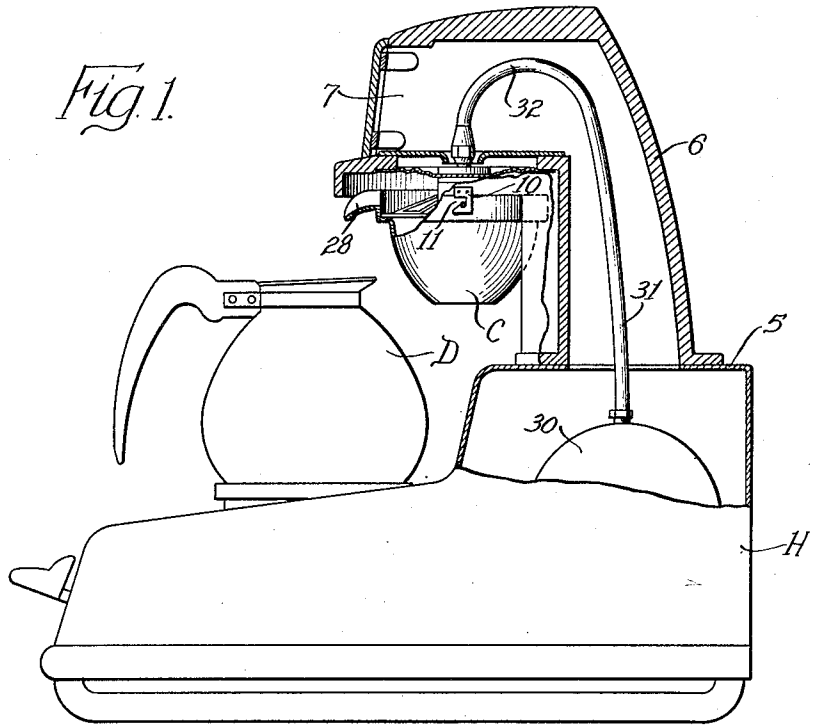
May 22, 1951 H. R. KARLEN 2,554,367

BEVERAGE BREWER

Filed Oct. 23, 1948

Fig. 1.



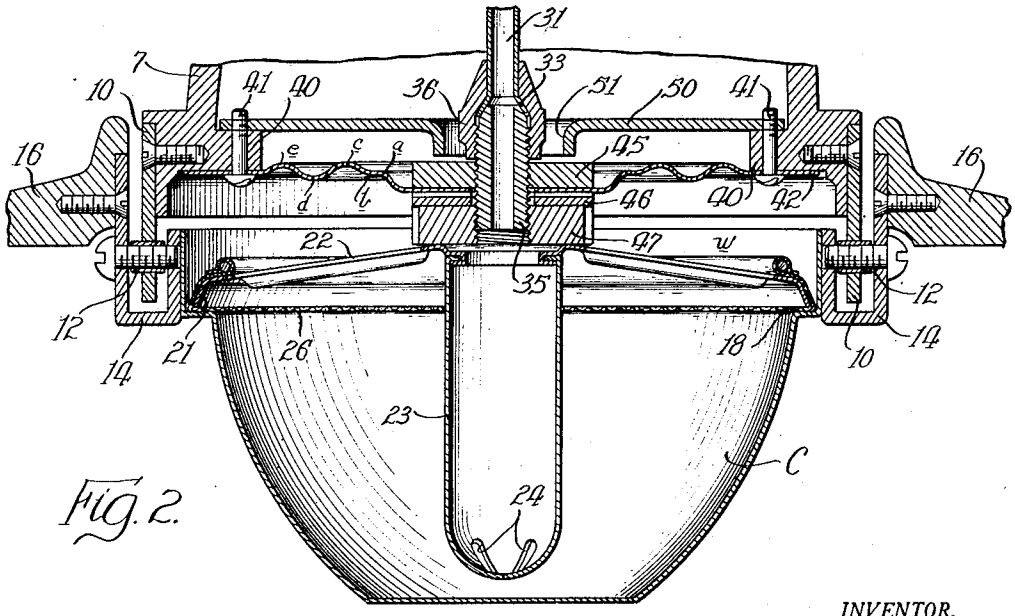


Fig. 2.

