

March 28, 1933.

G. BROWNING

1,903,089

AUTOMATICALLY TIMED APPARATUS FOR HEAT TREATMENT

Original Filed Aug. 15, 1927 3 Sheets-Sheet 1

Fig. 1.

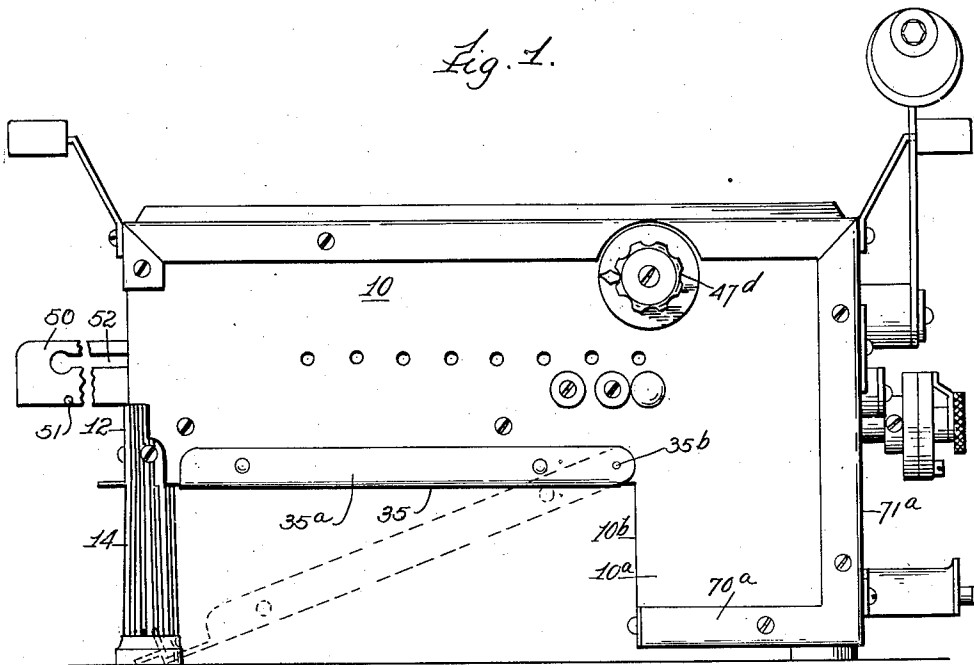


Fig. 2.

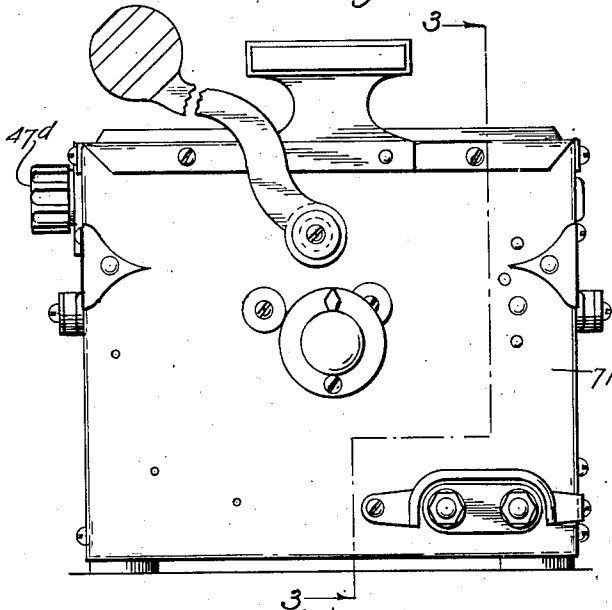
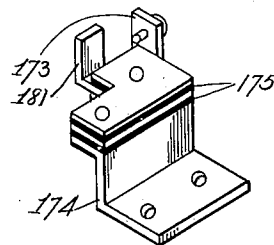


Fig. 3.



