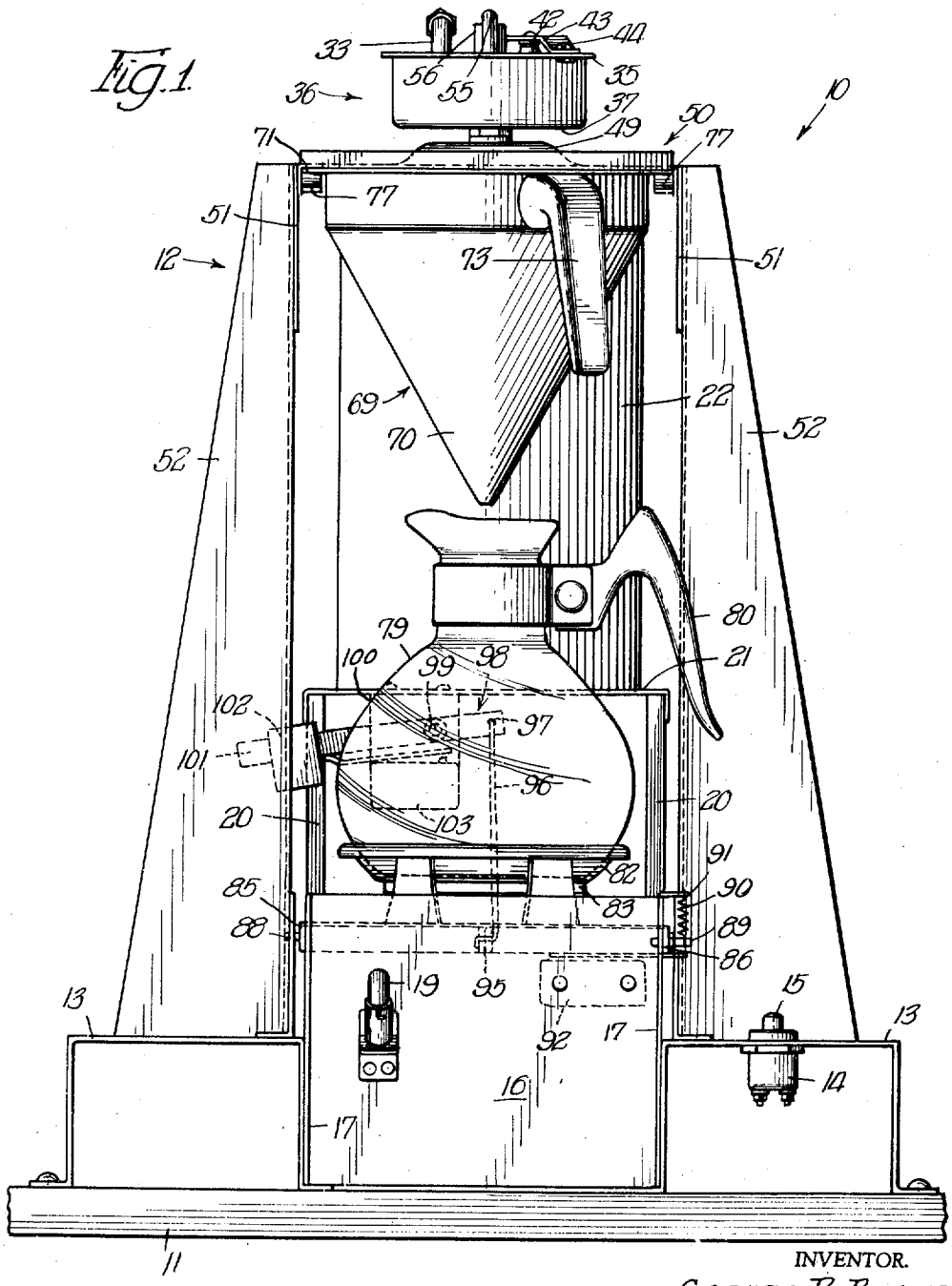
Oct. 13, 1964 G. R. BUNN Re. 25,663

COFFEE MAKING MACHINE

Original Filed Sept. 8, 1959 7 Sheets-Sheet 1

Fig. 1.



INVENTOR.

George R. Bunn,

BY

Robert R. Lockwood

Atty

Oct. 13, 1964 G. R. BUNN Re. 25,663

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Fig. 2.

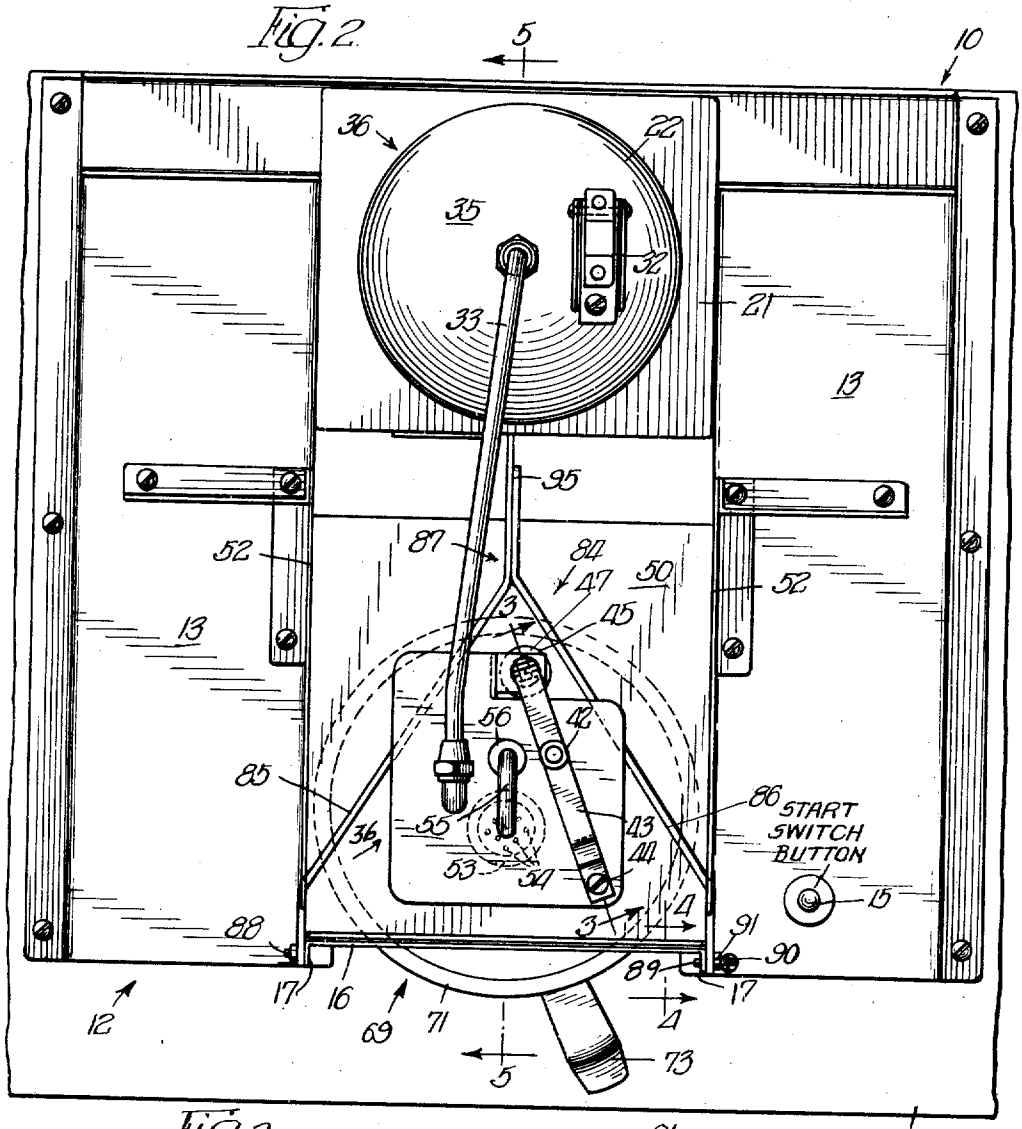
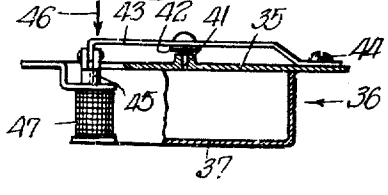


Fig. 3.



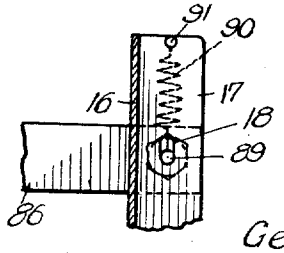


Fig. 4.

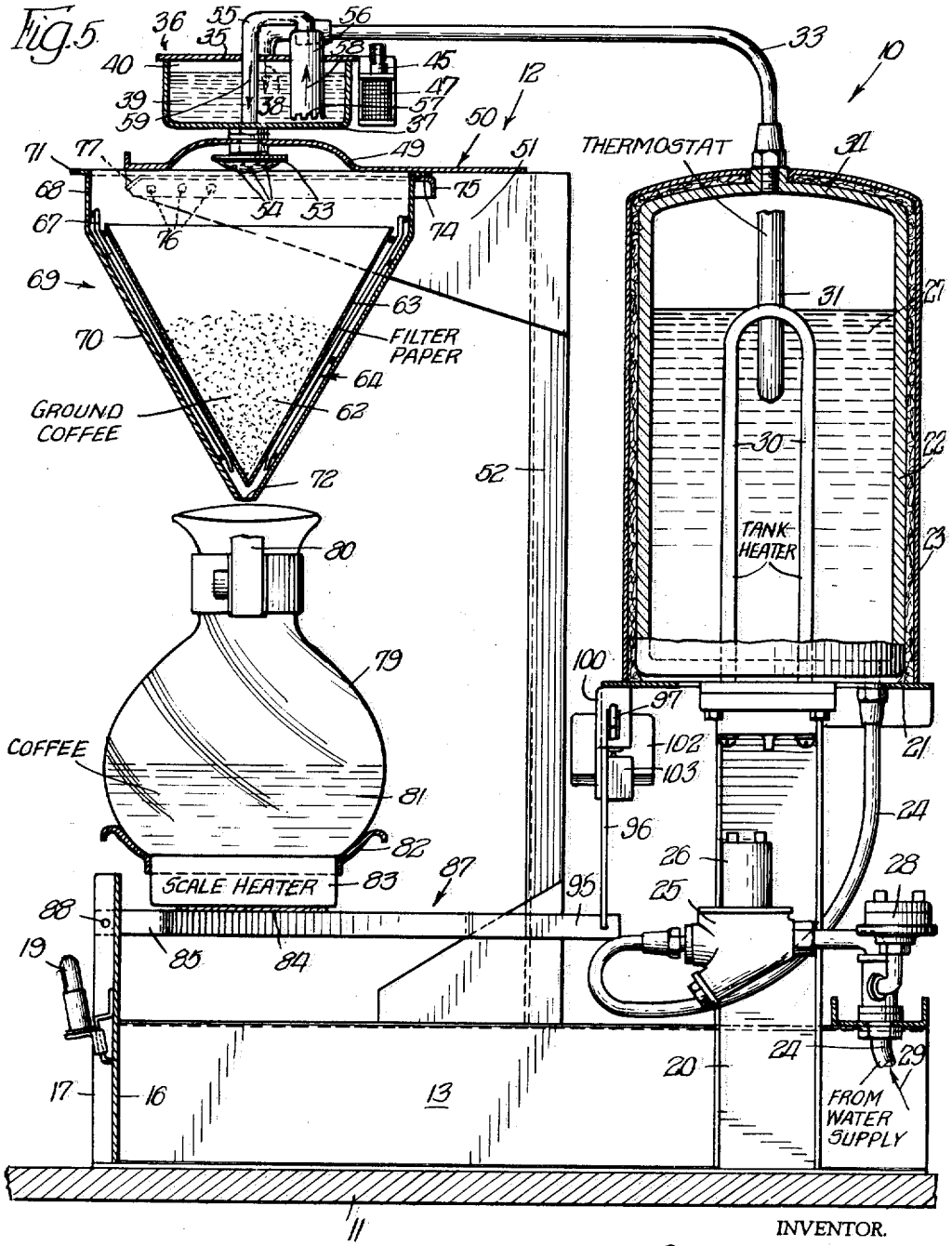
INVENTOR.
George R. Bunn,
BY
Robert R. Lockwood
Atty

