

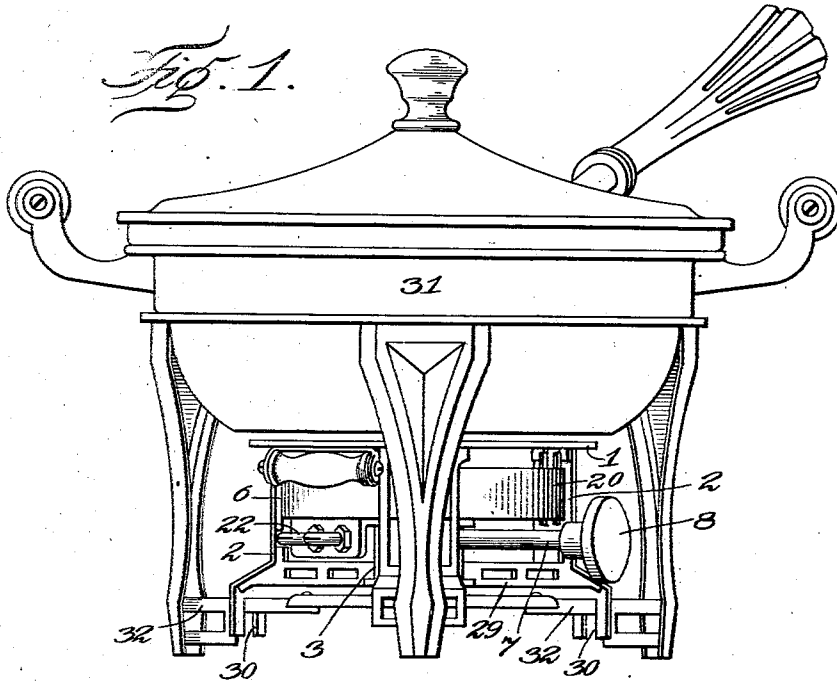
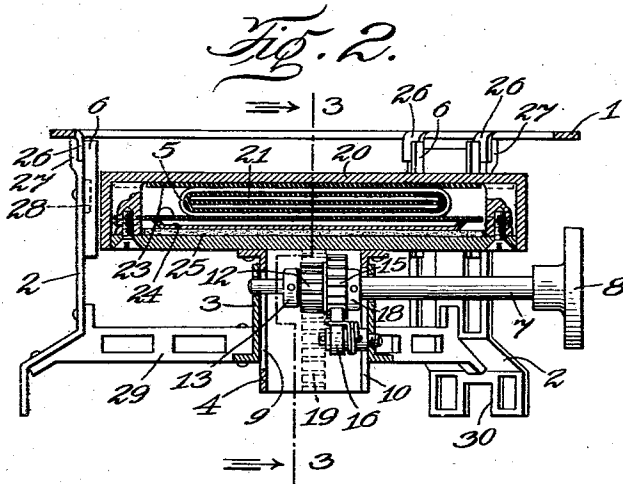
H. W. DENHARD.
ELECTRIC HEATER.

APPLICATION FILED OCT. 17, 1910.

Patented July 13, 1915.

2 SHEETS—SHEET 1.

1,145,977.



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2 SHEETS—SHEET 2.

Fig. 3.