Witness
H. O. McKnight

Inventor:
George Browning
by Burton Burton
his Attorneys

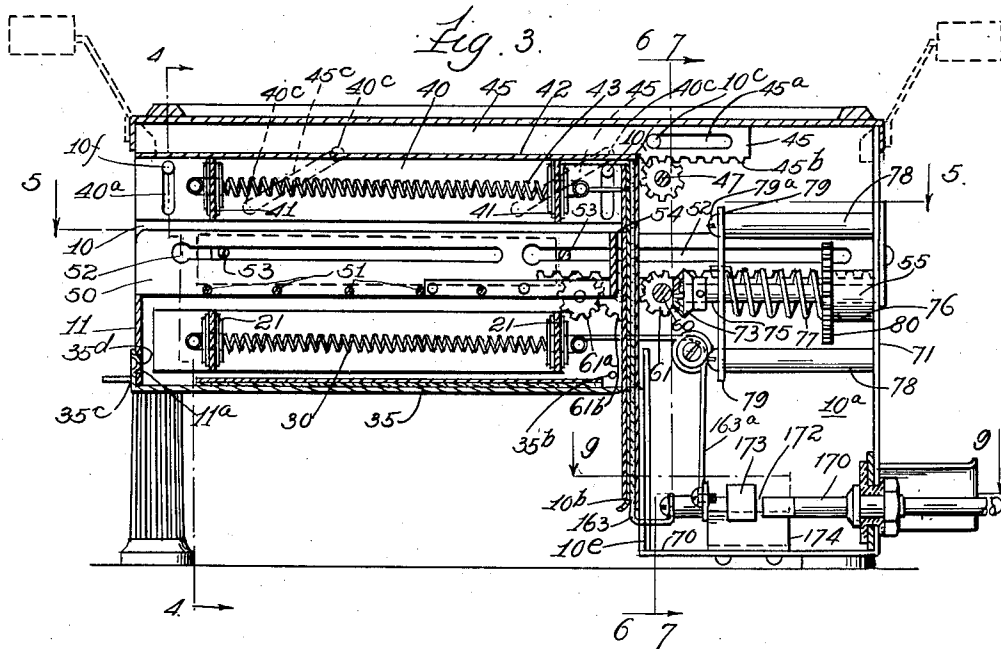
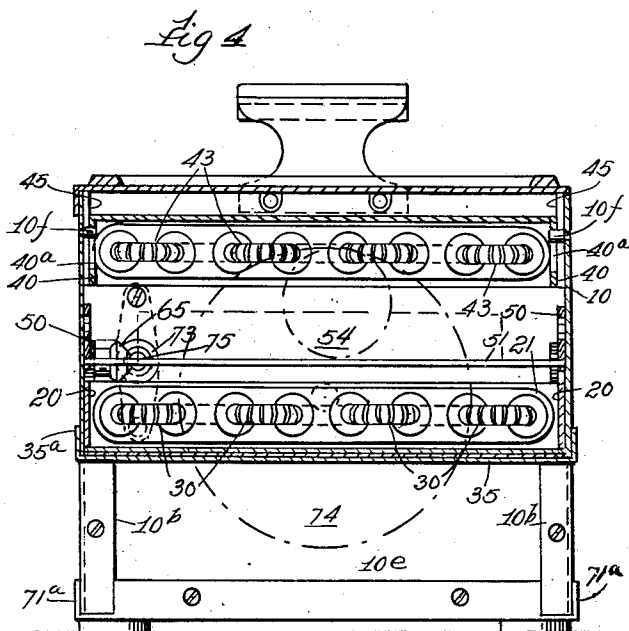
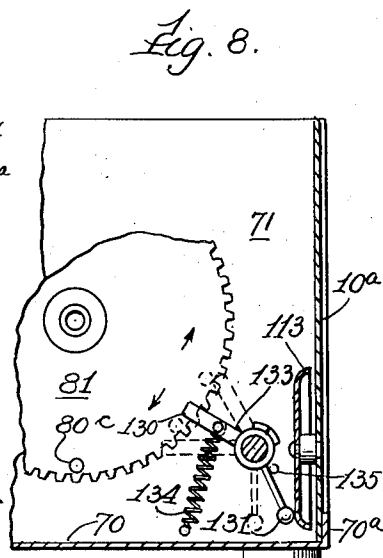
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AUTOMATICALLY TIMED APPARATUS FOR HEAT TREATMENT

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Witness.
H. C. McKnight.