Oct. 13, 1964 G. R. BUNN Re. 25,663

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Fig. 5



INVENTOR.
George R. Bunn,
BY
Robert R. Lockwood
Atty

Oct. 13, 1964 G. R. BUNN Re. 25,663

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Fig. 6

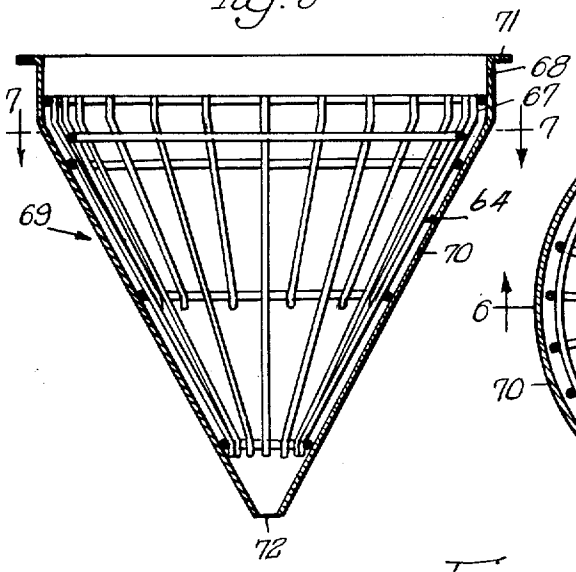


Fig. 7

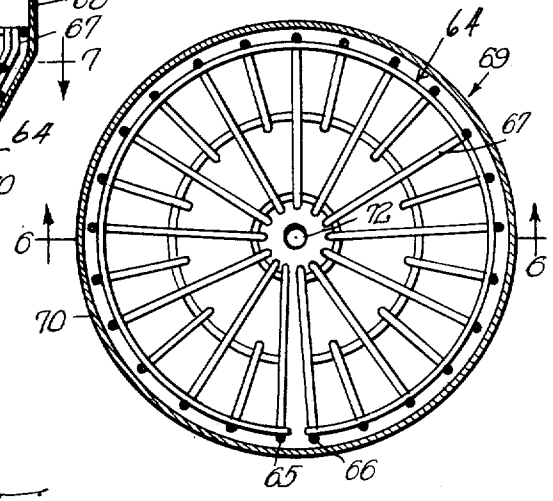
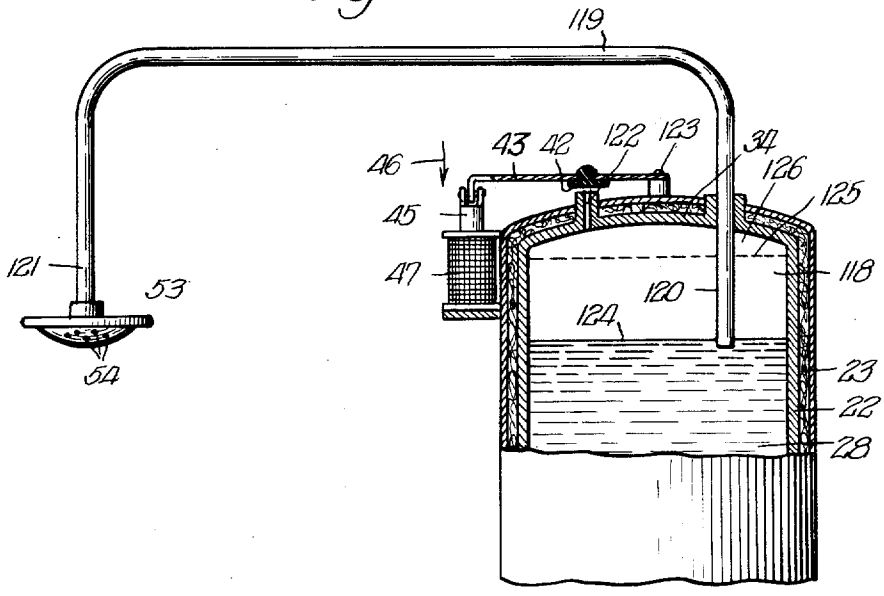


Fig. 9



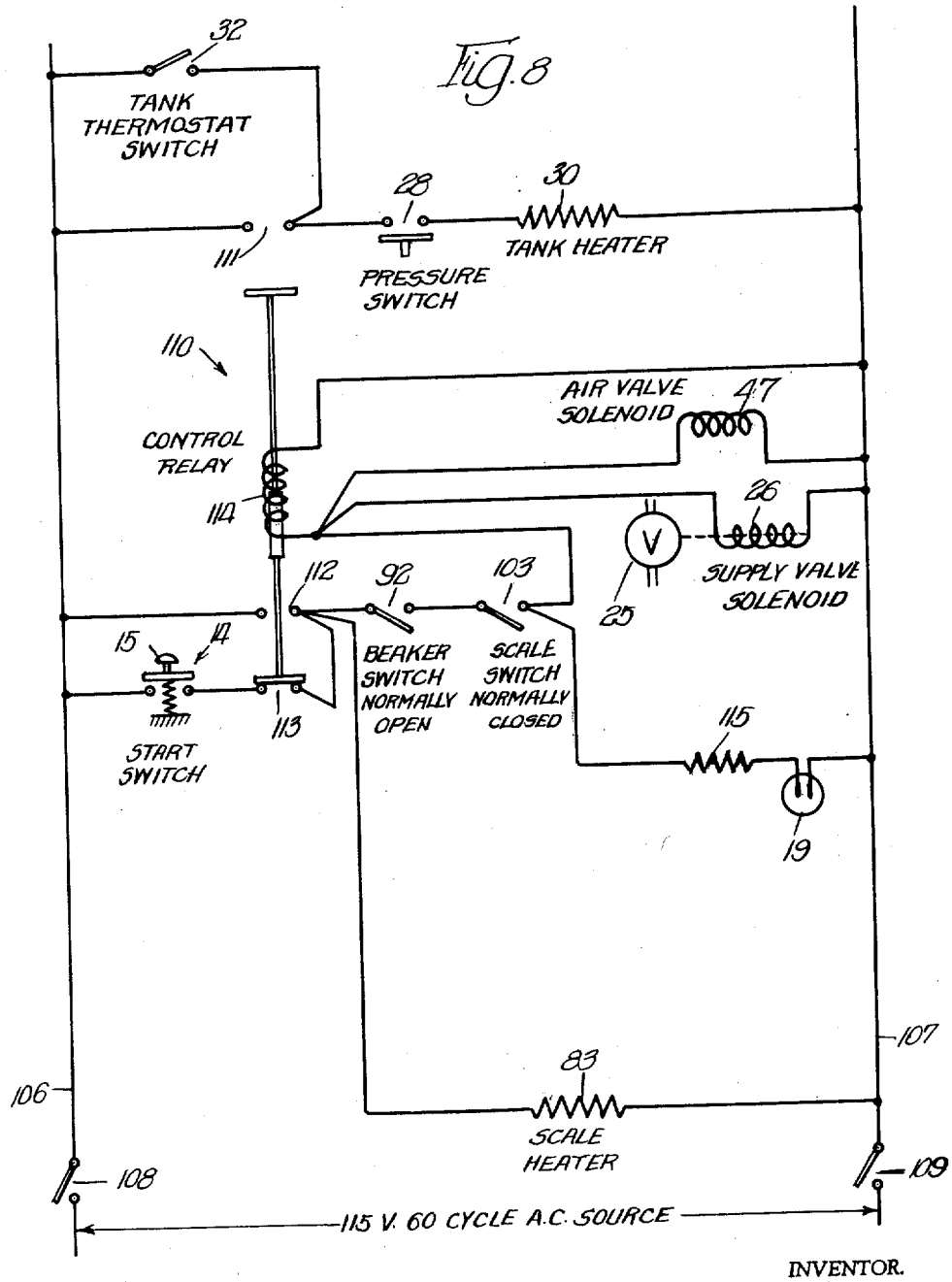
INVENTOR.
George R Bunn,
BY
Robert R. Lockwood
Atty

