H. E. REDEKER.

HEATER.

APPLICATION FILED MAR. 27, 1916.

1,203,406.

Patented Oct. 31, 1916.

2 SHEETS—SHEET 1.

FIG. 1.

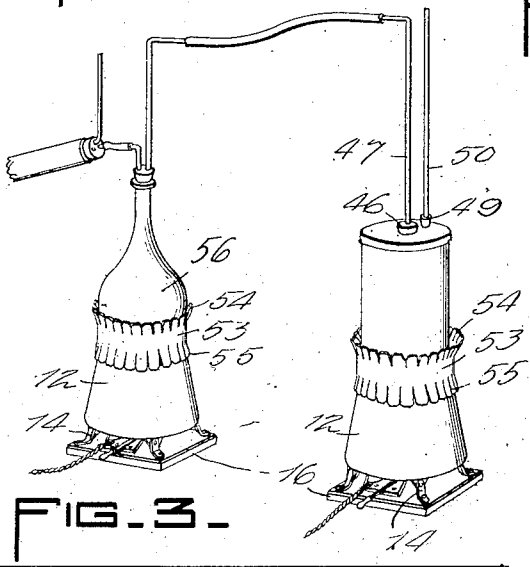


FIG. 2.

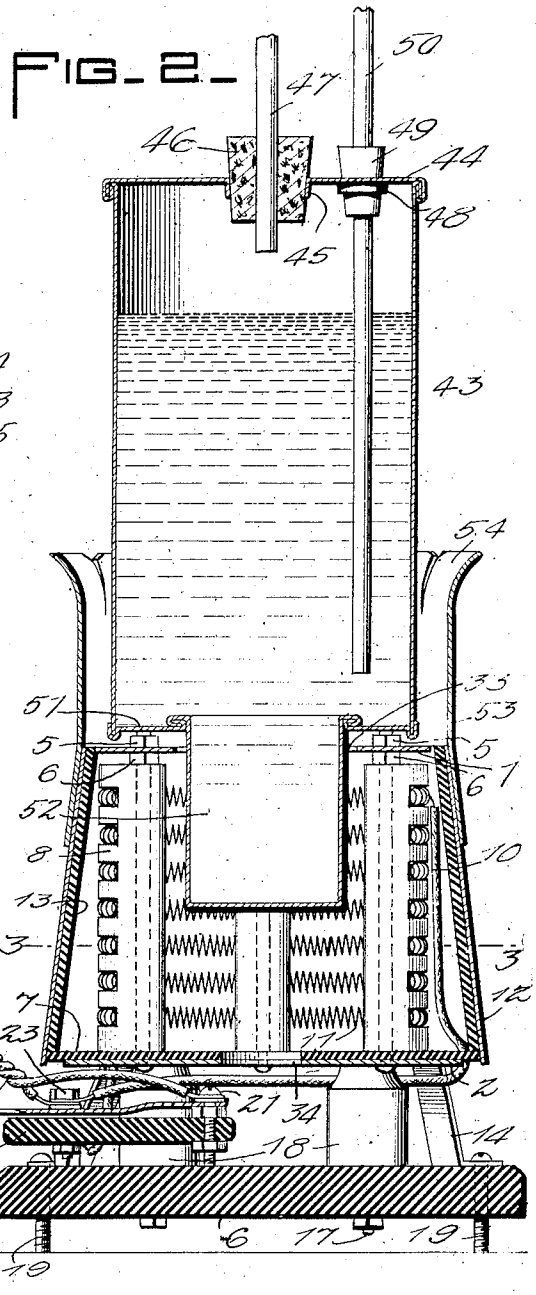
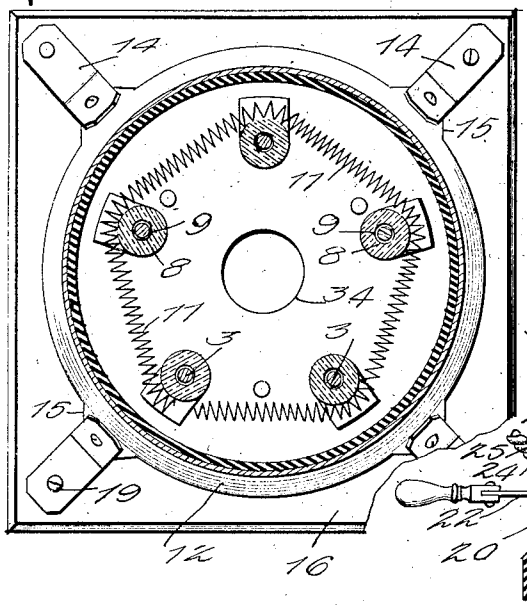


FIG. 3.