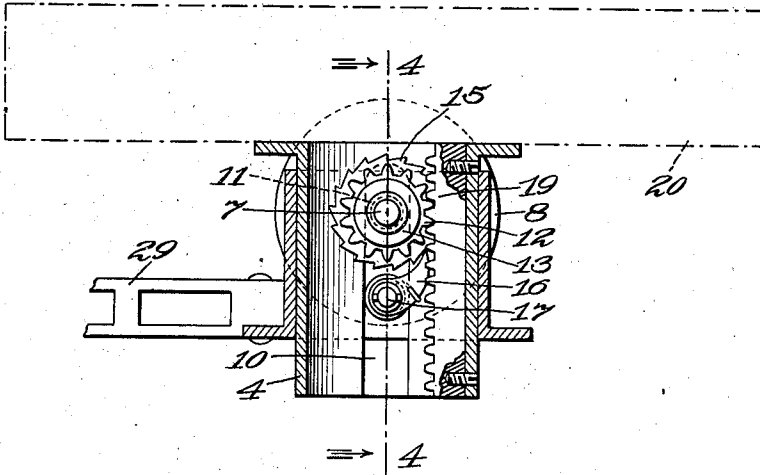
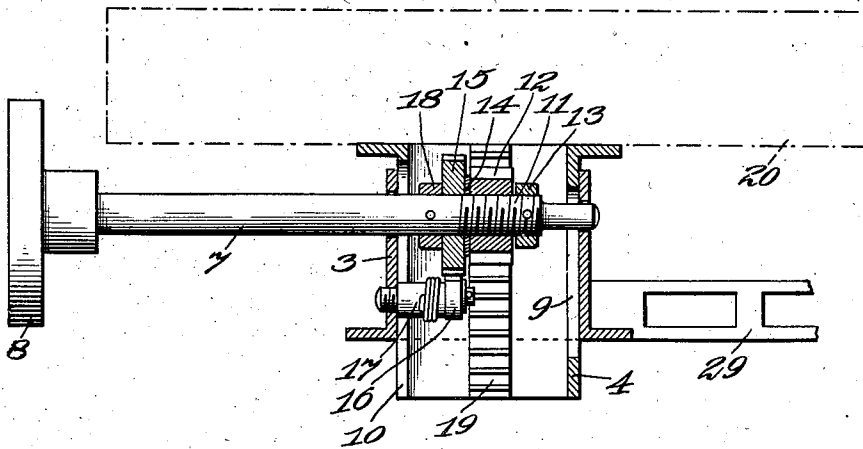


Fig. 4.



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UNITED STATES PATENT OFFICE.

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ELECTRIC HEATER.

1,145,977.

Specification of Letters Patent.

Patented July 13, 1915.

Application filed October 17, 1910. Serial No. 587,359.

To all whom it may concern:

Be it known that I, HARRY W. DENHARD, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Electric Heaters, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

This invention relates to improvements in electric heaters.

It is especially adapted for use with cooking appliances and the like, but it should be understood that it is capable of use in various other relations.

Electric cooking appliances are usually provided with a heating coil which is constructed or arranged so that a cooking utensil may be placed in a position adjacent the coil to be heated thereby. It is frequently desirable to regulate and vary the heat applied to the utensil and to attain this end it is customary to vary the current through the coil and thereby regulate the heat generated.

When a resistance is used to vary the current it causes a waste of energy and since it is generally varied in a few steps it does not permit of a gradual variation of the heat generated. Moreover, when a resistance is employed the heat cannot be reduced instantly or quickly without removing the utensil, which is not always convenient or desirable and in some appliances is impossible. The reason for this difficulty is that the heating coil and its surrounding structure retains the heat for a prolonged period during which time the contents of the utensil may be overheated.

One of the objects of the present invention is to provide improved means by which the heat may be readily regulated.

Another object is to provide means by which the heat applied to the utensil may be instantly reduced.

Another object is to provide means by which the heat applied to the utensil may be gradually varied.

A further object is to provide a heater which in itself is a unitary structure capable of use either alone or in conjunction with other appliances.

A still further object of the invention is to provide a heating appliance in which the

heat delivered to the utensil may be regulated by the manipulation of a single controlling means.

In accordance with my invention I so arrange or mount the heating coil that its relation to the object to be heated, either immediately or immediately, may be varied as occasion may require. In the case of cooking appliances, I preferably arrange the coil in a structure which constitutes a heating unit, which unit is mounted so as to be movable relatively to the utensil and I provide means by which it may be readily moved so as to vary the heat applied to the utensil.

Various adaptations and embodiments of my invention may be used, all of which find their foundation in the idea depicted herein and fall within the purview of my improvement.

As a means of illustrating the principle of my invention I have shown in the accompanying drawings one form which it may assume in practice.

In these views Figure 1 illustrates a side elevation of one form of my improved heating device, arranged to heat a chafing dish, or similar utensil. Fig. 2 shows a partial sectional view of this form of my improved heating device. Fig. 3 shows a partial sectional view on line 3—3 of Fig. 2, of one form of mechanism which may be used to vary the position of the heating unit. Fig. 4 shows a partial sectional view of this mechanism on line 4—4 of Fig. 3.

In the construction shown in the drawing I provide a frame having a ring 1 adapted to support a utensil. This frame has suitable legs 2 and supports within it, a central pedestal 3. Adapted to be adjusted vertically within this pedestal by suitable means, hereinafter described, is a telescoping member 4. Upon the upper end of this telescoping member is mounted a heating unit 5 of a construction hereinafter described, which is vertically adjusted with the telescoping member 4 and is guided in such movement by suitable guides 6 formed on the inner surface of the utensil supporting ring 1.