Oct. 13, 1964 G. R. BUNN Re. 25,663

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Fig. 8



INVENTOR.
George R. Bunn,
BY
Robert R. Lockwood
Atty

Oct. 13, 1964 G. R. BUNN Re. 25,663

COFFEE MAKING MACHINE

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Fig. 10

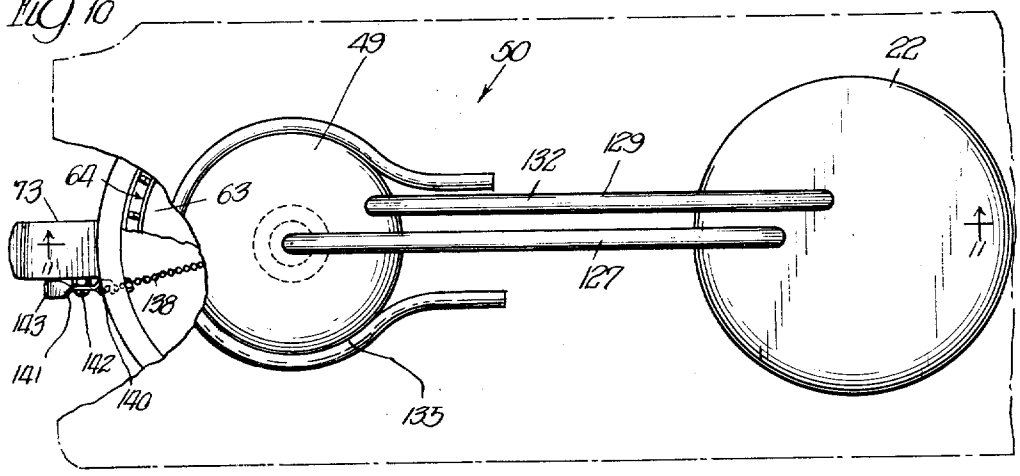
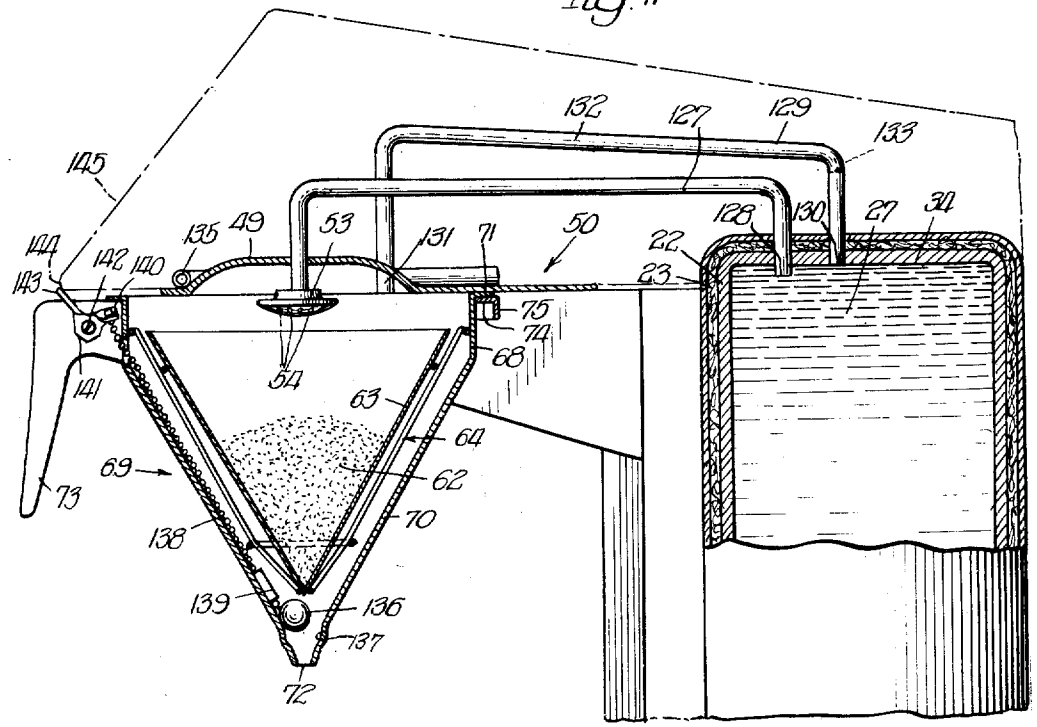


Fig. 11



INVENTOR.
George R. Bunn,
BY
Robert R. Lockwood
Atty.

Oct. 13, 1964 G. R. BUNN Re. 25,663

COFFEE MAKING MACHINE

Original Filed Sept. 8, 1959 7 Sheets-Sheet 7

Fig. 12.

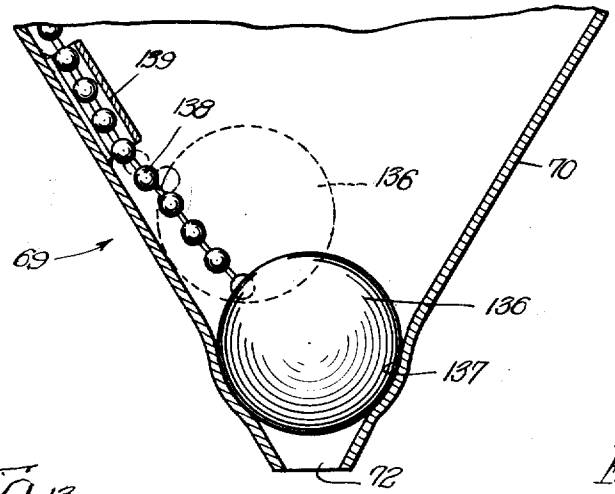


Fig. 13.

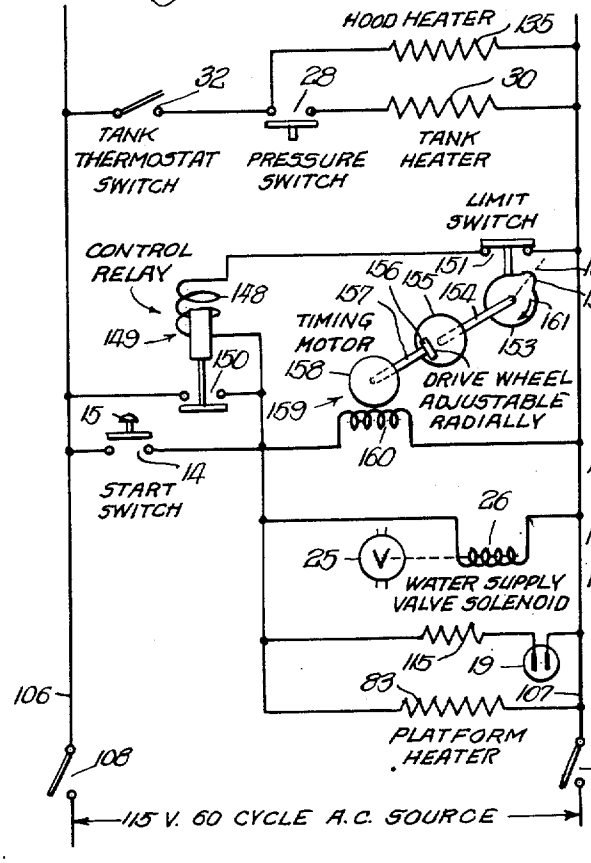
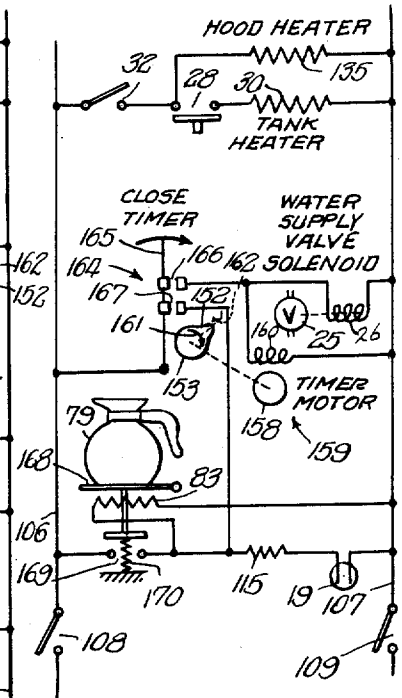


Fig. 14.



INVENTOR.
George R. Bunn,
BY
Robert R. Lockwood
Attys.

United States Patent Office

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25,663

COFFEE MAKING MACHINE

George R. Bunn, Springfield, Ill., assignor, by mesne assignments, to Bunn-O-Matic Corporation, Springfield, Ill., a corporation of Delaware

Original No. 3,034,417, dated May 15, 1962, Ser. No. 839,047, Sept. 8, 1959. Application for reissue Sept. 16, 1963, Ser. No. 309,919

26 Claims. (Cl. 99—282)

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

This invention relates, generally, to coffee making machines and it has particular relation to automatic coffee making machines for use in industrial plants, hospitals, restaurants and the like. This application is a continuation-in-part of application Serial No. 725,813 filed April 2, 1958, now abandoned.

Among the objects of this invention are: To provide for automatically making predetermined amounts of coffee in rapid succession and on a continuous basis; to maintain a supply of hot water on a stand-by basis for use in making coffee; to provide direct communication between a tank containing the hot water and the atmosphere except when water is being drawn from the tank for coffee making purposes; to spray the hot water over a body of ground coffee located in a funnel by means of a spray head positioned above the funnel; to collect the coffee in a beaker below the funnel; to start a coffee making cycle by placing an empty beaker underneath the funnel; to stop the coffee making cycle when a predetermined quantity of coffee has flowed into the beaker; to support the beaker on scale means for starting and stopping the coffee making cycle; to heat the coffee in the beaker; to apply heat to the water in the tank while hot water is being drawn therefrom for coffee making purposes; to prevent dripping of the hot water from the spray head after the coffee making cycle has been completed; to siphon the final quantity of water that is sprayed over the coffee from a surge chamber by opening the chamber to the atmosphere; to provide the surge chamber separate from or as a part of the water tank; to prevent the application of heat to the water in the tank when the water pressure is below a predetermined pressure; to provide direct communication between the tank and the atmosphere at all times whether or not water is being drawn therefrom; to provide this direct communication with the atmosphere at a location above the level at which the hot water is sprayed over the ground coffee; to accomplish the direct communication by a siphon tube that extends above the connection between the tank and the spray head and opens to the atmosphere over the funnel; to prevent condensation of moisture on the hood adjacent the spray head by maintaining it at an elevated temperature; to prevent dripping of coffee from the funnel after it is removed from operative position on the hood; to provide a self sealing valve at the bottom of the funnel for this purpose that is automatically closed when the funnel is removed and is automatically opened when the funnel is placed in operative position on the hood; to stop the coffee making cycle a predetermined time after it is initiated; and to employ a timer for this purpose that is initiated in operation by manually starting the coffee making cycle.

Other objects of this invention will, in part, be obvious and in part appear hereinafter.

This invention is disclosed in the embodiments thereof shown in the accompanying drawings and it comprises the features of construction, combination of elements and arrangement of parts that will be exemplified in the constructions hereinafter set forth the scope of the application of which will be indicated in the appended claims.

For a more complete understanding of the nature and scope of this invention reference can be had to the following detailed description, taken together with the accompanying drawings, in which:

FIGURE 1 is a view, in front elevation, of an automatic coffee making machine in which this invention is embodied;

FIGURE 2 is a top plan view of the coffee making machine shown in FIGURE 1;

FIGURE 3 is a vertical sectional view taken generally along the line **3—3** of FIGURE 2;

FIGURE 4 is a vertical sectional view, at an enlarged scale, taken generally along the line **4—4** of FIGURE 2;

FIGURE 5 is a vertical sectional view taken generally along the line **5—5** of FIGURE 2;

FIGURE 6 is a vertical sectional view, at an enlarged scale, of the removable funnel provided with a resilient wire grill, the funnel being shown in FIGURE 1 and FIGURE 5, FIGURE 6 being a vertical sectional view taken generally along the line **6—6** of FIGURE 7;

FIGURE 7 is a horizontal sectional view taken generally along the line **7—7** of FIGURE 6;

FIGURE 8 illustrates, diagrammatically, the electrical connections that can be employed in practicing this invention;

FIGURE 9 is a vertical sectional view showing a modified form of surge chamber arrangement that can be employed in practicing this invention;

FIGURE 10 is a top plan view of a modified form of the automatic coffee making machine;

FIGURE 11 is a vertical sectional view taken generally along the line **11—11** of FIGURE 10;

FIGURE 12 is an enlarged vertical sectional view of the lower end of the funnel shown in FIGURE 11 with the ball valve in the closed position;

FIGURE 13 illustrates, diagrammatically, a modified circuit that can be employed in practicing this invention; and

FIGURE 14 illustrates another circuit that can be employed.

