March 10, 1936. A. F. CAMP 2,033,323

NONBUMPING HEATER FOR DISTILLATIONS AND EVAPORATIONS

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Fig. 1.

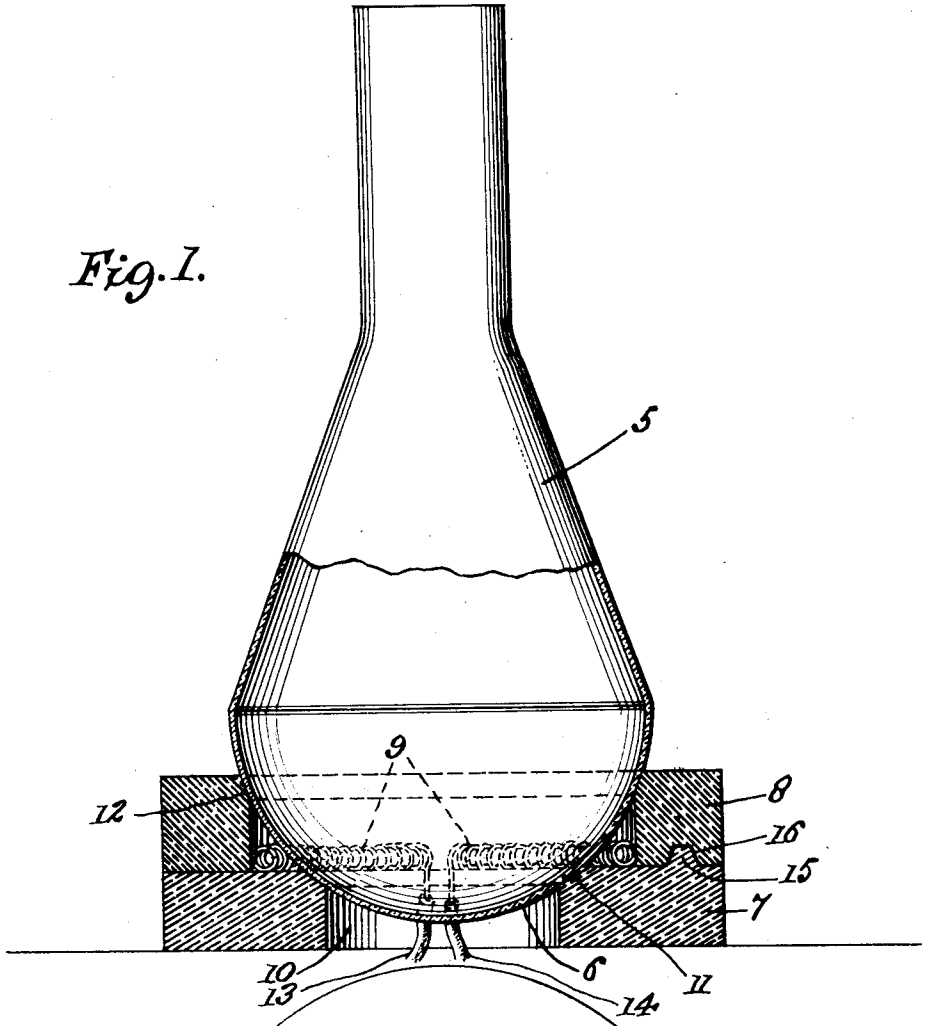
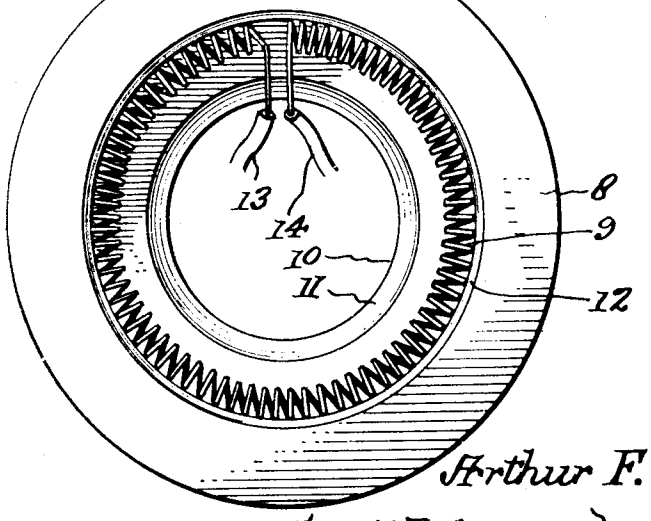


Fig. 2.



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NONBUMPING HEATER FOR DISTILLATIONS AND EVAPORATIONS

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4 Claims. (Cl. 219—43)

The present invention relates to improvements in non-bumping heaters for distillations and evaporations and has for an object to avoid the "bumping" or uneven distillation of liquids in laboratories and elsewhere.

The "bumping" or uneven distillation of liquids in laboratories is a perpetual problem and has been the occasion of a great deal of research work. It is probably due to the superheating of the liquid at the bottom of the flask and, due to a lack of circulation of the liquid, the rising of large bubbles of gas results in a jumping or "bumping" of the flask, often resulting in breakage or in the loss of the sample being analyzed due to some of the liquid being forced over into the receiver.

