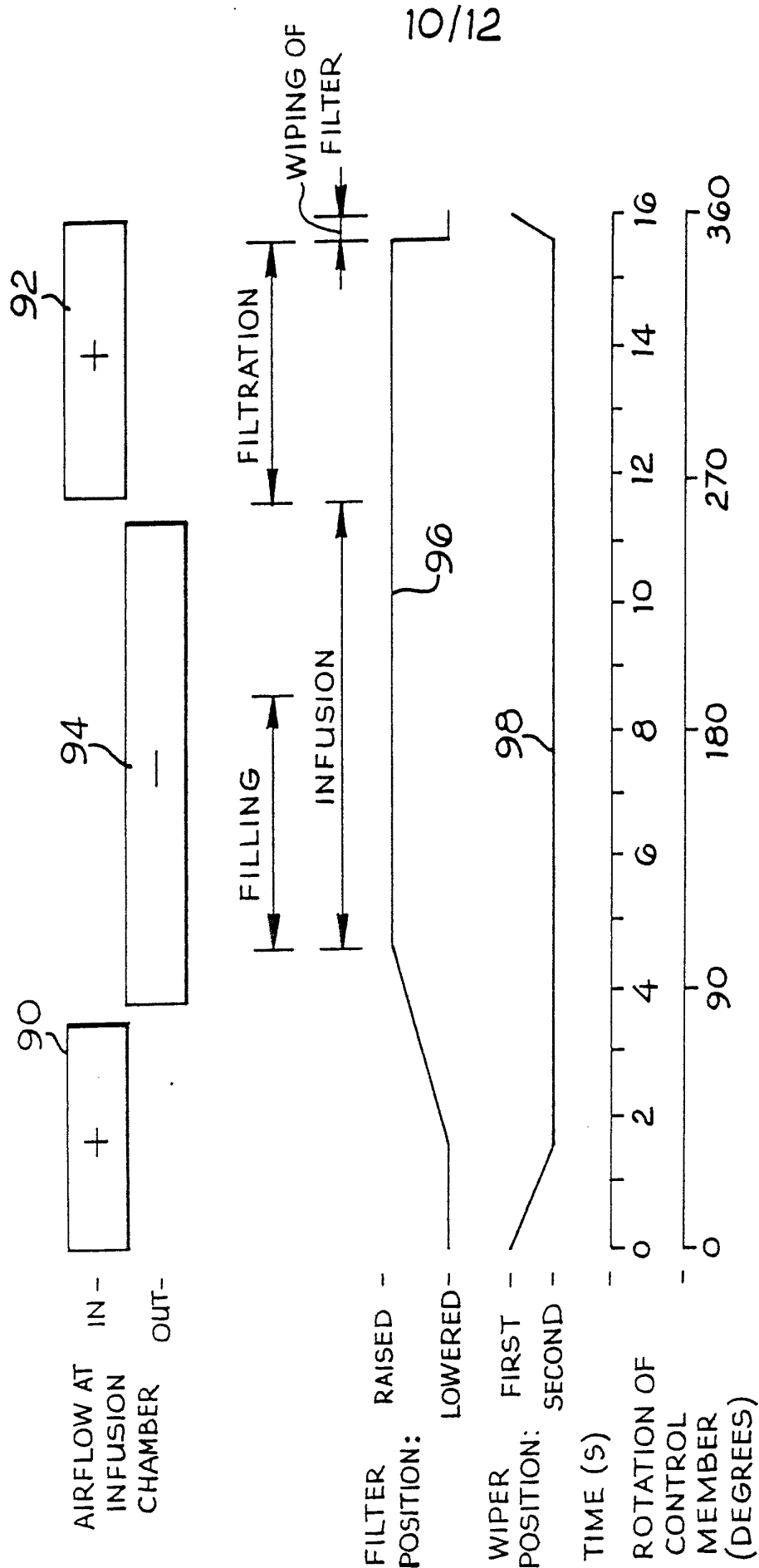


Fig.13

11/12

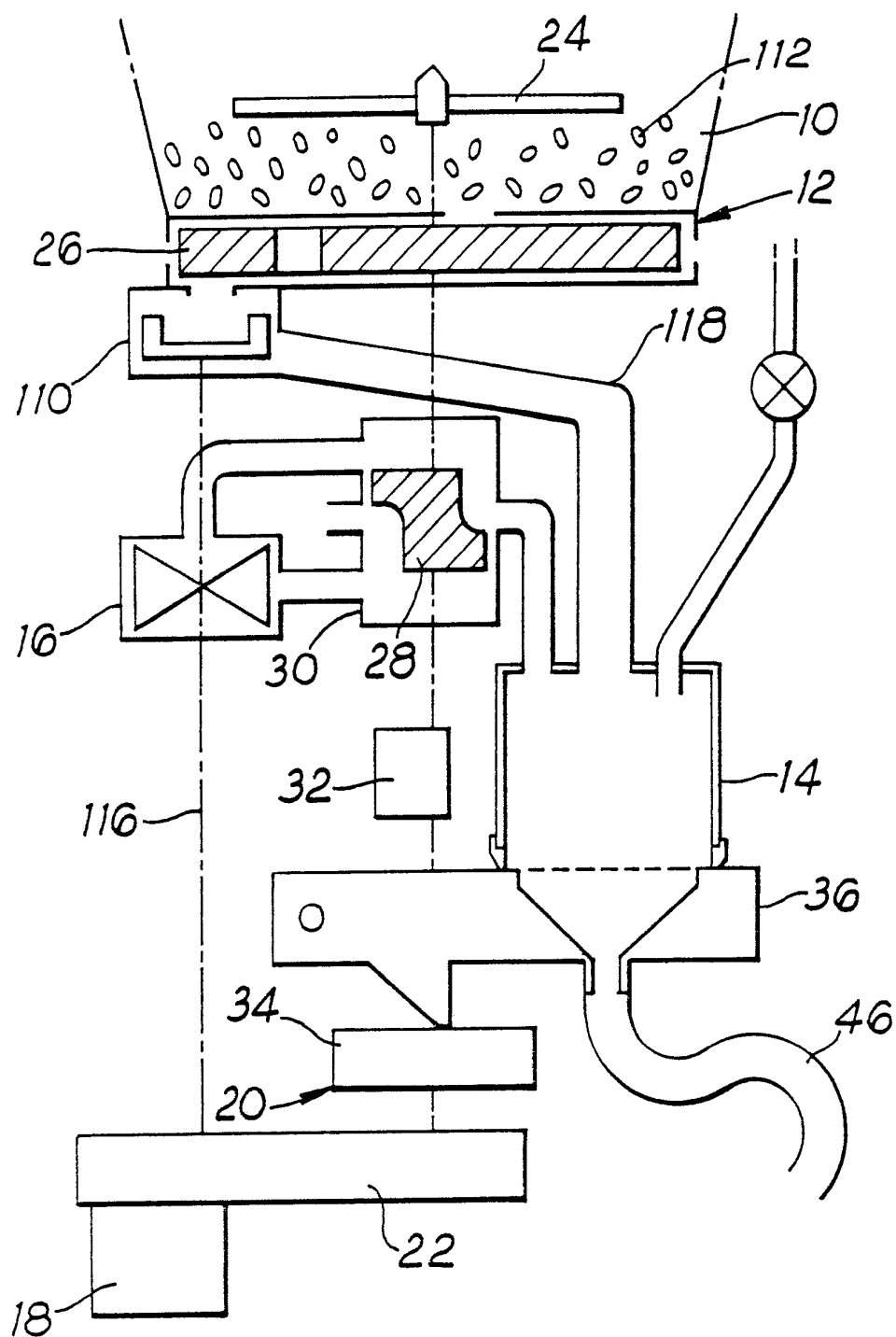