Referring now particularly to FIGURES 1, 2 and 5 of the drawings, it will be observed that the reference character **10** designates, generally, an automatic coffee making machine. The machine **10** can be mounted on a support plate **11** which may be a counter top or like support as will be understood readily. Suitably secured to the support plate **11** is a frame that is indicated, generally, at **12**. The frame **12** preferably is fabricated from sheet steel members that may be suitably painted. Obviously many forms of frame construction can be employed. Further, for decorative and safety purposes, the frame **12** can be enclosed within a suitable hood or other barrier. However, in order to illustrate more clearly the details of construction of the invention such a hood or barrier has been omitted.

The frame **12** may include a pair of inverted channel members **13** which can be supported directly on the support plate **11** as shown. Secured to one of the channel members **13** there is a start switch **14** which includes a push button **15** that can be operated manually to close the normally open contacts for initiating a coffee making cycle in a manner to be described hereinafter. The push button **15** and start switch **14** can be located in any convenient place, the mounting thereof on one of the channel members **13** having been chosen for convenience.

Between the channel members **13** and forming a part of the frame **12** is a front panel **16** having forwardly extending flanges **17**. As shown in FIGURE 4, one of the flanges **17** is provided with a vertically extending slot **18** the purpose of which will be set forth hereinafter.

Since it is desirable that a visual indication be given that the machine 10 is in operation an indicating lamp 19, preferably a neon lamp, is mounted on the front panel 16. It will be described hereinafter how the indicating lamp 19 is energized during the cycle of automatic operation of the coffee making machine 10.

As shown more clearly in FIGURE 5 of the drawings upright channel supports 20 are provided at the rear of the machine 10 for carrying a platform 21 at the top. Mounted on the platform 21 is a water tank 22 which may be surrounded by a layer 23 of insulation. It will be understood that water in the water tank 22 is maintained at an elevated temperature and it is for this reason that the layer 23 of insulation is provided. Water to the water tank 22 can be supplied through an intake water line 24 which is connected to a suitable source of water under pressure. The flow of water through the intake water line 24 to the water tank 22 is controlled by a water supply valve 25 which is arranged to be operated on energization of a water supply valve solenoid 26. Since the water supply valve 25 and its solenoid 26 are of conventional construction, the details of which form no part of this invention, such details are not shown or described herein other than to illustrate the solenoid 26 diagrammatically in FIGURE 8. Since it is desirable that no heat be supplied to water 27 in the water tank 22 in the event that the pressure from the supply is below a predetermined value, a pressure switch 28 is employed having contacts that are closed when the water pressure is above a predetermined value. The control for the pressure switch 28 is obtained by a direct connection to the water intake line 24 as shown. On energization of the water supply valve solenoid 26 and opening of the water supply valve 25, water flows, as indicated by the arrow 29 from the water supply through the intake water line 24 into the water tank 22.

In order to heat the water 27 in the water tank 22 so that a substantial quantity of it will be available on a stand-by basis for coffee making purposes, an electric tank heater 30 is located within the water tank 22 as shown. The electric tank heater 30 is of conventional construction well known to those skilled in the art. The operation of the electric tank heater 30 is controlled by a thermostat 31, also of conventional construction, which may be located in the upper part of the water tank 22 and arranged to operate a tank thermostat switch 32, FIGURE 2, to close the contacts thereof and complete a circuit for connecting the electric tank heater 30 for energization to a suitable current source when the temperature of the water 27 in the tank 22 falls below a predetermined temperature.

The water from the water tank 22 flows out of the top through a discharge water line 33. As shown in FIGURE 5 it will be observed a discharge water line 33 interconnects the top 34 of the water tank 22 and a top 35 of a surge chamber, shown generally at 36, which is located in spaced relation to the water tank 22 and has a bottom 37 which is located above the top 34 of the water tank 22. Hot water from the discharge water line 33 flows into the surge chamber 36 as indicated by the arrow 38. During the coffee making cycle the surge chamber 36 is closed so that hot water, indicated at 39, fills the principal part of it leaving an air space 40 at the top.

It is desirable that provision be made for siphoning the water 39 from the surge chamber 36 at the end of the coffee making cycle. For this purpose an air vent 41, FIGURE 3, is provided in the top 35 of the surge chamber 36 and it is arranged to be closed by an air valve 42 which is carried by a resilient arm 43 that is secured at 44 to the top 35 at one end. At the other end the resilient arm 43 is provided with an armature 45 that is arranged to be attracted downwardly in the direction indicated by the arrow 46 on energization of an air valve solenoid 47.

Referring again to FIGURE 5 of the drawings, it will be noted that an upwardly deformed portion 49 of a hood, shown generally at 50, is located directly underneath the surge chamber 36. The hood 50 has depending sides 51 which are secured to and carried by frame uprights 52, which form a part of the frame 12, and are secured to the inverted channel members 13 at their lower ends. Positioned within the deformed portion 49 of the hood 50 is a spray head 53 that is provided with spray openings 54 which are arranged to spray hot water downwardly and outwardly over a substantial area. It will be observed that the spray head 53 is positioned at the lower end of an auxiliary discharge water line 55 which extends centrally upwardly through the surge chamber 36 and is connected at the upper end of an enlarged intake section 56 which projects downwardly through the top 35 and close to the bottom 37 of the surge chamber 36. The lower end of the enlarged intake section 56 is provided with notches 57 to facilitate the flow of water upwardly, as indicated by the arrow 58, through the enlarged intake section 56 and then downwardly, as indicated by the arrow 59, to the spray head 53.

The auxiliary discharge water line 55 with the enlarged intake section 56 functions as a siphon on cessation of flow of hot water from the water tank 22 through the discharge water line 33. While the hot water is flowing into the surge chamber 36 from the discharge water line 33, the air vent 41 is closed. The hot water then sprays out of the openings 54 in the spray head 53. At the end of the cycle, the air valve 42 is opened and the air space 40 is placed in communication with the atmosphere through the air vent 41. Although water has ceased to flow through the discharge water line 33, the water 39 in the surge chamber 36 continues to flow since the auxiliary discharge water line 55 and enlarged intake section 56 act as a siphon. As a result, as soon as the level of the water 39 in the surge chamber 36 is lowered to a level below the upper ends of the notches 57, no further flow of water takes place through the auxiliary discharge water line 55 and, consequently, there is no dripping of water from the spray head 53.

The hot water during the coffee making cycle sprays over ground coffee 62 a quantity of which is positioned in the lower end of a disposable conical filter 63, preferably formed of one or more layers of filter paper. The filter 63 is located centrally underneath the spray head 53 and it is supported on a resilient conical wire grill 64 the details of construction of which are shown more clearly in FIGURES 6 and 7 of the drawings. As there shown, the wire grill 64 is formed of various lengths of wire which extend in spaced relation lengthwise of the conical surfaces thereof and are secured together in spaced relation by circularly extending wire supports. Preferably the wire grill 64 is formed of stainless steel or like material. It is resilient and flexible and has spaced longitudinally extending sides 65 and 66 which can be moved toward each other for a purpose that will be apparent presently. The wire grill 64 is of conical shape for the lower principal part and it has a cylindrical top section 67 for interfitting with a cylindrical upper end 68 of a funnel, shown generally at 69, which has a conical body portion 70, a radial flange 71 around the upper periphery and a discharge opening 72 at the bottom. Since the wire grill 64 is resilient and the sides 65 and 66 are spaced apart, the wire grill 64 can be reduced slightly in size by bringing the sides 65 and 66 toward each other for insertion in the funnel 69. On release of the wire grill 64, because of its resiliency, it is frictionally gripped by the inner surface of the conical body portion 70 and the inner surface of the cylindrical upper end 68. Even though the funnel 69 is turned upside down to permit the removal of the filter 63 and spent coffee grounds, the wire grill 64 remains in place.

As shown more clearly in FIGURE 5 of the drawings, the filter 63 is spaced by the resilient conical wire

grill **64** from the inner surface of the conical body portion **70** of the funnel **69**. As a result of this spacing the filter **63** does not become clogged but rather the flow therethrough of filtered liquid can take place over a relatively large area with the result that the time required for water to pass through the funnel **69** is reduced to a minimum. The construction and arrangement of the filter paper **63**, wire grill **64** and funnel **69** are claimed in application Serial No. 814,877, filed May 21, 1959, now abandoned.

As shown in FIGURE 1, the funnel **69** is provided with a handle **73** to facilitate removal from and application to the frame **12**. The funnel **69** is supported by its radial flange **71** overlying a flange **74**, FIGURE 5, of an arcuate support **75** that is secured by rivets **76** to the depending sides **51** of the hood **50**. Since the flange **74** is spaced below the central portion of the hood **50** a distance slightly greater than the thickness of the flange **71** on the funnel **69**, the latter can be inserted and removed as will be understood. In order to facilitate the application of the funnel **69** to the hood **50**, the outer ends **77**, FIGURE 1, of the flanges **74** are turned downwardly.

The coffee that is formed as the result of the spraying of hot water over the ground coffee **62** in the funnel **69** flows downardly through the discharge opening **72** into a beaker **79** that is located therebelow. The beaker **79** may be a conventional glass beaker provided with a handle **80**. The coffee appears therein as indicated at **81**. The beaker **79** is positioned on an annular rim **82** that surrounds a scale heater **83**. The scale heater **83** is employed to maintain the coffee **81** in the beaker **79** at an elevated temperature during the coffee making cycle. Provision is made, as will appear hereinafter, for energizing the scale heater **83** only during the time that the coffee making cycle is being performed.

The beaker **79** supported on the annular rim **82** and scale heater **83** is further supported by a transversely extending plate **84** underneath the scale heater **83**. The plate **84** extends between and is secured to arms **85** and **86** of a bifurcated end of a scale beam that is indicated, generally at **87**. The bifurcated arrangement of the arms **85** and **86** is shown more clearly in FIGURE 2. The arm **85**, at the extreme outer end, is mounted by a pivot pin **88** on one of the flanges **17** of the front panel **16** while the other arm **86** is mounted by a pivot pin **89** which extends through the slot **18** referred to previously. Thus, the arm **86** of the scale beam **87** is mounted for both pivotal and sliding movement by the slot **18**. A relatively light tension spring **90** interconnects the pivot pin **89** and a connection **91** at the upper end of the associated flange **17**. In the absence of the beaker **79**, the spring **90** biases the pivot pin **89** and thereby the arm **86** of the scale beam **87** upwardly to the upper end of the slot **18**. When the beaker **79** is placed empty on the scale heater **83**, the added weight is sufficient to overcome the spring **90** and to cause the arm **86** of the scale beam **87** to move downwardly until the pivot pin **89** engages the lower end of the slot **18**. When this takes place contacts of a beaker switch **92**, mounted on the rear of the front panel **16**, as shown in FIGURE 1, are closed as a result of downward movement of the arm **85** of the scale beam **87** as permitted by the slot **18** through which the pin **89** extends to permit the initiation of the coffee making cycle in a manner to be described hereinafter.