WITNESSES:

J. X. Phillips Jr.

C. E. Trainor

INVENTOR

HARRY E. REDEKER,

BY Munn & Co.

ATTORNEYS

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2 SHEETS—SHEET 2.

FIG. 4.

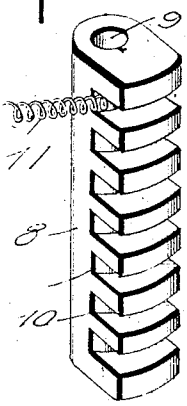


FIG. 5.

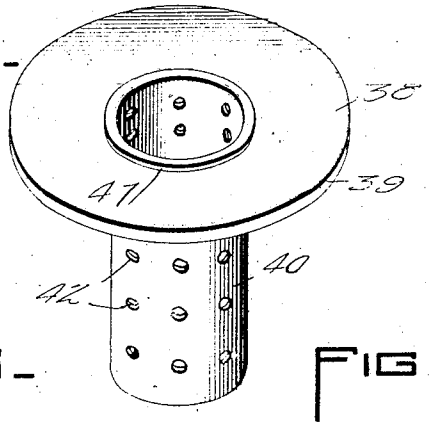


FIG. 6.

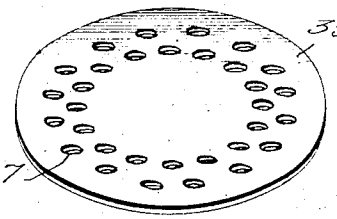


FIG. 7.

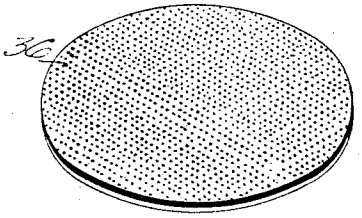


FIG. 9.

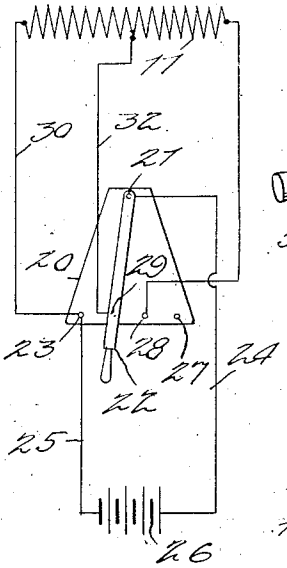


FIG. 10.

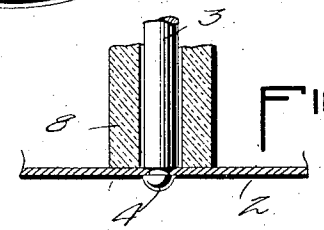


FIG. 11.

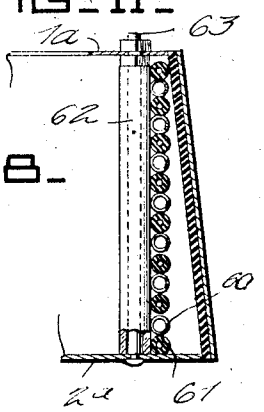
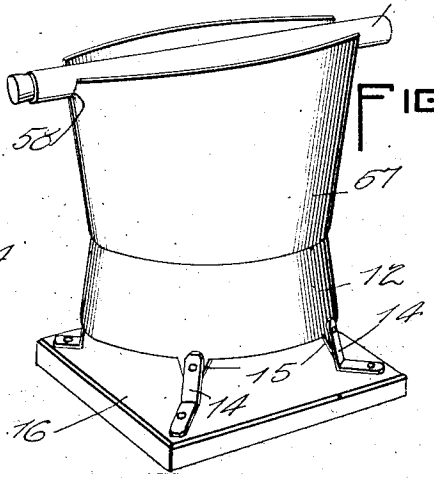


FIG. 8.