INVENTOR.
Harvey R. Karlen
BY
Banning & Banning
Atty's.

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BEVERAGE BREWER

Harvey R. Karlen, Chicago, Ill., assignor to Cory Corporation, Chicago, Ill., a corporation of Delaware

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5 Claims. (Cl. 99—303)

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This invention relates in general to a commercial coffee brewer having means for producing repeated charges of a coffee infusion in quantities sufficient to meet the requirements of many people. More particularly it is concerned with an apparatus of the type wherein a charge of finely ground coffee is contained within a cartridge which is suspended in operative position beneath the discharge end of a delivery duct that leads from a tank containing hot water. It is primarily an object of this invention to provide a sealing but separable connection between the discharge end of such a duct and the filter unit which is positioned across the top of the cartridge.

In the past, various expedients have been resorted to for the purpose of establishing a substantially sealed separable connection between a filter unit at the top of a cartridge containing finely divided coffee and the discharge end of a hot water duct which is positioned thereover. In all such cases certain deficiencies have existed, such as rapid deterioration of a sealing element where rubber is used, imperfect sealing where a bellows type of seal is interposed, etc. While previous constructions of the kinds noted have worked with a fair degree of success, they still leave something to be desired.

According to the present invention I utilize a sealing member which constitutes a fixed extension of the duct, but which is mounted to yield against the controlled resistance of a diaphragm so as to remain tightly engaged with the filter unit of the cartridge when the latter is supported operatively in place. In such a construction the hot water duct is also required to yield with the sealing member. The mounting in which the fitting is yieldably supported is itself supported upon an immovable head, and relative movement of the parts comprised in the connection is confined to the sealing member and to the mounting which carries it.

A suggestive embodiment of this invention is set forth in the accompanying drawing wherein—

Figure 1 is an end elevation of a typical commercial coffee brewer stove of the automatic type, certain of the parts being broken away to exhibit features which are special to this invention; and

Fig. 2 is a transverse section through the cartridge and its mounting, taken at right angles to Fig. 1.

The present stove comprises a housing H having a raised rear portion 5 from which upstands a column 6 supporting a forwardly extending head 7 which is open on the underside. Depending from opposite sides of the head is a pair of hangers 10 formed with oppositely facing cam bayonet slots 11 each adapted to receive a roller trunnion 12 which is carried in a bracket 14 that is affixed exteriorly to a bowl-like cartridge. Associated with these two brackets are outwardly extending handles 16 to facilitate handling of the cartridge.

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In its upper region the cartridge is outset at 18, the ledge thus provided defining a cylindrical well *w*. The ledge also provides a circular support for the marginal flange 21 of a dished spider 22 having a central opening from which depends a tube 23 in whose bottom is a plurality of radially disposed openings 24. Fitted over the spider is a strainer 26 of fabric or the like whose margins are appropriately secured. Through this strainer coffee infusion may pass upwardly into the well portion of the cartridge preliminary to its draining out through a pouring spout 28 at the front thereof. This spider furnishes a frame whereon the strainer is carried, and in conjunction therewith may conveniently be referred to as the filter unit.

Within the housing H is a suitable mechanism forming no part of this invention whereby hot water is admitted, as needed, into a tank 30 where it is heated, and from which it passes outwardly and upwardly through a duct 31 which is disposed within the column 6. At a top point 32 this duct executes a bend which may be as much as 180° or so whereby its delivery end 33 which is outwardly flared is pointed downwardly. Fitted within the delivery end of the duct is the beveled upper end of a bushing 35 to which is screw threaded in its upper end portion a sleeve 36 whose internal contour follows that of the duct at this point. When the sleeve is tightened upon the bushing the flared delivery end of the duct will be clamped tightly therebetween in unitary relation therewith.