Inventor:
George Browning.
by Burton & Burton
his Attorneys.

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AUTOMATICALLY TIMED APPARATUS FOR HEAT TREATMENT

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3 Sheets-Sheet 3

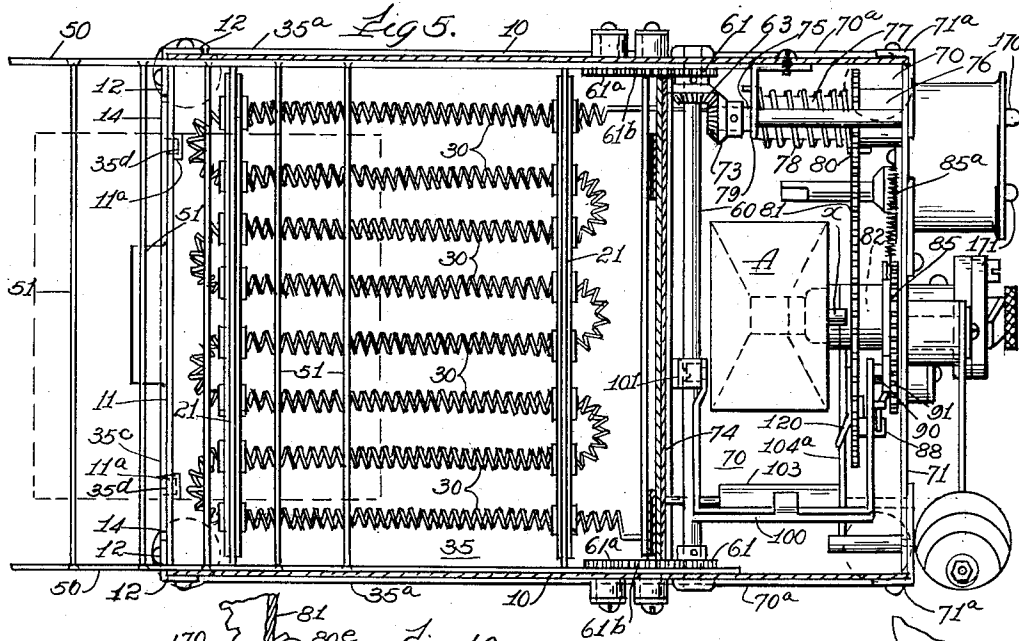
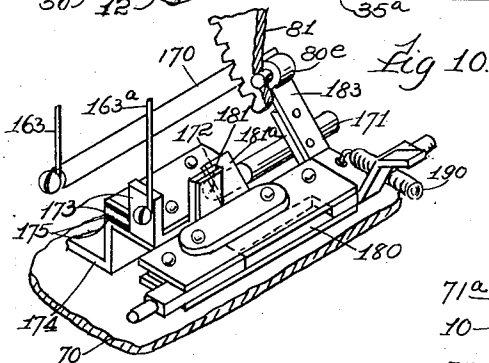
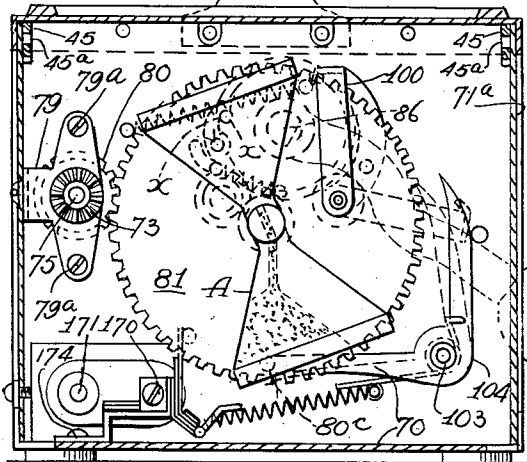
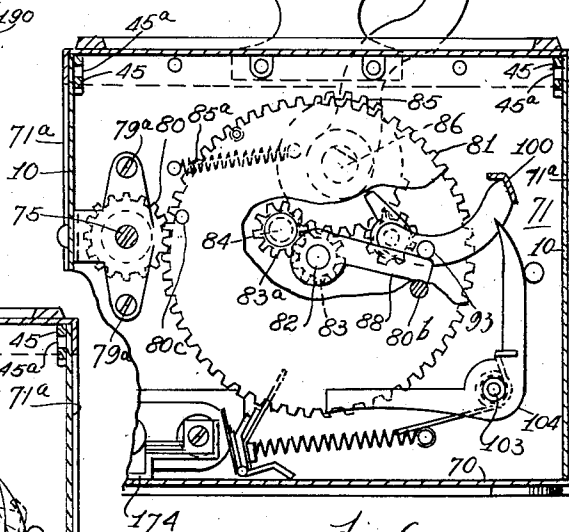