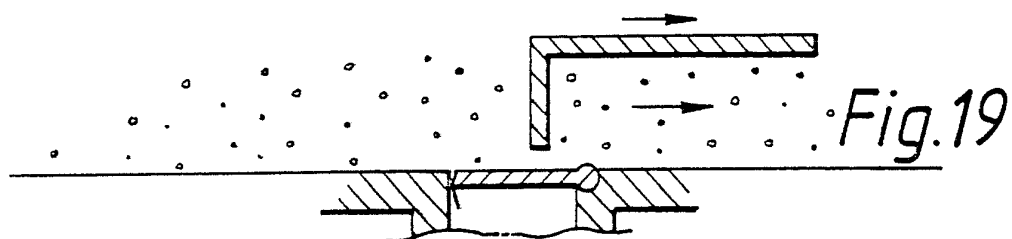
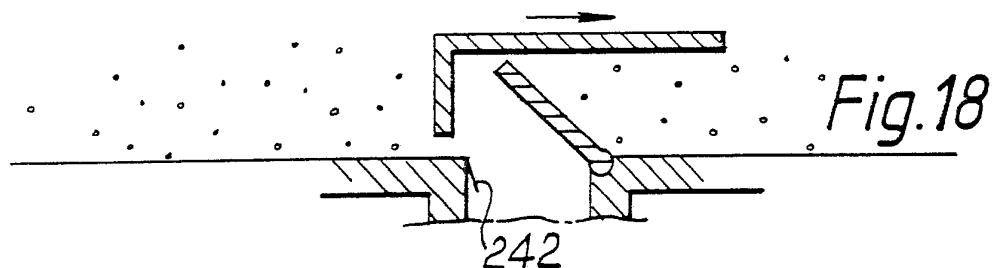
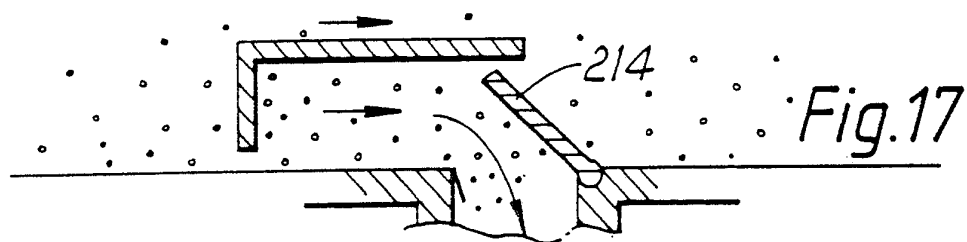