The head 7 adjacent the opening on its under face is provided with an inset flange 40 through which may be extended a plurality of vertical screws 41 the heads of which engage with a circular deflectable diaphragm 42, desirably of spring metal, which is extended across the head on its under side. This diaphragm is apertured in its center to receive the bushing 35 therethrough. A nut 45 is screw threaded on the bushing to engage the diaphragm on its top side. To the underside of the diaphragm is seated one or more spaced washers 46, and therebelow is a sealing member 47 in the form of a disc which is screw threaded onto the bushing and adapted

when advanced thereupon to clamp the diaphragm fixedly in place. Extended across the open underside of the head above the diaphragm is a centrally apertured plate 50 constituting a bridge, there being a flange 51 depending from the aperture and terminating in spaced relation to the nut 45.

Directly below the pouring spout 28 is a decanter D which is rested upon a platform controlling operation of an automatic mechanism whereby flow of water into the tank 30 is started and stopped according to whether the decanter is empty or nearly full. Whenever a filled decanter is replaced by one which is empty, the operative cycle is initiated so that water will again be admitted into the tank 30 to become heated and then pass outwardly therefrom through the duct 31 and into the cartridge C containing a charge of ground coffee.

Each time the cartridge is filled with finely ground coffee and the filter unit is applied in place, the cartridge is fitted to the supporting hangers 10. In this movement which involves a slight rotation, the cartridge is advanced by the cam slots 11 upwardly so that the filter unit is brought into tight engagement with the sealing disc 47. This engagement is confined to a circular line at the high point of the spider 22. The diaphragm 42 which normally is deflected downwardly below a medial plane is then pushed up somewhat, but not to a point above center. This upward movement is approximately one-half of its deflecting capacity which is limited to a point not above center by the stop-flange 51 which ends immediately above the nut 45.

In the ensuing stage, hot water which is delivered into the cartridge will enter the charge of ground coffee near the bottom and then migrate outwardly and upwardly therethrough. In this operation the coffee grounds are floated upwardly so as to exert a pressure on the underside of the strainer 26 which confines the grounds against escape. Filtered coffee may then pass through the strainer to enter into the enlarged well *w* in the upper part of the cartridge preliminary to draining out through the spout 28. The upward pressure exerted on the underside of the filter unit is communicated to the sealing disc 47 and to the diaphragm 42 by which this pressure is yieldingly resisted.

The diaphragm is designed to resist yieldingly any upward deflection of its body so as to maintain the sealing disc 47 in tight pressure engagement with the circular top of the filter unit. There is thus assured at all stages of the coffee making operation a close and firm pressure engagement which will prevent any leakage of the water outwardly, or of the coffee infusion inwardly, at this point of separable connection.

The diaphragm as herein illustrated is provided with a plurality of circular corrugations or undulations *a, b, c,* etc. Such a configuration will affect its deflection characteristics in a way which may be accurately predetermined. By appropriately configuring the diaphragm it is possible to provide a desired degree of compressive resistance at every point in its deflecting range, thereby assuring a proper and effective sealing engagement between the disc 47 and the cartridge therebelow.

As shown, the body of the diaphragm is normally deflected below the plane defined by its margins; any upward deflection is resisted by radial compression forces augmented by the circular corrugations or undulations whose cross-

sectional configurations are further angled in consequence. Obviously, therefore, a predetermined degree of yielding pressure is maintained along the circular sealing line where the disc 47 contacts the filter unit; and with increase of upward pressure on the underside of the filter unit, the sealing disc may yield, as necessary, but against a resistance which is controllable by the contour characteristics of the diaphragm to best meet the conditions encountered in service. In each upward deflecting movement of the diaphragm, the duct 31 is required to move correspondingly, but since it is affixed at its distant end to the tank 30 any resulting deformation of the duct will be confined largely to its return bend portion 32 which is curved about a radius of substantial length.

I claim:

1. In a beverage brewer, a hot water supply duct, a downwardly facing sealing disc affixed to the duct at its discharge end, a diaphragm affixed to the duct adjacent the disc and extended radially outwardly therefrom, a fixed mounting to which the diaphragm is secured near its periphery, the diaphragm being normally deflected downwardly below the plane of its mounting, a cartridge including a bowl having a discharge outlet at its upper portion and removably secured in a fixed position below the sealing disc, and a centrally apertured filter unit carried by the cartridge below the discharge outlet and separably engaged with the sealing disc through an endless contact line, the diaphragm being deflectable upwardly against pressure interiorly of the cartridge to maintain pressure engagement between the sealing disc and filter unit whereby to provide a liquid tight connection at that point.