Fig 7.



Inventor
George Browning
by Burton Burton
his Attorneys.

UNITED STATES PATENT OFFICE

GEORGE BROWNING, OF WILMETTE, ILLINOIS, ASSIGNOR TO CHICAGO FLEXIBLE SHAFT COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

AUTOMATICALLY TIMED APPARATUS FOR HEAT TREATMENT

Original application filed August 15, 1927, Serial No. 213,179. Divided and this application filed September 25, 1929. Serial No. 395,100.

This application is a divisional of my pending application Serial No. 213,179, filed August 15, 1927.

The purpose of this invention is to provide an improved apparatus for heat treatment,—cooking, drying, or other treatment employing heat developing means, preferably electric,—comprising means for timing the duration of heat periods of heat treatment, whether by timing the period of exposure of the article treated with the heating means or by timing the period of heat duration. It consists of certain elements and features of construction in combination, as herein shown and described and as indicated by the claims.

In the drawings:—

Figure 1 is a side elevation of a structure embodying this invention.

Figure 2 is a rear end elevation of the same.

Figure 3 is a transverse vertical section at the staggered line 3—3 on Figure 2.

Figure 4 is a transverse vertical section at the line 4—4 on Figure 3.

Figure 5 is a horizontal section at the plane indicated by the line 5—5 on Figure 3.

Figures 6 and 7 are transverse vertical sections at the plane indicated by the line 6—7, 6—7, on Figure 3, certain parts being omitted from each of said figures for disclosing parts which would otherwise be obscured.

Figure 8 is a detail sectional elevation showing parts constituting an audible signal in relation to the timer train wheel by which it is operated, section being made through the lower rear right-hand corner of the casing at the same plane as Figures 6 and 7 from which the parts shown in Figure 8 are omitted to avoid obscuring parts specially shown in those figures.

Figure 9 is a perspective view of one of the parts in the circuit shown in Figure 10, reversed in position from that at which it appears in Figure 10.

Figure 10 is a perspective view of the circuit connection and switch upon a larger scale than the same are shown in Figure 6.

The structure shown in the drawings comprises a frame or casing for mounting and enclosing two heating units and a carrier for

the article to receive heat treatment, mechanism for operating the carrier to move it into and out of position for exposing the contents to heat treatment, and means for determining the duration of such exposure.

In the specific embodiment of the invention shown in the drawings, the heating means is electric and the periods of heat treatment are terminated and their duration therefore determined both by interrupting the electric circuit and by withdrawing the carrier from proximity to the heating elements, and thus taking the contents more or less out of the region of exposure to the heat.