WITNESSES:

J. B. Phillips Jr.

C. E. Trainor

INVENTOR

HARRY E. REDEKER,

BY Munn Hes

ATTORNEYS

BEST AVAILABLE COPY

UNITED STATES PATENT OFFICE.

HARRY E. REDEKER, OF RUPERT, IDAHO.

HEATER.

1,203,406. Specification of Letters Patent. Patented Oct. 1, 1916.

Application filed March 27, 1916. Serial No. 86,995.

To all whom it may concern:

Be it known that I, HARRY E. REDEKER, a citizen of the United States, and a resident of Rupert, in the county of Minidoka and State of Idaho, have invented a new and useful Improvement in Heaters, of which the following is a specification.

My invention is an improvement in heaters, and the invention has for its object to provide a heater especially adapted for laboratory use, wherein a heater casing is provided of frusto-conical form and arranged with its large end downward and provided with axial openings in its ends for the admission and departure of air, the casing having a heating coil supported near its side wall and having a switch below the casing for controlling the flow of current to the coil, and wherein a supporting sleeve is provided shaped at one end to fit around the upper end of the casing and having flaring lugs at the other end for receiving a beaker or the like, and wherein a series of attachments is provided, each adapted to seat within the sleeve upon the casing, and each having a cylindrical extension fitting within the opening at the upper end of the casing.

A further object is to provide a series of attachments designed to permit the heater to be used in a number of different operations in the laboratory, as for instance, for heating test tubes, beakers, evaporating dishes, distilling flasks, reduction tests, digestion and distilling operations, and in combined straight and steam distillation, merely by changing the attachments.

In the drawings:—Figure 1 is a perspective view of the improved heater in use in combined straight and steam distillation, Fig. 2 is a vertical section through the heater with the water heater and steam attachment in place, Fig. 3 is a section on the line 3—3 of Fig. 2, looking in the direction of the arrow adjacent to the line, Fig. 4 is a perspective view of one of the supports for the heating coil, Fig. 5 is a perspective view of the attachment for permitting the heating of test tubes, Fig. 6 is a similar view of the beaker heater attachment, Fig. 7 is a similar view of a modified arrangement for the same purpose, Fig. 8 is a perspective view of the heater in use with the reduction apparatus, Fig. 9 is a diagrammatic view of the wiring for the heating coil, Fig. 10 is an enlarged section of a modified form of heating coil support, and Fig. 11 is a partial sectional view of the support shown in Fig. 10.

In the embodiment of the invention shown in Figs. 2 and 3, the heater proper is composed of an upper plate 1 and a lower plate 2, the said plates being connected by a series of rods 3, and the said rods are preferably of shaft steel. Each rod as shown in Fig. 10, is reduced at its lower end, and passed through an opening in the lower plate 2, the rod being headed below the plate as indicated at 4. The upper end of each rod is threaded and each rod is passed at its upper end through an opening in the plate 1, and nuts 5 and 6 are threaded to each rod above and below the plate. The rods in the present instance are five in number and they are spaced apart at equal distances from each other, and each rod supports a heating coil support of insulating material, preferably from clay, which when baked will withstand a high degree of heat and will not crack under ordinary usage.

A layer or sheet 7 of asbestos is arranged on the upper face of the plate 2, and the supports 8 for the heating coil rest at their lower ends on the upper face of the sheet and at their upper ends against the lock nuts 6. The lock nuts 6 are turned down just far enough to touch the upper ends of the tubular supports 8, but are not tightened, since the unequal expanding and contracting due to heating and cooling might injure the supports of the heating coil were they clamped tightly between the nut and the lower plate 2. Each of these tubes or supports 8 has a longitudinally extending opening 9, through which a rod 3 passes, and it will be noticed from an inspection of Figs. 3 and 4 that the said supports are oblong in cross section, the opening 9 being eccentric or nearer one end of the long axis of the cross section than the other.