As shown in FIGURES 1 and 5 of the drawings, the other end **95** of the scale beam **87** is supported by a link **96** from one end **97** of a lever **98** which is pivoted at **99** intermediate its ends on a transverse plate **100** which is carried by the front side of and depends from the platform **21**. At its other end **101** the lever **98** carries an adjustable weight **102** which functions to bias the other end **95** of the scale beam **87** upwardly against the downward force exerted by the beaker **79**, annular rim **82**, scale heater **83** and the varying amount of coffee **81** in the beaker **79**. When a predetermined quantity of coffee **81** has flowed into the beaker **79**, the for exerted downwardly on the scale beam **87** by it in ad tion to the other forces, previously referred to, is suf cient to rock the lever **98** from the position shown FIGURE 1 to an alternate position for opening co tacts of a scale switch **103** which is mounted on t transverse plate **100**. As the result of the opening the contacts of the scale switch **103**, the water supp valve solenoid **26** is deenergized and water supply val **25** is closed. No further water flows into the wat tank **22**. However, the hot water **39** in the sur chamber **36** is siphoned out in the manner describ and the coffee continues to flow from the discharge ope ing **72** of the funnel **69** for a limited period.

FIGURE 8 shows the electrical connections that can employed in practicing the invention. It will be observ that line conductors **106** and **107** are arranged to be co nected by line switch **108** and **109** to a suitable sour of current such as 115 volt 60 cycle alternating curre source. Preferably a control relay, shown generally **110**, is employed for performing certain operations. T control relay **110** includes a first set of normally op contacts **111** which are connected in shunt with the co tacts of the tank thermostat switch **32** for the purpo of making certain that the tank heater **30** is energiz during the coffee making cycle in order to maintain t water **27** in the water tank **22** at the required temper ture which might not be retained if reliance were plac solely on the thermostat **31**. The control relay **110** i cludes a second set of normally open contacts **112** whi function as holding contacts and a third set of normal closed contacts **113**. The control relay **110** is provid with an operating wind **114**. It will be observed th the supply valve solenoid **26**, air valve solenoid **47** a operating winding **114** are connected in parallel circ relation and to the line conductor **107**. They are a ranged to be connected through the contacts of the sca switch **103** which are normally closed, the contacts the beaker switch **92**, which are closed only when t beaker **79** is placed in operative position under the fu nel **69**, through the third set of normally closed contac **113** of the control relay **110** and the contacts of the st switch **14** when the push button **15** is depressed to t line conductor **106**. In parallel with the supply val solenoid **26** and the other elements in parallel therewi is a resistor **115** in series with the neon indicating lamp **1**

In describing the operation of the automatic coff making machine **10**, it will be assumed that a measur amount of ground coffee **62** has been placed in the low portion of the filter **63** and that the funnel **69** has be placed in position as shown in FIGURE **5** of the dra ings. In addition it will be assumed that the water pr sure is sufficient to hold the contacts of the pressu switch **28** closed and that the line switches **108** and **1** have been closed to energize line conductors **106** and **1** Under these assumed conditions the thermostat **31** w function to close and open the contacts of tank therm stat switch **32** for the purpose of maintaining the wat **27** in the water tank **22** at the desired temperature. U der these assumed conditions the air valve solenoid is deenergized and the surge chamber **36** is open to t atmosphere through the air vent **41**. Thus the system in effect an open system and pressure cannot build up the water tank **22**.

Next it will be assumed that an empty beaker **79** h been placed on the scale heater **83**. This causes t contacts of the beaker switch **92** to be closed. Now t cycle can be initiated by the operator depressing the pu button **15** and closing the contacts of the start switch **1** The operating winding **114** of the control relay **110** energized, contacts **113** are opened, and holding contac **112** are closed to maintain the operating winding **1** energized. Contacts **111** are closed to shunt the contac of the tank thermostat switch **32** and insure that the ta heater **30** is energized.

he scale heater 83 is energized and, since the contacts he beaker switch 92 are closed and the contacts of the e switch 103 are closed, the neon indicating lamp s illuminated, supply valve solenoid 26 is energized likewise air valve solenoid 47 is energized. As a lt of the energization of the supply valve solenoid 26, water supply valve 25 is opened and water flows into bottom of the water tank 22. Since this water is cold since the thermostat 31 is located at the top of the er tank 22, the temperature at the upper end might be as to hold the contacts of the tank thermostat switch pen. By shunting them by the first set of normally n contacts 111 on energization of the control relay an adequate supply of hot water is assured for the t cycle of operation.

he energization of the air valve solenoid 47 causes air valve 42 to close the air vent 41. The hot water ing in the discharge water line 33 into the surge mber 36 fills the same nearly to the top where the air e 40 is formed. The hot water then is forced in the ction indicated by the arrow 58 through the auxiliary harge water line 55 downwardly as indicated by the w 59 to the spray head 53. The water sprays from openings 54 over the entire exposed area of the und coffee 62 in the filter 63 and thus there is a large of contact to promote the coffee making operation. e the filter 63 is spaced by the resilient conical wire l 64 from the inner surface of the funnel 69, the ee flows rapidly through the filter 63.

he operation continues, as described, until the quan- of coffee 81 that has flowed into the beaker 79 is icient to overbalance the weight 102 on the lever 98. le switch 103 then is operated and its contacts are ned. Referring to FIGURE 8 it will be observed that opening of the contacts of the scale switch 103 opens holding circuit for the operating winding 114 of the trol relay 110. As a result it is deenergized. The in- ating lamp 19 is extinguished and the supply valve noid 26 and air valve solenoid 47 are deenergized. opening of the first set of contacts 111, the control of tank heater 30 is restored to the thermostat 31. No itional cold water flows through the intake water line since the water supply valve 25 now is closed. The valve 42 is opened and the air vent 41 permits the ion to operate in a manner previously described. er a short interval no further flow of coffee takes place ough the discharge opening 72 at the bottom of the nel 69.

t will be understood that the foregoing cycle can be eated as often as desired. The time required for com- ting a cycle will depend upon the position of the ght 102. At the completion of a cycle the beaker 79 d with coffee 81 is removed and is placed on an aux- ry heating unit (not shown). The scale heater 83 s deenergized as soon as the control relay 110 was nergized.

The funnel 69 can be removed readily by grasping the idle 73. All that is necessary to be done to remove coffee grounds and the filter 63 is to turn the funnel upside down over a suitable waste basket. Since the er 63 is spaced by the resilient conical wire grill 64 m the inner surface of the funnel 69, none of the fee grounds comes in contact with the funnel 69 and, s, it is unnecessary to wash it at the end of each cycle operation.

FIGURE 9 of the drawings shows a modified arrange- nt of the surge chamber. It will be observed here that upper end 118 of the water tank 22 provides a surge mber which corresponds to the surge chamber 36 pre- usly described. Here a discharge water line 119 inter- nects the water tank 22 directly with the spray head

The intake end 120 of the discharge water line 119 ends downwardly into the water tank 22 through the 34 while the other end or discharge end 121 of the charge water line 119 has the spray head 53 attached

thereto. An air vent 122, corresponding to the air vent 41, is provided in the top 34 of the water tank 22 and is arranged to be closed by the air valve 42 in the manner previously described. In this case the resilient arm 43 is secured at 123 to the upper end 34 of the water tank 22.

On the cessation of flow of cold water to the water tank 22 at the end of the coffee making cycle, the water continues to flow from the water tank 22 through the discharge water line 119 since the latter acts as a siphon on opening of the air valve 42. The flow continues until the water level 124 is lowered to the elevation of the spray head 53, whereupon further flow ceases and no dripping of water takes place at the spray head 53.

On closure of the air valve 42 at the start of a coffee making cycle, the water level 124 rises in the water tank 22 due to the inflow of water in a manner previously described. The water level 124 rises to a location in the vicinity of the broken line 125 and an air space 126 is provided thereabove which corresponds to the air space 40 in the surge chamber 36.

It will be understood that a certain amount of expansion of the water 28 in the water tank 22 takes place as the result of its being heated. This expansion is accommodated by the air spaces 40 and 126, in part. Since the only water valve is the water supply valve 25 and it is located in the intake water line 24, there is no necessity for any other control in the lines which carry hot water. Thus there is no likelihood of a valve in a hot water line being clogged by sediment in the water. The system is inherently safe since it is an open system, rather than a closed system.

The construction shown in FIGURE 9 can be employed in lieu of the corresponding construction shown in FIGURES 1, 2 and 5 of the drawings. Further, it is possible to omit the air valve 42 and associated control parts including the air valve solenoid 47. When this is done, the water tank 22 is filled completely to the top and a slight amount of water leaks out of the air vent 122 because the discharge water line 119 is above the top of the air vent 122 while water sprays out of the opening 54 in the supply head 53 in the manner hereinbefore described. On deenergization of the supply valve solenoid 26 and closure of the water supply valve 25, no additional water is supplied to the water tank 22 and the siphoning takes place as described since the air vent 122 opens to the atmosphere above the spray openings 54 in the spray head 53.

In order to avoid the leak incident to the operation of the construction shown in FIGURE 9 with the air valve 42 omitted, the construction shown in FIGURES 10 and 11 can be employed. Here it will be observed that the water tank 22 is provided with the layer of insulation 23. The spray head 53 is arranged to discharge hot water over the ground coffee 62 in the funnel 69. A discharge water line 127 interconnects the upper end of the water tank 22 with the spray head 53. It will be noted that the intake end 128 of the discharge water line 127 is located above the discharge openings 54 in the spray head 53. Also it will be observed that the intake end 128 extends below the under surface of the top 34 of the water tank 22 a slight distance. In order to provide the siphoning action a siphon tube 129 is employed. It will be noted that it opens through the top 34 of the water tank 22 into the interior thereof and that its intake end 130 may be flush with the under surface of the top 34. The discharge end 131 of the siphon tube 129 opens through the hood 50 over the funnel 69 so that if there should be any discharge through the siphon tube 129, it will be received by the funnel 69. The intermediate portion 132 of the siphon tube 129 is located well above the discharge water line 127. When the hot water is discharging from the spray openings 54 in the spray head 53, the discharge water line 127 of course is filled with hot water. At this time the level of the water in the

siphon tube **129** rises to the location indicated by the broken line **133** and, under normal operating conditions, it rises no higher than this. When the water supply valve **25** is closed to prevent further flow of water to the water tank **22**, the pressure from the atmosphere applied through the siphon tube **129** to the surface of the water in the water tank **22** causes the siphoning action to continue until the level of the water tank **22** reaches the intake end **128** of the discharge water line **127**. Thereupon further discharge from the spray head **53** ceases and no dripping of water takes place from the spray head **53**.

It has been found that water tends to condense on the underside of the hood **50** in the vicinity of the upwardly deformed portion **49**. In order to avoid this, heat is applied as shown in FIGURES 10 and 11 by means of a hood heater **135**. As described hereinafter, the hood heater **135**, which is an electrical resistance element, is arranged to be energized together with the tank heater **30** under the control of the tank thermostat switch **32**. This is shown diagrammatically in FIGURES 13 and 14 of the drawings.