The supporting and enclosing frame or casing comprises opposite parallel side plates, 10—10, joined by a front transverse bar, 11, the junction being effected by angular clasps, 12—12, formed by the upper end portions of tubular legs, 14—14, which support the structure at the front end, said side plates being L-shaped in side elevation, as seen in Figure 1, the arms, 10^a—10^a, of their L-shape constituting rear end legs of the structure. At the forward vertical edges of the legs, 10^a—10^a, the plates, 10—10, are folded to form inwardly projecting flanges, 10^b—10^b, which afford means of securing a supplemental portion of the frame or casing for enclosing certain parts of the mechanism separately from the heating elements and the carrier of the article to be heat treated, as will be hereinafter more particularly described.

A lower heating element is mounted between the plates, 10—10, consisting of side bars, 20—20, joined at front and rear ends by transverse bars, 21—21, between which the electrically energized heating coils, 30, extend, being laced back and forth between said transverse bars longitudinally of the structure, as seen in Figures 3, 4 and 5. Below the lower heating unit there is provided a bottom plate, 35, having lateral upturned flanges, 35^a, dimensioned for clasping between said flanges the lower edges of the side plates, 10—10, said bottom plate being hinged by means of said flanges at its rear end, as seen at 35^b, to said side plates, 10—10, the front edge having also an upturned flange,

35^c, provided with two small inwardly struck bosses, 35^d, for engaging apertures, 11^a, in the cross bar, 11, of the frame to retain the bottom plate in position extending horizontally under the lower heating unit. An upper heating unit is provided with parallel side bars, 40—40, joined rigidly by transverse bars, 41, and a top plate, 42, the heating coil, 43, being laced back and forth between the transverse bars longitudinally of the structure, similarly to the construction of the lower heating unit. This upper heating unit is mounted between the upper marginal portions of the side plates, 10—10, said mounting being by means of studs, 10^c—10^c, projecting inwardly from the side plates, 10—10, engaging vertical slots, 40^a—40^a, in the side bars, 40—40, near the opposite ends of said side bars, this construction being for the purpose of adapting the upper heating unit to be adjusted up and down with respect to the lower unit, which adjustment is effected by longitudinal sliding rack bars, 45—45, interposed between the plates, 10—10, and the bars, 40—40, respectively, guided for longitudinal sliding by means of slots, 45^a, in said rack bars respectively engaging a stud, 10^c, which project inwardly from the corresponding plates, 10, respectively, said bars, 40, having toward their opposite ends respectively oblique cam slots, 45^c—45^c, which are engaged with studs, 40^c—40^c, projecting into them from the rack bars, 45. 45, respectively. A rock shaft, 47, extending across the structure at the rear end of the upper heating unit and journaled in the side plates, 10—10, carries pinions, 47^a, (only one shown) which mesh with the racks, 45^b, (only one shown), of the rack bars, 45 (only one shown); and the rock shaft has at one end at the outer side of one of the side plates, 10—10, an operating knob, 47^a, for rotating the rock shaft to operate the sliding rack bars to cause them by the cam slots engaging the studs projecting from the rack bars cooperating with the vertical slots, 40^a—40^a, of the side bars, 40, 40, and the studs, 10^c—10^c, engaged therewith, to raise and lower the upper heating unit.

Between the upper and lower heating units there is mounted slidably between the side plates, 10—10, a carrier for the article to be heat-treated which comprises parallel side bars, 50—50, tied together by light rods or wires, 51, at intervals in the length of the side bars and constituting a grating for supporting the article to be heated,—as for example, a slice of bread to be toasted,—indicated at A. The side bars, 50—50, are longitudinally slotted at 52, the slots being engaged by studs, 53, projecting from the side plates, 10—10. This carrier is provided with a cross bar, 54, located rearwardly beyond the area in which the grating rods, 51, are located, for rendering the carrier suit-

ably rigid independently of said rods, the rear end slots, 52, in the side bars, 50, being extended rearwardly beyond said cross bar; and said rearwardly extending and slotted part of said side bars have their lower edges formed as racks, as seen at 55—55, and a shaft, 60, journaled in the side plates, 10, extending across the structure carrying gear pinions, 61—61, which mesh with the racks, 55—55, respectively, for operating the carrier to slide it in and out between the upper and lower heating units. The shaft, 60, carries also at one end adjacent to the gear pinion, 61, at that end, a bevel gear, 63, which meshes with a bevel gear, 73, on a longitudinally extending shaft, 75, which is supported on the supplemental frame and casing above mentioned and which will now be described.