Each support is notched horizontally at spaced intervals as indicated at 10 at the end of the long cross sectional axis remote from the opening 9 and the heating coil indicated at 11 is supported in these notches 10. The lower plate 2 is larger than the upper plate, and the heater proper is completed by a body in the form of a frusto-conical sleeve 12, which fits outside the plates 1 and

2. A lining 13 of asbestos is arranged on the inner face of the body, and legs 14 support the body, each leg being connected at its upper end to an outwardly bent lug 15, on the lower edge of the body and at its lower end each leg engages a base 16 of asbestos board.

That portion of the heater constituted by the plates 1 and 2, the rods 3 and the heating coil supports 8, is also connected with the base in spaced relation by means of bolts 17, and spacing members in the form of porcelain knobs or sleeves 18 encircle the bolts between the lower plate 2 and the base 16. The upper and lower plates and connected parts and the body 12 of the heater are thus held in proper spaced relation by the legs 14, the bolts 17, and the knobs 18. The base 16 is preferably provided with legs at its corners in the form of screws 19, the said screws serving also to connect the legs 14 at their lower ends with the base. The screws are passed through the legs and through the base and are of a length to extend below the base to space the base above the support upon which it rests as shown in Fig. 2.

A switch plate or board 20 is supported between the base and the plate 2, the said plate being approximately triangular and having its base outward. A binding post 21 is arranged at the apex of the plate, and a switch lever 22 is pivoted to the binding post. A second binding post 23 is connected with the left hand corner of the switch plate, and the lead wires 24 and 25 from the source of current, in the present instance, a battery 26 are connected with the binding posts 21 and 23.

Contact buttons 27, 28 and 29 are arranged in line with the binding post 23 and a line through the said binding post and contact buttons is parallel with the base of the switch plate. A lead wire 30 connects the binding post 23 with one end of the coil 11, the upper end, in the present instance, and a second lead wire connects the other end of the coil, the lower end in the present instance with the contact button 28. A third lead wire 32 leads from the contact button 29 to the center of the coil, and it is obvious that when the switch lever 22 is in the position of Fig. 9 the current will flow by way of the lead wires 25 and 30 through half the coil, returning by way of the lead wire 32, the switch lever, and the lead wire 24. When the switch lever is on the button 28 the current will flow by way of the lead wires 25 and 30, through all the coil, returning by way of the lead wire 31, the switch lever 32 and the lead wire 24. When the switch lever is on the button 27 the current is interrupted. It will be understood that in practice the heater will receive current from a lighting circuit.

The upper plate 1 of the heater is provided with a central opening 33, and the lower plate is provided with a co-axial opening 34 of smaller size, the lining 7 of asbestos having an opening registering with the opening 34. The edge of the opening 33 extends to near the inner faces of the supports 8.

In operation the conducting wires 24 and 25 are connected with for instance, a 110 volt A. C. circuit by means of a plug and the switch lever is thrown into the position shown in Fig. 9 in order that the heater may heat quickly. After the required degree of heat has been attained the switch lever may be moved to the plug 28, if desired. The air within the inclosing casing of the heater is heated by the coil and rises upward passing out through the opening 33. Cold air enters through the opening 34 to replace the heated air and is in turn heated. When it is desired to heat beakers, the disk 35 shown in Fig. 6 is used or the disk 36 shown in Fig. 7 or both may be used if desired, one being arranged above the other. These disks are of a size to fit over the upper plate 1 of the heater body, and it is obvious that the uprising heated air will heat the disks 35 and 36. The disk 35 is provided with openings 37 arranged in annular series near its periphery and the disk 36 is of perforate material. A flat bottomed object, as for instance, a beaker, when placed upon the heater receives the heat as from the ordinary heated plate and in addition receives an upward current of hot air.

In Fig. 5 a test tube heater is shown, the said heater consisting of a ring 38, having a depending flange 39 at its outer edge and having connected therewith a cylindrical body 40 at its inner edge. The upper end of the body 40 is passed through the inner opening of the ring and is flanged outwardly as indicated at 41 above the ring. The lower end of the cylindrical body is closed, and the side wall thereof is provided with perforations as shown at 42. In use the cylindrical body 40 is inserted in the opening 33, with the flange 39 of the ring 38 resting upon the upper ends of the rod 3 and with the flange 39 depending outside of the rods. The test tubes are placed in the cylindrical body, and it is obvious that the heated air will pass through the perforations 42 into contact with the test tubes, and they will also be heated directly from the heating of the cylindrical body and the ring.