After the flow of hot water from the spray head **53** ceases, there is likely to be some drip from the discharge opening **72** of the funnel **69**. This is due to the fact that some liquid remains in the ground coffee **62** and in the conical filter paper **63**. Often it is desirable that the funnel **69** be removed immediately upon cessation of flow of hot water from the spray head **53**. Accordingly, a ball valve **136**, FIGURES 11 and 12, is provided at the lower end of the conical body portion **70** of the funnel **69**. The ball valve **136** is arranged to interfit with a deformed valve surface **137** adjacent the discharge opening **72**. The ball valve **136** falls to the position shown in FIGURE 12 upon removal of the funnel **69** from the operative position underneath the spray head **53**.

In order to control the position of the ball valve **136** an operator **138** in the form of a flexible chain is provided. The chain **138** extends upwardly through a guide sleeve **139** which is suitably secured to the inner surface of the conical body portion **70** of the funnel **69**. At its upper end the chain **138** is connected to one arm **140** of a lever **141** which is pivoted at **142** on the handle **73**. The other arm **143** of the lever **141** is arranged, when the funnel **69** is positioned underneath the hood **50**, to engage a forward edge **144** of a cover **145** that extends over the hood **50**. As soon as the funnel **69** is withdrawn slightly from operative position, the weight of the ball valve **136** swings the lever **141** in a clockwise direction since the other arm **143** is no longer restrained by the forward edge **144** of the cover **145**. Accordingly, the ball valve **136** falls to the closed position shown in FIGURE 12 and immediately no further flow of coffee can take place through the discharge opening **72**.

FIGURE 13 shows a modified circuit arrangement that can be employed in lieu of the circuit arrangement shown in FIGURE 8 of the drawings and without using the air valve solenoid **47**. The circuit arrangement shown in FIGURE 8 depended upon the operation of the scale switch **103** on flow of a predetermined weight of coffee to the beaker **79** for deenergizing the supply valve solenoid **26** and closing the water supply valve **25**. In the circuit arrangement shown in FIGURE 13 this control function is effected by a timing mechanism which is incorporated in the circuit.

Referring now particularly to FIGURE 13, it will be observed that the tank heater **30** and the hood heater **135** are connected for energization between the line conductors **106** and **107** when the line switches **108** and **109** are closed through the contacts of the tank thermostat switch **32**. The pressure switch **28** is provided to insure that the tank heater **30** is not energized in the event that the pressure of the water is below a predetermined value. Also in the system shown in FIGURE 13 there is a winding **148** of a control relay **149** which is provided with normally open contacts **150**. When the contacts of the start switch **14** are closed by depressing the bush button **15** a circuit is completed for energizing the winding **148** through normally closed limit switch contacts **151**. On energization of the winding **148**, the contacts **150** are closed and the winding **148** is sealed in so that the contacts of the start switch **14** can be opened. Upon the closure of the contacts of the start switch **14**, in addition to energization of the winding **148**, the water supply valve solenoid **26** is energized to open the water supply valve **25** and permit the flow of water to the water tank **22** in the manner previously described. For example the arrangement shown in FIGURE 11 can be utilized or the arrangements in the preceding figures of the drawings can be employed as may be desired. In addition to the energization of the water supply valve solenoid **26** the indicating lamp **19** is energized through the resistor **115** and the scale or platform heater **83** also is energized for maintaining the coffee in the beaker **79** at an elevated temperature.

It is desirable that the contacts of the limit switch **151** be opened at the expiration of a predetermined interval which interval corresponds to the time required for sufficient hot water to flow from the tank **22** through the spray head **53** and fill the beaker **79** to the desired level. Provision is made for opening the contacts of the limit switch **151** through the agency of a cam **152** that is carried by a disc **153** which is mounted on and rotates with a shaft **154**. At the other end of the shaft **154** there is a disc **155** which is arranged to be rotated by a drive wheel **156**. The drive wheel **156** rotates at a slow speed, such as 1 r.p.m., and its position in variable axially in order to vary the speed at which the disc **155** is driven. Any suitable means well known to those skilled in the art can be employed for changing the position of the drive wheel **156**. In order to rotate the drive wheel **156** it is mounted on a shaft **157** which is connected through a suitable gear reduction train to a rotor **158** of a synchronous motor of well known construction that is indicated, generally, at **159**. The synchronous motor **159** includes a motor winding **160** which is connected to be energized on closure of the contacts of the start switch **14** and which remains energized together with the other devices by the maintenance of a circuit through the closed contacts **150** of the control relay **149**.

In operation, after closure of the contacts of the start switch **14** and completion of the holding circuit through the contacts **150** of the control relay **149**, the motor winding **160** is energized and the disc **153** rotates in the direction indicated by the arrow **161** from the start position indicated at **162**. The water supply valve **25** is opened in the manner described, the indicating lamp **19** is energized and the platform heater **83** is energized until the cam **152** operates the limit switch contacts **151** to open them and deenergize the winding **148** of the control relay **149**. Thereupon the water supply valve solenoid **26** is deenergized and the water supply valve **25** is closed. The indicating lamp **19** is extinguished and the platform heater **83** is deenergized. Also the motor winding **160** is deenergized.

However, the construction of the timing mechanism is such that the disc **153** returns to the position indicated at **162** so that it always starts from the same position.

FIGURE 14 shows a further modification of the circuit connections that can be employed without the air valve solenoid **47**. Here the control for the tank heater **30** and the hood heater **135** are the same as before. The timer motor **159**, previously described, is arranged to rotate the disc **153** and it may be in the manner described for FIGURE 13. Here the disc **153** with the cam **152** thereon is arranged to control the operation of a timer switch which is indicated, generally, at **164**. The timer switch **164** includes a manually operable arm **165** which is arranged, when moved clockwise, to close contacts **166** and **167**. On closure of the contacts **166**, a circuit is completed for energizing the water supply valve solenoid **26**

) open the water supply valve **25** and initiate the flow of ot water from the tank **22** to the spray head **53** in the ıanner hereinbefore described. In addition the closure f the contacts **166** completes an energizing circuit for the ıotor winding **160** and the rotor **158** begins to rotate the isc **153** in the direction indicated by the arrow **161**.

The closure of the contacts **167** completes a circuit for nergizing the indicating lamp **19** through the resistor **115**. n addition a circuit is completed for energizing the platorm heater **83** which is located adjacent a movable platorm **168** on which the beaker **79** is positioned underneath he spray head **53**.

It is desirable that the platform heater **83** be maintained nergized after the coffee making cycle has been comıleted and the water supply valve **25** has been closed. Iowever, it is preferable that the platform heater **83** be nergized only at the beginning of the coffee making ycle and that it not be energized merely by placing the eaker **79** on the movable platform **168**. In order to naintain the platform heater **83** energized normally open ontacts **169** are provided in parallel with the contacts **167**. An adjustable spring **170** serves to hold the contacts **169** open and to hold the movable platform **169** in an elevated position against the weight of the beaker **79** and the weight of the beverage as it is filled. However, the tension of the spring **170** is adjusted so that, when the beaker **79** is partly filled, the contacts **169** are closed. Thus, when the contacts **167** are opened by the timer motor **159** in the manner described, the energizing circuit for the platform heater **83** is maintained through the contacts **169**.

In addition the indicating lamp **19** remains energized until the filled beaker **79** is removed. Thereupon the spring **170** opens the contacts **169** and the placing of an empty beaker **79** on the movable platform **168** will not provide sufficient weight to overcome the upward force of the spring **170** and close the contacts **169**.

Since certain further changes can be made in the foregoing constructions and different embodiments of the invention can be made without departing from the spirit and scope thereof, it is intended that all matter shown in the accompanying drawings and described hereinbefore shall be interpreted as illustrative and not in a limiting sense.

What is claimed as new is:

1. An automatic coffee making machine comprising, in combination, a frame, a water tank on said frame connected through a supply valve to a supply of water under pressure, *said water tank having a closed top,* means for heating water in said tank, a discharge head mounted on said frame in spaced relation to said water tank having one or more openings for causing hot water supplied thereto to be discharged over a substantial area, siphon means interconnecting the upper end of said water tank and said discharge head [including] *through said closed top including a discharge water line having its intake end opening in said water tank above the central portion thereof and* an air vent, an air valve for closing said air vent, means underneath said discharge head for receiving ground coffee to be covered by hot water from said discharge head, a beaker below said coffee receiving means for receiving coffee extract therefrom, and means for closing said air valve and opening said supply valve to cause [hot water] *water heated by said heating means to flow concurrently through said discharge water line to said discharge head* to cover said ground coffee and coffee extract to flow into said beaker.

2. An automatic coffee making machine comprising, in combination, a frame, a water tank on said frame connected through a supply valve to a supply of water under pressure, means for heating water in said water tank, a discharge head mounted on said frame in spaced relation to said water tank having one or more openings for causing hot water supplied thereto to be discharged over a substantial area, siphon means interconnecting the upper end of said water tank and said discharge head including an air vent, an air valve for closing said air vent, means underneath said discharge head for receiving ground coffee to be covered by hot water from said discharge head, a beaker below said ground coffee receiving means for receiving coffee extract therefrom, scale means supporting said beaker, and means responsive to placement of an empty beaker on said scale means for closing said air valve and opening said supply valve to cause hot water to cover said ground coffee and coffee extract to flow into said beaker.

3. An automatic coffee making machine comprising, in combination, a frame, a water tank on said frame connected through a supply valve to a supply of water under pressure, means for heating water in said water tank, a discharge head mounted on said frame in spaced relation to said water tank having one or more openings for causing hot water supplied thereto to be discharged over a substantial area, siphon means interconnecting the upper end of said water tank and said discharge head including an air vent, an air valve for closing said air vent, means underneath said discharge head for receiving ground coffee to be covered by hot water from said discharge head, a beaker below said ground coffee receiving means for receiving coffee extract therefrom, scale means supporting said beaker, means for closing said air valve and opening said supply valve to cause hot water to cover said ground coffee and coffee extract to flow into said beaker, and means responsive to the filling of said beaker with coffee to a predetermined extent and thereby operation of said scale means for opening said air valve and closing said supply valve.

4. An automatic coffee making machine comprising, in combination, a frame, a water tank on said frame connected through a supply valve to a supply of water under pressure, means for heating water in said water tank, a spray head mounted on said frame in spaced relation to said water tank having openings for causing hot water supplied thereto to be sprayed downwardly over a substantial area, means providing a surge chamber between the surface of the water in said water tank and said spray head, said surge chamber being located above said openings in said spray head, a discharge water line interconnecting said surge chamber from a level therein substantially below the top thereof and said spray head, said surge chamber having an air vent in the top, an air valve for closing said air vent, means underneath said spray head for receiving ground coffee to be sprayed by hot water from said spray head, a beaker below said ground coffee receiving means for receiving coffee extract therefrom, and means for closing said air valve and opening said supply valve to cause hot water to spray over said ground coffee and coffee extract to flow into said beaker.