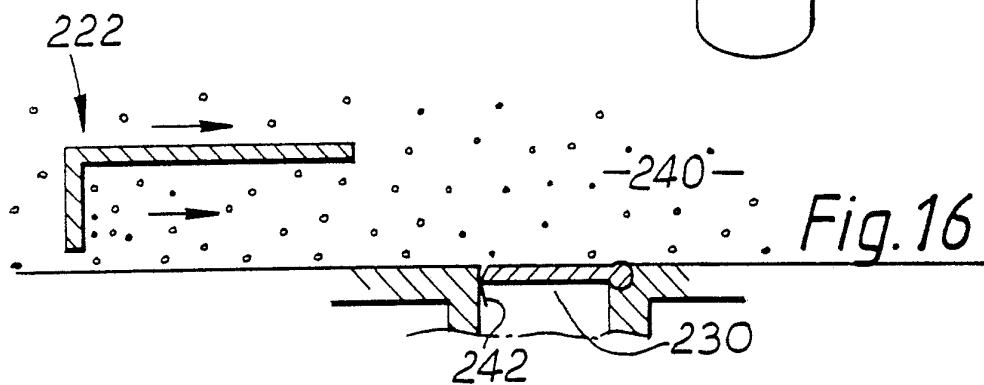
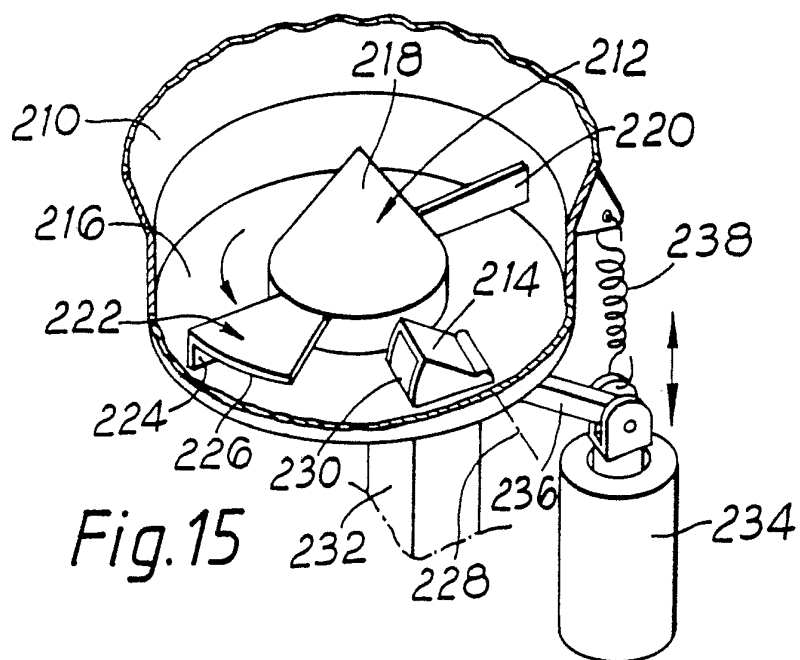