One means which I may employ for varying the elevation of the heating unit, with respect to the utensil to be heated, comprises a shaft 7, having a knob or handle 8 and journaled in the pedestal 3, and a rack

and pinion mechanism associated with this shaft for varying the elevation of the telescoping member 4 and the heating unit 5 carried thereby. Suitable slots 9 and 10 are provided in the telescoping member so that in its vertical movement it may pass the shaft 7. At a point between the ends and within the telescoping member 4, the shaft 7 is screw threaded at 11. Cooperating with this thread is an internally threaded pinion 12 having a travel on the thread limited in one direction by a collar 13 fixed to the shaft and rotating with the same. Immediately adjacent the pinion 12 and separated from it by a soft metal washer 14 if desirable, is a ratchet wheel 15 provided with a spring held pawl 16 of the usual type. This pawl is mounted on a stud 17 carried by the pedestal 3 and extending through the slot 10 in the inner telescoping member 4. Fixed to the shaft 7, or integral with it, and immediately adjacent the ratchet wheel 15 is a collar 18. All of these elements 12, 13, 14 and 18 may be within the telescoping member 4.

Fixed to the inner surface of the telescoping member 4 is a longitudinally extending rack 19 engaging with the pinion 12 and upon the rotation of said pinion adapted to raise or lower the telescoping member 4 and the heating unit 5 carried thereby, to vary the position of the latter as desired.

In Fig. 2 I have illustrated one form of heating unit which may be used if desired. This unit preferably comprises a number of turns of resistance wire wound about an insulated core 21 of suitable material and having terminal connections 22 suitably supported on an inclosing casing 20 and insulated therefrom. Suitable mica disks 23 above and below the coil may be provided to insulate it from the casing 20, and a heat-retaining plate 24 and a disk 25 of asbestos may be provided in order to prevent the downward radiation and consequent loss of heat. The heating means may, however, assume any desired form.

The frame which supports the unit 5 may be constructed of suitably stamped metal. It preferably comprises a utensil supporting ring 1, a pedestal 3 in which the telescoping member is adapted to be raised or lowered, and supporting legs 2. The utensil supporting ring 1 is preferably so stamped that it has ears 26 bent downward and adapted to overlap flanges 27 formed on the upper ends of the legs 2. According to a preferred construction, the unit guides 6 are formed by bending a portion of the ears 26 inward and I also preferably form lugs 28 upon the guides and rivet these lugs to the legs 2. Beneath the utensil supporting ring 1, the pedestal 3 is centrally supported by rods 29 fixed to the pedestal 3

and the legs 2 by any suitable means. The lower ends of the legs 2 are bifurcated at 30 so that if it is desired to use my heating device in conjunction with another appliance, such as a chafing dish 31 for example, they may straddle the frame pieces 32 of the chafing dish, or other appliances, to center the heating device accurately and hold it securely in the frame. Thus I am able to obtain a structure which is capable of being used independently as a unitary device, in this instance resting on a suitable support, such as a table, and which is, if desirable, also capable of being used with another appliance without any change whatsoever to the construction of either.

I will now describe the operation of this embodiment of my invention. Let it be supposed that it is desired to heat a material contained in any suitable receptacle and that the heating unit is in its lowest position in the frame. The utensil is placed upon the ring 1 and the line conductors are connected to the plugs 22 of the heating unit 5. Heat is thereupon radiated from the heating unit, but at such a distance from the utensil as to have little heating effect upon it. If an increase in heating effect is desired it is accomplished by simply turning the knob 8 so as to rotate the threaded shaft 7 to the right in Fig. 4. On this rotation of the shaft 7 and its thread 11, the pinion 12 engaging with the thread moves transversely along the same until it abuts against the ratchet wheel 15, forcing the latter along the shaft until it in turn abuts against the collar 18 and engages frictionally therewith. Thus a frictional engagement of the three parts is made so that they all turn together. As the shaft is further rotated, the pinion 12 is rotated with it. Since the pinion 12 meshes with the rack 19, the rack is moved upward as the pinion is rotated, carrying with it the telescoping member 4 and the heating unit 5 until the unit reaches the desired position beneath the object to be heated. During this upward movement of the rack the pawl 16 slides over the teeth of the ratchet wheel 15 forming, through its engagement between the teeth at each step, a lock to prevent the downward movement of the heating unit. Through the provision of this means it is impossible for the heating unit, after it has been moved to a certain position, to be forced downward by any pressure applied to it or any weight resting upon it until the shaft 7 is turned in the reverse direction.