5. An automatic coffee making machine comprising, in combination, a frame, a water tank on said frame connected through a supply valve to a supply of water under pressure, means for heating water in said tank, a spray head mounted on said frame in spaced relation to said water tank having openings for causing hot water supplied thereto to be sprayed downwardly over a substantial area, means providing a surge chamber between the surface of the water in said water tank and said spray head, said surge chamber being located above said openings in said spray head, a discharge water line interconnecting said surge chamber from a level therein substantially below the top thereof and said spray head whereby on cessation of flow of water to said water tank water in said surge chamber is siphoned out of the same, said surge chamber having an air vent in the top, an air valve for closing said air vent, means underneath said spray head for receiving ground coffee to be sprayed by hot water from said spray head, a beaker below said ground coffee receiving means for receiving coffee extract therefrom,

scale means supporting said beaker, means for closing said air valve and opening said supply valve to cause hot water to spray over said ground coffee and coffee extract to flow into said beaker, and means responsive to the filling of said beaker with coffee extract to a predetermined extent and thereby operation of said scale means for opening said air valve and closing said supply valve.

6. An automatic coffee making machine comprising, in combination, a frame, a water tank on said frame connected through a supply valve to a supply of water under pressure, means for heating water in said water tank, a spray head mounted on said frame in spaced relation to said water tank having openings for causing hot water supplied thereto to be sprayed downwardly over a substantial area, means providing a surge chamber between the surface of the water in said water tank and said spray head, said surge chamber being located above said openings in said spray head, a discharge water line interconnecting said surge chamber from a level therein substantially below the top thereof and said spray head whereby on cessation of flow of water to said water tank in said surge chamber water is siphoned out of the same, said surge chamber having an air vent in the top, an air valve for closing said air vent, means underneath said spray head for receiving ground coffee to be sprayed by hot water from said spray head, a beaker below said ground coffee receiving means for receiving coffee extract therefrom, scale means supporting said beaker, means responsive to placing an empty beaker on said scale means for closing said air valve and opening said supply valve to cause hot water to spray over said ground coffee and coffee extract to flow into said beaker, and means responsive to the filling of said beaker with coffee extract to a predetermined extent for opening said air valve and closing said supply valve.

7. An automatic coffee making machine comprising, in combination, a frame, a water tank on said frame connected through a supply valve to a supply of water under pressure, means for heating water in said water tank, a spray head mounted on said frame in spaced relation to said water tank having openings for causing hot water supplied thereto to be sprayed downwardly over a substantial area, siphon means interconnecting the upper end of said water tank and said spray head including an air vent, an air valve for closing said air vent, means underneath said spray head for receiving ground coffee to be sprayed by hot water from said spray head, a beaker below said ground coffee receiving means for receiving coffee extract therefrom, a scale beam supporting said beaker, said scale beam being bifurcated at one end with one arm pivotally supported by said frame and the other arm pivotally and slidably supported by said frame, a spring secured to said frame and biasing said other arm upwardly, means biasing the other end of said scale beam upwardly, means responsive to downwardly movement of said other arm as a result of placement of an empty beaker on said scale beam for closing said air valve and opening said supply valve to cause hot water to spray over said ground coffee and coffee extract to flow into said beaker, and means responsive to the filling of said beaker with coffee extract to a predetermined extent for overcoming the biasing means at said other end of said scale beam for opening said air valve and closing said supply valve.

8. An automatic coffee making machine comprising, in combination, a frame, a water tank on said frame connected through a solenoid operated supply valve to a supply of water under pressure, means for heating the water in said water tank, a spray head mounted on said frame in spaced relation to said water tank having openings for causing hot water supplied thereto to be sprayed downwardly over a substantial area, siphon means interconnecting the upper end of said water tank and said spray head including an air vent, a solenoid operated air valve for closing said air vent, means underneath said spray

head for receiving ground coffee in position to be sprayed by hot water from said spray head, a beaker below said ground coffee receiving means for receiving coffee extract therefrom, a scale beam supporting said beaker, and pivotally supported by said frame, means biasing said scale beam upwardly, a scale switch on said frame operated by said scale beam in response to a predetermined quantity of coffee extract in said beaker, means for connecting the supply valve solenoid and the air valve solenoid for energization to a source of electric current to open said supply valve and close said air valve, and means responsive to operation of said scale switch as a result of the flow of a predetermined quantity of coffee extract into said beaker for effecting deenergization of said supply valve solenoid and of said air valve solenoid and closing of said supply valve and opening of said air valve.

9. An automatic coffee making machine comprising, in combination, a frame, a water tank on said frame connected through a solenoid operated supply valve to a supply of water under pressure, means for heating the water in said water tank, a surge chamber on said frame having an air vent at the top and the bottom of said surge chamber above the top of said water tank, a solenoid operated air valve for closing said air vent to said surge chamber, a discharge water line interconnecting the top of said water tank and the top of said surge chamber, an auxiliary discharge water line having an intake opening near said bottom of said surge chamber and extending above said top of said surge chamber and acting as a siphon on cessation of flow of hot water in said discharge water line, a spray head at the discharge end of said auxiliary discharge water line having openings for causing the hot water to be sprayed downwardly over a substantial area, means underneath said spray head for receiving ground coffee in position to be sprayed by hot water from said spray head, a beaker below said ground coffee receiving means for receiving coffee extract therefrom, a scale beam supporting said beaker and pivotally supported by said frame, means biasing said scale beam upwardly, a scale switch on said frame operated by said scale beam in response to a predetermined quantity of coffee extract in said beaker, means for connecting the supply valve solenoid and the air valve solenoid for energization to a source of electric current to open said supply valve and close said air valve, and means responsive to operation of said scale switch as a result of the flow of a predetermined quantity of coffee extract into said beaker for effecting deenergization of said supply valve solenoid and of said air valve solenoid and closing of said supply valve and opening of said air valve.

10. An automatic coffee making machine comprising, in combination, a frame, a water tank on said frame connected through a supply valve to a supply of water under pressure, means for heating water in said water tank, the upper end of said water tank providing a surge chamber and having an air vent at the top, a discharge water line extending into said water tank and opening at the intake end into the same at the bottom of said surge chamber, a spray head at the discharge end of said water line having openings for causing the hot water to be sprayed downwardly over a substantial area, said openings being located at the level of the bottom of said surge chamber whereby on cessation of flow of water to said water tank water in said surge chamber is siphoned out of the same, means underneath said spray head for receiving ground coffee to be sprayed by hot water from said spray head, a beaker below said ground coffee receiving means for receiving coffee extract therefrom, scale means supporting said beaker, means for closing said air valve and opening said supply valve to cause hot water to spray over said ground coffee and coffee extract to flow into said beaker, and means responsive to the filling of said beaker with coffee extract to a predetermined extent and thereby operation of said scale means for opening said air valve and closing said supply valve.

11. An automatic coffee making machine comprising, in combination, a frame, a water tank on said frame connected through a solenoid operated supply valve to a supply of water under pressure, means for heating the water in said water tank, the upper end of said water tank providing a surge chamber and having an air vent at the top, a solenoid operated air valve for closing said air vent to said surge chamber, a discharge water line extending into said water tank and opening at the intake end into the same at the bottom of said surge chamber, a spray head at the discharge end of said water line having openings for causing the hot water to be sprayed downwardly over a substantial area, said openings being located at the level of the bottom of said surge chamber, means underneath said spray head for receiving ground coffee in position to be sprayed by hot water from said spray head, a beaker below said ground coffee receiving means for receiving coffee extract therefrom, a scale beam supporting said beaker and pivotally supported by said frame, means biasing said scale beam upwardly, a scale switch on said frame operated by said scale beam in response to a predetermined quantity of coffee extract in said beaker, means for connecting the supply valve solenoid and the air valve solenoid for energization to a source of electric current to open said supply valve and close said air valve, and means responsive to operation of said scale switch as a result of the flow of a predetermined quantity of coffee extract into said beaker for effecting deenergization of said supply valve solenoid and of said air valve solenoid and closing of said supply valve and opening of said air valve.

12. An automatic coffee making machine comprising, in combination, a frame, an insulated water tank on said frame connected through a solenoid operated supply valve to a supply of water under pressure, a pressure switch connected to said supply of water having contacts held closed under predetermined pressure, an electric heating element in said water tank connected for energization to a source of electric current through said contacts of said pressure switch, a thermostat in said water tank operating a tank thermostat switch the contacts of which are interposed in the circuit to said electric heating element and are operated by said thermostat to maintain the water in said water tank at a predetermined temperature, the upper end of said water tank providing a surge chamber and having an air vent at the top, a solenoid operated air valve for closing said air vent to said surge chamber, a discharge water line extending into said water tank and opening at the intake end into the same at the bottom of said surge chamber, a spray head at the discharge end of said water line having openings for causing the hot water to be sprayed downwardly over a substantial area, said openings being located at the level of the bottom of said surge chamber, means underneath said spray head for receiving ground coffee in position to be sprayed by hot water from said spray head, a beaker below said ground coffee receiving means for receiving coffee extract therefrom, a scale beam supporting said beaker and pivotally supported by said frame, means biasing said beam upwardly, a scale switch on said frame having normally closed contacts and operated by said scale beam in response to a predetermined quantity of coffee extract in said beaker to open its contacts; a control relay having first and second sets of normally open contacts, and an operating winding; a normally open start switch on said frame, circuit means connecting said operating winding for initial energization through the contacts of said start switch and for maintaining said operating winding energized through said normally closed contacts of said scale switch and through said second set of relay contacts when closed on opening of said start switch, circuit means connecting the supply valve solenoid and the air valve solenoid in parallel circuit relation and in series circuit relation with said second set of relay contacts and circuit means connecting said first set of contacts in parallel with said contacts of said tank thermostat switch.

13. An automatic coffee making machine comprising, in combination, a water tank connected through a supply valve to a supply of water under pressure, *said water tank having a closed top,* means for heating water in said tank, a discharge head mounted in spaced relation to said water tank having one or more openings for causing hot water supplied thereto to be discharged over a substantial area, siphon means interconnecting the upper end of said water tank and said discharge head [including] *through said closed top including a discharge water line having its intake end opening in said water tank above the central portion thereof and* an air vent placing said upper end of said water tank in communication with the atmosphere at a location above the level at which water is discharged from said head, means underneath said discharge head for receiving ground coffee to be covered by hot water from said dischareg head, a beaker below said coffee receiving means for receiving coffee extract therefrom, and means for opening said supply valve to cause [hot water] *water heated by said heating means to flow concurrently through said discharge water line to said discharge head* to cover said ground coffee and coffee extract to flow into said beaker.

14. An automatic coffee making machine comprising, in combination, a water tank connected through a supply valve to a supply of water under pressure, means for heating water in said tank, a discharge head mounted in spaced relation to said water tank having one or more openings for causing hot water supplied thereto to be discharged over a substantial area, siphon means interconnecting the upper end of said water tank and said discharge head including a discharge water line providing a connection between said upper end of said water tank and said discharge head and an air vent line extending above said discharge water line through which water normally does not flow and in which the water level under normal operating conditions is the same as the highest level of the water in said discharge water line, means underneath said discharge head for receiving ground coffee to be covered by hot water from said discharge head, a beaker below said coffee receiving means for receiving coffee extract therefrom, and means for opening said supply valve to cause hot water to cover said ground coffee and coffee extract to flow into said beaker and for subsequently closing said supply valve, said air vent line providing direct communication between said water tank and the atmosphere at all times and limiting the pressure that can be created in said water tank to atmospheric pressure and the siphon action preventing further flow of water through said discharge water line and further discharge of water from said discharge head after closure of said supply valve and the water in said tank has been discharged to the level of the intake end of said discharge water line in said tank.