Fig. 14

SUBSTITUTE SHEET

12/12



SUBSTITUTE SHEET

INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 87/00749

| | | |
|--|---|-------------------------------------|
| I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) * | | |
| According to International Patent Classification (IPC) or to both National Classification and IPC | | |
| IPC ⁴ : A 47 J 31/40; A 47 J 31/32 | | |
| II. FIELDS SEARCHED | | |
| Minimum Documentation Searched ⁷ | | |
| Classification System | Classification Symbols | |
| IPC ⁴ | A 47 J | |
| Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸ | | |
| III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹ | | |
| Category ⁹ | Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹² | Relevant to Claim No. ¹³ |
| A | US, A, 3338153 (HOLSTEIN) 29 August 1967, see column 10, line 70 - column 11, line 23; figure 1 -- | 1,2,9 |
| A | US, A, 3446137 (PRYOR et al.) 27 May 1969, see column 14, line 38 - column 15, line 14; figures 2,3,9 -- | 1,3,4,5 |
| A | US, A, 2827845 (RICHESON) 25 March 1958, see column 9, lines 13-42; figures 1,6 -- | 1,3,4,5,9 |
| A | WO, A, 82/01120 (DREMME) 15 April 1982, see figures 2,3 -- | 6 |
| A | JP, A, 61119142 (TOSHIBA) 6 June 1986, see abstract ----- | 1 |
| <p>* Special categories of cited documents: ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> | | |
| IV. CERTIFICATION | | |
| Date of the Actual Completion of the International Search | Date of Mailing of this International Search Report | |
| 18th January 1988 | 19 FEB 1988 | |
| International Searching Authority | Signature of Authorized Officer | |
| EUROPEAN PATENT OFFICE | P.E.G. VAN DER PUTTEN | |

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

GB 8700749

SA 19166

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 05/02/88
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---------------------|----------------------------|---------------------|
| US-A- 3338153 | | None | |
| US-A- 3446137 | 27-05-69 | None | |
| US-A- 2827845 | | None | |
| WO-A- 8201120 | 15-04-82 | EP-A, B 0061472 | 06-10-82 |
| | | SE-A- 8203419 | 03-06-82 |
| | | AU-A- 7588081 | 11-05-82 |
| | | CH-A- 641030 | 15-02-84 |
| | | US-A- 4457216 | 03-07-84 |
| | | SE-B- 434595 | 06-08-84 |
| | | NL-T- 8120356 | 01-09-82 |
| JP-A-61119142 | 06-06-86 | None | |