This supplemental frame comprises a bottom plate, 70, formed integrally with a rear end plate, 71, folded at right angles thereto, both parts, 70 and 71, being inwardly flanged as seen at 70^a and 71^a, respectively, for rigidity and to afford means of securing the supplemental frame and casing to the principal frame structure previously described, which securement is effected by the plates, 70—71, being dimensioned so that the flanges, 70^a—71^a, embrace the lower horizontal and the rear vertical edges of the plates, 10—10, to which said supplemental frame is secured by screws through said flanges and screwed into said side plates, 10—10. This supplemental frame and casing is completed by a partition plate, 74, secured by screws to inturned flanges, 10^b, formed at the forward vertical edges of the leg portions, 10^a, of the side plates, 10—10, and the flange, 10^c, and upturned at the bottom part, 70, of the supplemental frame and casing. For supporting and journaling the shaft, 75, an extended journal bearing, 76, is welded onto the forward face of the rear end plate, 71, and parallel horizontal bracket rods, 78—78, are likewise welded to said end plate positioned vertically above and below said journal bearing, 76, and a bracket plate, 79, secured by screws, 79^a, to the forward ends of said rods and to the side plate, 10, affords the second journal bearing for the shaft, 75, which carries at its forward end in front of the plate, 79, the bevel gear, 73, above mentioned as meshing with the bevel gear, 63, on the shaft, 60, by whose rotation the carrier is propelled in and out between the upper and lower heating units.

The shaft, 75, carries a spur gear, 80, which may be referred to as the initial gear of the gear actuating train,—comprising the bevel gears 63—73, the spur gears, 61, 61^b, 61^a and the racks, 45, 45, and another train about to be described, and which may be referred to as the timer operating train. The gear, 80, becomes the initial gear of both these trains

by virtue of the circumstance that about its shaft, 75, there is coiled what may be referred to as a motor spring, 77, of which one end is made fast to the gear, 80, and the other end 5 is engaged with the plate in which said shaft, 75, is journaled, so that the rotation of the shaft in one direction coils the spring, conditioning it for reaction from such coiling for rotating the shaft, 75, and the spur gear, 80, 10 and bevel gear, 73, thereon, and the two trains indicated.

It will be noted that the motor mechanism and timer, necessarily for operating as described, occupy space endwise beyond the 15 heating units and therefore beyond the heat-treatment position of the carrier and contents, and that the dimension of this space in the direction of the inthrust movement of the carrier is very much less than the length of 20 the heating units, and therefore less than the distance which the carrier must move to carry the toast fully into and out of heat treatment position; and that with the gear shaft, 60 as 25 shown, beyond the inthrust position of the carrier,—as is unavoidable if it is to extend across the frame to carry the gears, 61, 61, for engaging the opposite side racks, 55, 55,—these racks of the length which can be accommodated in said space beyond the shaft, 30 60, and the gear, 61, thereon, will be disengaged from said gear at the withdrawn position of the carrier. And to maintain driving connection of the racks with the motor train and at the withdrawn position of the carrier, 35 throughout the entire withdrawing movement and at the withdrawn position of the carrier, there is provided a supplemental gear, 61^a, meshing with one of the racks, 55, and an intermediate idler pinion, 61^a, meshing 40 with both pinions, 61 and 61^a, but not with the rack, thus providing means for maintaining driving engagement of the motor train with the rack throughout the limit of 45 the withdrawal movement.