15. An automatic coffee making machine comprising, in combination, a water tank connected through a supply valve to a supply of water under pressure, means for heating water in said tank, a discharge head mounted in spaced relation to said water tank having one or more openings for causing hot water supplied thereto to be discharged over a substantial area, siphon means interconnecting the upper end of said water tank and said discharge head including a discharge water line providing a connection between said upper end of said water tank and said discharge head and an air vent line extending above said discharge water line and placing the upper end of said water tank in communication with the atmosphere whereby on cessation of flow of water to said water tank atmospheric pressure causes the flow of water to said discharge head to continue until the vacuum within said tank is broken, said air vent line opening to the atmosphere in the vicinity of said discharge head, means underneath said discharge head for receiving ground

coffee to be covered by hot water from said discharge head and any discharge from said air vent line, a beaker below said coffee receiving means for receiving coffee extract therefrom, and means for opening said supply valve to cause hot water to cover said ground coffee and coffee extract to flow into said beaker and for subsequently closing said supply valve, said air vent line providing direct communication between said water tank and the atmosphere at all times and limiting the pressure that can be created in said water tank to atmospheric pressure and the siphon action preventing further flow of water through said discharge water line and further discharge of water from said discharge head after closure of said supply valve and the water in said tank has been discharged to the level of the intake end of said discharge water line in said tank.

16. An automatic coffee making machine comprising, in combination, a water tank connected through a supply valve to a supply of water under pressure, means for heating water in said tank, a discharge head mounted in spaced relation to said water tank having one or more openings for causing hot water supplied thereto to be discharged over a substantial area, siphon means interconnecting the upper end of said water tank and said discharge head including a discharge water line providing a connection between the upper end of said water tank and said discharge head and an air vent through which water under normal operating conditions does not flow placing said upper end of said water tank in communication with the atmosphere at a location above the level at which water is discharged from said head whereby on cessation of flow of water to said water tank atmospheric pressure causes the flow of water to said discharge head to continue until the vacuum within said tank is broken, means underneath said discharge head for receiving ground coffee to be covered by hot water from said discharge head, a beaker below said coffee receiving means for receiving coffee extract therefrom, means for opening said supply valve to cause hot water to cover said ground coffee and coffee extract to flow into said beaker, and means for closing said supply valve a predetermined time after it is opened, said air vent providing direct communication between said water tank and the atmosphere at all times and limiting the pressure that can be created in said water tank to atmospheric pressure and the siphon action preventing further flow of water through said discharge water line and further discharge of water from said discharge head after closure of said supply valve and the water in said tank has been discharged to the level of the intake end of said discharge water line in said tank.

17. The invention as set forth in claim 16 wherein the means for closing the supply valve is a motor driven timer that is initiated in operation when the supply valve is opened.

18. An automatic coffee making machine comprising, in combination, a water tank connected through a supply valve to a supply of water under pressure, means for heating water in said tank, a discharge head mounted in spaced relation to said water tank having one or more openings for causing hot water supplied thereto to be discharged over a substantial area, siphon means interconnecting the upper end of said water tank and said discharge head including an air vent placing said upper end of said water tank in communication with the atmosphere at a location above the level at which water is discharged from said head, a hood overlying said discharge head, means for heating said hood to avoid condensation of moisture on the under side thereof, means underneath said discharge head and hood for receiving ground coffee to be covered by hot water from said discharge head, a beaker below said coffee receiving means for receiving coffee extract therefrom, and means for opening said supply valve to cause hot water to cover said ground coffee and coffee extract to flow into said beaker.

19. An automatic coffee making machine comprising, in combination, a water tank connected through a supply valve to a supply of water under pressure, means for heating water in said tank, a discharge head mounted in spaced relation to said water tank having one or more openings for causing hot water supplied thereto to be discharged over a substantial area, siphon means interconnecting the upper end of said water tank and said discharge head including a discharge water line providing a connection between said upper end of said water tank and said discharge head and an air vent line extending above said discharge water line, a hood overlying said discharge head, means for heating said hood to avoid condensation of moisture on the under side thereof, means underneath said discharge head and hood for receiving ground coffee to be covered by hot water from said discharge head, a beaker below said coffee receiving means for receiving coffee extract therefrom, and means for opening said supply valve to cause hot water to cover said ground coffee and coffee extract to flow into said beaker.

20. An automatic coffee making machine comprising, in combination, a frame, a water tank on said frame connected through a supply valve to a supply of water under pressure, means for heating water in said water tank, the upper end of said water tank having an air vent, a discharge water line extending into said water tank and opening at the intake end into the same at the top thereof, a spray head at the discharge end of said water line having openings for causing the hot water to be sprayed downwardly over a substantial area, said openings being located no higher than the level of said intake end of said water line whereby on cessation of flow of water to said water tank water is siphoned out of the same, means underneath said spray head for receiving ground coffee to be sprayed by hot water from said spray head, a beaker below said ground coffee receiving means for receiving coffee extract therefrom, scale means supporting said beaker, means for opening said supply valve to cause hot water to spray over said ground coffee and coffee extract to flow into said beaker, and means responsive to the filling of said beaker with coffee extract to a predetermined extent and thereby operation of said scale means for closing said supply valve.

21. An automatic coffee making machine comprising, in combination, a frame, a water tank on said frame connected through a supply valve to a supply of water under pressure, means for heating water in said water tank, the upper end of said water tank having an air vent, a discharge water line extending into said water tank and opening at the intake end into the same at the top thereof, a spray head at the discharge end of said water line having openings for causing the hot water to be sprayed downwardly over a substantial area, said openings being located no higher than the level of said intake end of said water line whereby on cessation of flow of water to said water tank water is siphoned out of the same, means underneath said spray head for receiving ground coffee to be sprayed by hot water from said spray head, a beaker below said ground coffee receiving means for receiving coffee extract therefrom, means for opening said supply valve to cause hot water to spray over said ground coffee and coffee extract to flow into said beaker, and motor driven timer means for closing said supply valve a predetermined time after it is opened.

22. A coffee making machine comprising, in combination, a water tank, a supply valve, means connecting said water tank through said supply valve to a source of water under pressure, means for heating water in said tank, a discharge head mounted in spaced relation to said water tank for causing hot water supplied thereto to be discharged therefrom, siphon means interconnecting said water tank and said discharge head including a discharge water line providing a connection between said water tank and said discharge head and an air vent line extending above said discharge water line through which water does

not normally flow and in which the water level under normal operating conditions is the same as the highest level of the water in said discharge water line, means associated with said discharge head for receiving ground coffee to have applied thereto hot water from said discharge head, a beaker associated with said coffee receiving means for receiving coffee extract therefrom, a solenoid for operating said supply valve, manually operable switch means for connecting said solenoid for emergization to a source of electric current, a relay having an operating winding connected to be energized from said current source on closure of said manually operable switch means and normally open contacts connected in shunt circuit relation with said manually operable switch means for maintaining completed the energizing circuits for said selenoid and said operating winding on opening of said manually operable switch means, normally closed timer contact means connected in series circuit relation with said operating winding, a timing motor operatively connected to said timer contact means for opening the same a predetermined time after energization of said timing motor, and circuit means connecting said timing motor for energization to said current source on closure of said manually operable switch means said air vent line providing direct communication between said water tank and the atmosphere at all times and limiting the pressure that can be created in said water tank to atmospheric pressure and the siphon action preventing further flow of water through said discharge water line and further discharge of water from said discharge head after closure of said supply valve and the water in said tank has been discharged to the level of the intake end of said discharge water line in said tank.

23. An automatic coffee making machine comprising, in combination, a water tank having a closed top, means for heating water in said tank, a discharge head mounted in spaced relation to said water tank having one or more openings for causing hot water supplied thereto to be discharged over a substantial area, siphon means interconnecting the upper end of said water tank and said discharge head including a discharge water line having its intake end opening in said water tank above the central portion thereof and an air vent line opening to the atmosphere above said closed top at all times to limit the pressure that can be created in said water tank to atmospheric pressure, means underneath said discharge head for receiving ground coffee to be covered by hot water from said discharge head, a beaker below said coffee receiving means for receiving coffee extract therefrom, and means for supplying water to said water tank to cause water heated by said heating means to flow concurrently through said discharge water line to said discharge head to cover said ground coffee and coffee extract to flow into said beaker.

24. An automatic coffee making machine comprising, in combination, a water tank, means for heating water in said tank, a discharge head mounted in spaced relation to said water tank having one or more openings for causing hot water supplied thereto to be discharged over a substantial area, siphon means interconnecting the upper end of said water tank and said discharge head including a discharge water line providing a connnection between said upper end of said water tank and said discharge head and an air vent line extending above said discharge water line, through which water does not normally flow and in which the water level under normal operating conditions is the same as the highest level of water in said discharge water line, means underneath said discharge head for receiving ground coffee to be covered by hot water from said discharge head, a beaker below said coffee receiving means for receiving coffee extract therefrom, and means for supplying water to said water tank to cause hot water to cover said ground coffee and coffee extract to flow into said beaker, said air vent line providing direct communication between said water tank and the atmosphere at all times and limiting the pressure that can be created in said water tank to atmospheric pressure and the siphon action preventing further flow of water through said discharge water line and further discharge of water from said discharge head after the water in said tank has been discharged to the level of the intake end of said discharge water line in said tank.

25. An automatic coffee making machine comprising, in combination, a water tank, means for heating water in said tank, a discharge head mounted in spaced relation to said water tank having one or more openings for causing hot water supplied thereto to be discharged over a substantial area, siphon means interconnecting the upper end of said water tank and said discharge head including an air vent placing said upper end of said water tank in communication with the atmosphere at a location above the level at which water is discharged from said head, a hood overlying said discharge head, means for heating said hood to avoid condensation of moisture on the under side thereof, means underneath said discharge head and hood for receiving ground coffee to be covered by hot water from said discharge head, a beaker below said coffee receiving means for receiving coffee extract therefrom, and means for supplying water to said water tank to cause hot water to cover said ground coffee and coffee extract to flow into said beaker.

26. An automatic coffee making machine comprising, in combination, a water tank, means for heating water in said tank, a discharge head mounted in spaced relation to said water tank having one or more openings for causing hot water supplied thereto to be discharged over a substantial area, siphon means interconnecting the upper end of said water tank and said discharge head including a discharge water line providing a connnection between said upper end of said water tank and said discharge head and an air vent line extending above said discharge water line, a hood overlying said discharge head, means for heating said hood to avoid condensation of moisture on the under side thereof, means underneath said discharge head and hood for receiving ground coffee to be covered by hot water from said discharge head, a beaker below said coffee receiving means for receiving coffee extract therefrom, and means for supplying water to said water tank to cause hot water to cover said ground coffee and coffee extract to flow into said beaker.

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ROBERT E. PULFREY, *Primary Examiner.*