2. In a beverage brewer, an upwardly extending hot water duct having a return bend to position its discharge end downwardly, a downwardly facing sealing disc affixed to the duct at its discharge end, a diaphragm affixed to the duct adjacent the disc and extended radially outwardly therefrom, a fixed mounting to which the diaphragm is secured near its periphery, the diaphragm serving also as the sole support for the discharge end of the hot water duct and being normally deflected downwardly below the plane of its mounting, a cartridge including a bowl having a discharge outlet at its upper portion and removably secured in a fixed position below the sealing disc, and a centrally apertured filter unit carried by the cartridge below the discharge outlet and separably engaged with the sealing disc through an endless contact line, the diaphragm being deflectable upwardly against pressure interiorly of the cartridge to maintain pressure engagement between the sealing disc and filter unit whereby to provide a liquid tight connection at that point, the discharge end of the hot water duct being raised with the diaphragm in this upward deflecting movement.

3. In a beverage brewer, an upwardly extending hot water duct having a return bend to position its discharge end downwardly, said duct being fixed at its other end, a downwardly facing sealing disc affixed to the duct at its discharge end, a diaphragm affixed to the duct adjacent the disc and extended radially outwardly therefrom, a fixed mounting to which the diaphragm is secured near its periphery, the diaphragm serving also as the sole support for the discharge end of the hot water duct and being normally deflected downwardly below the plane of its mounting, a cartridge including a bowl having a discharge

outlet at its upper portion and removably secured in a fixed position below the sealing disc, a centrally apertured filter unit carried by the cartridge below the discharge outlet and separably engaged with the sealing disc through an endless contact line, the diaphragm being deflectable upwardly against pressure interiorly of the cartridge to maintain pressure engagement between the sealing disc and filter unit whereby to provide a liquid tight connection at that point, the discharge end of the hot water duct being raised with the diaphragm in this upward deflecting movement, and means spaced from the diaphragm upper side near the center thereof for limiting its upward deflection to a point short of center.

4. In a beverage brewer, an upwardly extending hot water duct having a return bend to position its discharge end downwardly, a downwardly facing sealing disc affixed to the duct at its discharge end, a diaphragm formed with circular undulations affixed to the duct adjacent the disc and extended radially outwardly therefrom, a fixed mounting to which the diaphragm is secured near its periphery, the diaphragm serving also as the sole support for the discharge end of the hot water duct and being normally deflected downwardly below the plane of its mounting, a cartridge removably secured below the sealing disc, and a centrally apertured filter unit carried by the cartridge and separably engaged with the sealing disc through an endless contact line, the diaphragm being deflectable upwardly and compressible radially against an increasing resistance to maintain pressure engagement between the sealing disc and filter unit whereby to provide a liquid tight connection at that point, the discharge end of the hot water duct being raised

with the diaphragm in this upward deflecting movement.

5. In a beverage brewer, an upwardly extending hot water duct having a return bend to position its discharge end downwardly, a downwardly facing sealing disc affixed to the duct at its discharge end, a diaphragm formed with circular undulations affixed to the duct adjacent the disc and extended radially outwardly therefrom, a fixed mounting to which the diaphragm is secured near its periphery, the diaphragm serving also as the sole support for the discharge end of the hot water duct and being normally deflected downwardly below the plane of its mounting, a cartridge removably secured below the sealing disc, a centrally apertured filter unit carried by the cartridge and separably engaged with the sealing disc through an endless contact line, the diaphragm being deflectable upwardly and compressible radially against an increasing resistance to maintain pressure engagement between the sealing disc and filter unit whereby to provide a liquid tight connection at that point, the discharge end of the hot water duct being raised with the diaphragm in this upward deflecting movement, and means spaced from the diaphragm upper side near the center thereof for limiting its upward deflection to a point short of center.

HARVEY R. KARLEN.

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