In Fig. 2 a water heater and steam generator is shown, the said heater and generator comprising a cylindrical body 43, having at one end a head 44 provided with a central filling nipple 45, which may be closed by a stopper 46 and the stopper may be perforated as shown for the passage of a tube 47. The head 44 is also provided with an eccentric opening 48 through which is passed a stopper 49 having a central axial opening

for receiving a tube 50. The lower head 51 of the body 43 has a cer :al opening and a second cylinder 52 is inse..ed in the opening, the upper end of the cylinder being open as shown and communicating with the cylinder 43—44—51. The last-named cylinder 52 passes through the opening 33, thus assisting in retaining the heater in place and in centering the same.

With the steam generator 43—44—51—52, the ring 53 is also used, the said ring being especially designed however to permit distilling flasks to be heated. This ring as shown, is slitted from both its upper and lower edges, the slits of one series alternating with the slits of the other series, and the slits are rounded as shown. The tongues 54 formed at the upper edge between the slits are bent outward in rounding form as shown, while the tongues 55 formed at the lower edge in the same manner are bent angularly outward to fit around the body 12 of the heater. When a distilling flask 56 is used, as shown in Fig. 1, it may be seated directly within the tongues 54.

In Fig. 8 a reduction apparatus is shown, the said apparatus consisting of a sleeve 57 of a size to fit around the body 12 of the heater and to extend at its lower edge to about the vertical center of the body. The upper end of the sleeve 57 is flattened on one axis as shown into elliptical form and the said upper edge is notched as indicated at 58 at the ends of the long axis of the said end. The tube 59 containing material to be reduced is held in the notches 58, as shown.

In Fig. 11 is shown a modified arrangement of supporting the heating coil. In Fig. 2 the coil is supported within the notches 10, while in Fig. 11 the coil 60 is supported by an asbestos cord 61, the said cord being arranged in coils alternating with the coils of the heating coil. The porcelain tubes 62 constituting the supports corresponding to the tubes 8 for the coil 11 are fitted on rods 63, connected with the upper and lower plates 1^a and 2^a in the same manner as the rods 3 are connected with the plates 1 and 2. The tubes 62 are however, cylindrical and the lowermost coil of the asbestos cord rests on the lower plate 2^a. It will be understood that the double bottom or extension of the boiler not only provides the means for centering the boiler on the heater but also increases the heating surface.

I claim:—

1. A heater comprising a frusto-conical casing arranged with its large end downward and provided with a lining of non-heat conducting material on its side wall and base, and having axial openings in its top and base for the passage of air, a series of insulating supports arranged in annular form near the side wall, a heating coil supported by the supports, a switch below the base for controlling the flow of current to the coil, a sleeve having one end shaped to fit around the upper end of the heater and having outwardly bent lugs at its upper end, and an attachment for use with the heater and adapted to seat upon the top thereof within the sleeve, the attachment having a cylindrical extension at the center of its bottom fitting within the opening of the top of the heater.

2. A heater comprising a frusto-conical casing arranged with its large end downward and having axial openings in its top and base for the passage of air, a series of insulating supports arranged in annular form near the side wall, a heating coil supported by the supports, a switch below the base for controlling the flow of current to the coil, a sleeve having one end shaped to fit around the upper end of the heater and having outwardly bent lugs at its upper end, and an attachment for use with the heater and adapted to seat upon the top thereof within the sleeve.

3. A heater comprising a frusto-conical casing arranged with its large end downward and having axial openings in its top and base for the passage of air, a series of insulating supports arranged in annular form near the side wall, a heating coil supported by the supports, and a switch below the base for controlling the flow of current to the coil.

4. A heater comprising a frusto-conical casing arranged with its small end upward and having axial openings in its top and bottom, a heating element within the casing, means for controlling the flow of current to the element and a sleeve for supporting articles to be heated fitting around the top of the casing and extending above the same and having means for supporting the articles to be heated.

HARRY E. REDEKER.