This trouble is particularly prevalent in the so-called Kjeldahl methods of determination of nitrogen and, when soils are being worked with, the trouble is extremely pronounced. The same difficulty is met with in other distillations and in the evaporation of samples in beakers or evaporating dishes.

The main object of the invention is to avoid such "bumping" and the invention resides in a construction of heater for supporting the flask in a position relative to the heating coil whereby the heat is applied not at the bottom of the container as is the custom with the ordinary type of heater but in a ring above the bottom of the flask.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawing, wherein like symbols refer to like or corresponding parts throughout the several views,

Figure 1 is a vertical section taken through an improved heater constructed according to the present invention with the flask, party broken away, shown as reposing therein and

Figure 2 is a top plan view of the improved heater.

Referring more particularly to the drawing, 5 designates a flask, beaker, evaporating dish or other vessel in which distillations and evaporations are carried out. In Figure 1 a Kjeldahl flask is illustrated having the rounded bottom 6. The heater is composed of the refractory rings 7 and 8. Such rings may be made in one piece but are preferably of separate parts with the ring 8 resting upon the ring 7. The ring 8 may have the same external diameter as the ring 7 but such ring 8 has a greater internal diameter whereby to form a stepped structure with the bottom ring 7 internally of the heater and to provide an angled space between the rings 7 and 8 for the reception of an electric resistance heating coil 9 or other desired form of heater which shall thus exist in a horizontally extending ring around the side portion of the rounded bottom 6 of the flask 5. The lowermost portion of the bottom 6 will extend down into the open space 10 of the lower ring 7. This rounded bottom 6 will rest upon the bevel or inclined seats 11 and 12 formed on the rings 7 and 8. The seats are formed upon the inner upper corner portions of the rings 7 and 8 and they conform substantially to the contour of the rounded bottom 6 of the flask 5 whereby such flask will rest in the heater and be supported from lateral movement therein. Both seats 11 and 12 are annular. The lower seat 11 is more nearly horizontal than the upper seat 12 and may be greater in surface area as it supports the majority of the weight of the flask 5 and its contents.

The upper seat 12 is more nearly vertical and will act to prevent any rocking movement of the vessel in the heater. The rounded bottom portion 6 of the flask between the seats 11 and 12 spans the angle space in which the annular heater 9 is located. The leads 13 and 14 for the electrical coil 9 may be brought down through the opening 10.

In the use of the device the vessel 5 with its sample is placed upon the heater substantially in the position shown in Figure 1. In such position the heat will not be applied at the bottom of the vessel as is the custom with the ordinary type of heaters, but such heat is applied in a ring above the bottom of the flask. This results in a complete elimination of "bumping" or uneven distillation, probably due to the fact that the bottom of the flask is relatively cool and the application of heat on the side of the container results in a rapid circulation of the liquid with a downward current in the center of the flask and upward currents on the sides thereof. Such currents contribute to a rapid even distillation or evaporation without the usual "bumping" and spattering. The invention will save time through shorter distillations. There will also be a saving in electric current through the elimination of rheostats. Saving is accomplished also by the complete elimination of sample loss due to accidents in distillation.

The refractories in all cases may be of ordinary materials such as asbestos or porcelain. In Figure 1 the refractory is indicated as being

in two halves with lugs 15 and sockets 16 to hold the same in place. The lugs 15 are on the lower refractory 7 while the sockets 16 are in the lower face of the upper refractory 8.

Heaters according to the present invention would be improvements upon the Gilmer and precision type now generally employed in this type of work.

It will be obvious that various changes in the construction, combination and arrangements of parts could be made which could be used without departing from the spirit of my invention, and I do not mean to limit the invention to such details except as particularly pointed out in the claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States is:

1. In a heater for distillations and evaporations, refractory vessel supporting rings, the lower ring being of smaller diameter than the upper ring to form an internal stepped structure with an angled portion and seats above and below said angled portion for receiving the side portions of the bottom of the vessel, and heating means disposed in said angled portion.

2. In a heater for distillations and evaporations employing round bottomed vessels, a base refractory member of comparatively small internal diameter and provided with a beveled seat at its inner upper corner portion, a second refractory ring of larger internal diameter placed upon the first mentioned ring and forming an internal stepped structure therewith having an angled portion therebetween, said second ring also having a beveled seat at its inner upper corner portion, said beveled seats adapted to receive the side portions of the rounded vessel bottom, and heating means contained within the angled portion between said seats.

3. In a heater for round bottomed vessels, a supporting structure having an internal lower opening for receiving the lowermost portion of the rounded bottom of the vessel with an upper opening for receiving the wider side portions of said bottom, said supporting structure being internally stepped with spaced seats for receiving and supporting the side portions of the rounded bottom of the vessel and heating means between said seats.

4. A non-bumping heater consisting in a base ring member, an upper ring member of larger internal diameter than the base member on said base member, the difference in internal diameters of the two members providing an internal annular seat, and heating means located in said seat.

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