Let it now be supposed that it is desired to decrease the amount of heat which is being applied to the utensil resting upon the ring 1. By rotating the knob 8 in the reverse direction, that is toward the left, the shaft 7 is oppositely rotated. The thread 11 is therefore so rotated as to cause the pinion

12 to travel in the opposite direction along the shaft 7, that is, toward the collar 13. The pinion 12 is thereby disengaged from the ratchet wheel 15 and the latter is thereby released, whereupon the weight of the incased unit 5 will be sufficiently great to cause it to fall by gravity carrying with it the rack 19. The pinion 12 is turned by this downward movement of the rack and caused to travel along the thread 11 to reengage the ratchet wheel 15 and the collar 18 frictionally. When this occurs the downward movement of the rack 19, and consequently the unit 5 is stopped. The steps in the downward movement of the unit are dependent for their number and length upon the amount that the shaft 7 is turned. For example, if the shaft is turned sufficiently far the heating device will be free to fall to its position of least heating effect in a single rapid movement, while, if the shaft 7 is only turned a trifle at a time the device may be lowered gradually to provide a number of gradations in heating effect. In each position the unit, just as in elevating it, is locked by the pawl 16. Under certain circumstances it may be advisable to provide a positive lowering action rather than to rely upon the pull of gravity upon the unit for the downward movement. To accomplish this, I provide the collar 13 fixed to the shaft 7, with which the pinion 12 will engage frictionally when the shaft is turned sufficiently far toward the left. As the shaft is thus turned, the pinion 12 is locked to the collar 13 in such a manner that during the continued rotation of the shaft to the left the pinion rotates with it and affords a positive lowering means for the rack with which it engages.

It is obvious that by the use of my improved heating device that the heat applied to the utensil to be heated may be increased or decreased at will. It is apparent also that this heat may be reduced instantaneously when the unit is lowered, since the radiating range of the unit is always the same. Thus I am able to do away with the deleterious effects of the heat stored in the resistance unit, which are present in all devices wherein the unit is stationary, and I am able to regulate more delicately the heat applied to the material to be heated, than has been possible with other electrical heating devices heretofore employed. When desirable I may, however, combine these two methods of varying the heat and in this manner obtain an even more delicate adjustment of the heat. It is obvious that the heater may have any desired range of movement and that it may be of any desired type.

It is apparent to one skilled in the art that other constructions than that described in this application may be devised to operate upon the principle of my invention and I

wish it to be distinctly understood that I consider this description to be but illustrative of one form which my invention may assume in practice and do not wish to be limited to the particular construction herein described.

Having thus described my invention what I claim as new and desire to secure by Letters Patent, is.

1. In combination, a chafing dish frame, a heating device, a frame therefor independent of said chafing dish frame and having legs arranged to straddle the legs of said chafing dish frame, and means for varying the position of said heating device.

2. In combination, a frame having radially extending bifurcated feet, a pedestal centrally located in said frame, a heating device having a supporting member arranged to be telescopically received in said pedestal, and means for varying the elevation of said heating device.

3. In combination, a frame having radially extending bifurcated feet, a receptacle holding-ring carried on the upper part of said frame, a heating device, a supporting member for said heating device arranged to reciprocate within said frame, and means for varying the elevation of said heating device as desired.

4. In combination, a frame having radially extending portions arranged to receive a support, a receptacle holding ring carried by said frame, a pedestal supported in said frame, a heating device having a supporting member arranged to telescope in said pedestal, and means for varying the elevation of said heating device journaled in said pedestal.

5. In combination, a heating device, an operating shaft for varying the position thereof, and means operable by movement of said shaft for permitting said device to move independently of said shaft.

6. In combination, a heating device, a rotatable operating shaft therefor, and a pinion arranged to travel thereon to permit said device to be positively moved by said shaft or to move independently thereof.

7. In a heating appliance, a heating device, means for varying the elevation of the same, a shaft, and means operable upon movement of said shaft permitting said heating device to move a pre-determined amount independently of said shaft.

8. In a heating appliance, a heating device, a rack carried thereby, a pinion arranged to engage said rack, an operating shaft therefor, and means permitting the rotation of said pinion independently of said shaft.

9. In a heating appliance, a heating device, a rack for varying the elevation of the same, a pinion engaging said rack, an operating shaft for said pinion, and means per-

mitting said pinion and rack to move a pre-determined amount independently of said shaft.

10. In a heating appliance, a heating device, a rack arranged to be moved to vary the position thereof, an operating shaft, and means operated upon movement of said shaft for positively raising or lowering said rack or permitting said rack to move a pre-determined distance independently of said shaft.

11. In a heating appliance, a heating device, a rack arranged to be reciprocated to vary the position of said heating device, an operating shaft therefor having a threaded end, a pinion carried on said end and engaging said rack, and stops carried by said shaft arranged to be engaged by said pinion to lock said pinion to said shaft.

12. In a heating appliance, a heating device, a casing inclosing the same, a supporting member fixed to said casing, a pedestal arranged to receive said support telescopically, an operating member journaled in said pedestal, and a rack and pinion mechanism actuated by said operating member for varying the elevation of said heating device.

13. In a heating appliance, a heating device, a casing inclosing the same, a hollow supporting member fixed thereto, a rack carried by said supporting member, a pedestal arranged to receive said supporting member telescopically, an operating member journaled in said pedestal, and means operable upon movement of said shaft for positively raising or lowering said heating device or permitting the same to move through a pre-determined distance independently of said shaft.

14. In a heating appliance, a heating device, a rack arranged to reciprocate to vary the position of said device, an operating shaft, a pinion carried thereby and engaging said rack, and means carried by said shaft for positively raising said rack or for permitting said rack and pinion to move independently of said shaft through a pre-determined distance.

15. In a heating appliance, a heating device, a rack carried thereby, a pinion engaging therewith and having a threaded bore, a shaft extending through said pinion and having a threaded end, a support for said shaft, a ratchet carried on one side of said pinion, a pawl carried on said support and engaging said ratchet, and stops carried on opposite sides of said pinion and said ratchet.

16. In a heating appliance, a heating device, means for varying the elevation of said device with respect to the object to be heated, and mechanism for rendering inoperative said means to permit said device to fall a predetermined amount by gravity.

17. In a heating appliance, a heating device, means for increasing the elevation of said device with respect to the object to be heated, and mechanism for rendering inoperative said means to permit said device to fall by gravity, and auxiliary means for insuring the positive lowering of said device.

18. The combination with a heating device, of a frame supporting said heating device comprising legs, a utensil supporting ring fixed to said legs, and a pedestal relatively to which the heating device is adapted to be moved.

19. In combination with a heating device, a frame adapted to support the same and comprising legs, a utensil supporting ring fixed to said legs and adapted to guide the heating device, a central pedestal supported within said frame beneath said utensil supporting ring, with respect to which the heating device is adapted to be moved.

20. In a heating appliance, the combination of a frame, a pedestal carried thereby, a telescoping member adapted to slide in said pedestal, a heating device carried by said telescoping member, a rack fixed to said telescoping member, a threaded shaft mounted in said pedestal, a pinion adapted to travel on said shaft and to engage said rack to change the elevation of the same when the shaft is rotated, and means associated with said pinion whereby the rack is held in each position.

21. In a heating appliance, a heating element, an element to be heated, means for effecting a movement of one of said elements relatively to the other, said means being adapted to release the movable element when desired, and means for holding said movable element in any desired position.

22. In a heating appliance, a heating element, an element to be heated and means for effecting a movement of one of said elements with respect to the other, comprising a single controlling shaft having a screw thread and collars adjacent each end of said screw thread, a pinion adapted to travel on said screw thread, a ratchet wheel loosely mounted upon said shaft adjacent said pinion, a pawl adapted to hold said ratchet wheel in any desired position and a toothed member fixed to the movable element and adapted to be moved longitudinally upon the rotation of said pinion with said shaft.

23. In combination, a chafing dish having transversely extending supports near the base thereof, a frame adapted to be removably mounted upon said supports, an electric heating disk movable with respect to said frame, operating mechanism for varying the position of said disk and carried in said frame, and a single operating member for actuating said operating mechanism.

nism protruding from said frame and accessible from the side of said chafing dish frame.

24. In combination a heating device, an
5 operating shaft, and means controlled by said shaft for varying the position of said device, said means being arranged so that movement of the shaft in one direction positively moves said device and movement of

the shaft in the other direction permits said 10 device to move independently of the shaft.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

HARRY W. DENHARD.

Witnesses:

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W. E. SARGENT.