The timer operating train and timing device referred to requires no particular description for the purpose of this divisional application for pointing out that the timing 50 device being of the hour-glass type pivotally mounted and caused to reverse its position on the shifting of the center of gravity resulting from the flowing of the shiftable content from one compartment to the other, operating 55 means for releasing locking means by which the carrier-operating train is held stationary at the heat treatment position of the carrier to which the latter is moved, as described, for beginning the heat treatment. In order that 60 the train may be thus locked and released, the gear, 80, is meshed with the gear, 81, which is held locked at the heat treatment position of the carrier by the engagement of the stud, 80^c, on said larger gear with one end of a 65 lever member, 104, which at the other end

stands in position for encounter and actuation for disengagement from said stud, 80^c, by a pivoted and gravity-operated member, 100, which is started from a position of rest by the movement of the hour-glass timer 70 due to the shifting of its contents as mentioned, said gravity-operated member being thus started, falls into encounter with the lever, 104, and disengages it from the stud, 80^c, thereby releasing the gear, 81, and the 75 entire train in which it is connected for rotation under the impulse of the motor spring, 77.

The duration of the period of heat treatment is desirably determined not only by the 80 withdrawal of the carrier from position of maximum exposure of the contents to the heating elements, but also by interruption of the heat generating means, viz., in the structure illustrated the electric current; and for 85 this purpose the circuit in which the heating coils are energized comprises contact pins, 170 and 171, of customary form for receiving a customary form of circuit connecting 90 plug, said pins being mounted insulatedly in any convenient manner on the rear end wall, 71. The pin, 170, has circuit wire, 163, secured to its inner end and leading thence to the heating coils. The pin, 171, is terminated in line with,—and separated by a short 95 gap, 172, from,—a circuit member consisting of a small plate, 173, which is mounted insulatedly as indicated at 175, Figures 9 and 10, on a bracket, 174, secured to the frame, as 100 on the bottom plate, 70, said insulated circuit plate, 173, being connected to the return circuit wire, 163^a, from the heating coils. Pivotally mounted on the supplemental frame for rocking transversely of the axis of the gear, 105 81, is a circuit-making-and-breaking rocker, 180, carrying insulatedly gap-bridging lips, 181, 181^a, dimensioned and positioned for lapping and closing the circuit gap 172, at one position to which the rocker may be 110 rocked, and having an operating arm, 183, extending alongside the gear, 81, in position to be encountered by an abutment, 80^c, projecting from the rear side of said gear, 81, at a point in the circumference of the gear for 115 causing said encounter to occur just enough before the gear is locked by the bell crank dog so that at the stopped and locked position of the gear, the rocker, 180, has been rocked far enough to lap the lip, 181, on the proximate 120 ends of the pin, 171, and the circuit plate, 173, bridging the circuit gap, 172, between said parts, and causing the heater to be energized so long as the gear, 81, remains in its locked position. A spring, 190, stretched from a 125 suitable point on the lever arm, 183, to a point for attachment to the frame, operates to hold the rocker normally out of the circuit closing position of the lip, 181, and reacts for breaking the circuit at the instant the gear, 130

81, being rotated by the dog, begins to reverse rotation as described.

It may be desirable to provide for an audible signal to be operated for sounding at the close of the treatment period; and for this purpose there is mounted at any convenient position, preferably on the supplemental frame, a bell, 113, having its hammer carried on the end of one arm of a lever, 131, fulcrumed on a bearing stud extended from the rear end plate, 71, said lever preferably consisting of two parts pivoted together at the fulcrum of the lever, and stopped against relative movement about the pivot in the direction of movement of the lever as a whole for retracting the arm carrying the hammer head from the bell, a spring 133, being provided connected for reacting between the two arms, 130 and 131, of the lever for holding them normally in said relatively stopped position. A second spring, 134, is connected to the lever at the opposite side of the fulcrum from the hammer-carrying arm reacting for the stroke of the hammer on the bell. The usual construction is provided for causing recoil of the hammer after the sounding stroke, consisting in an elastically flexible part, 130^a, of said lever back of which, toward the fulcrum, the lever arm is stopped by a stud, 135, at a position just before the hammer head strikes the bell.

The pivoted arm, 130, of the lever, 131, projects in the path of the stud, 80^c, by which the locking dog, 104, is set and locked, as above described,—for encounter of said stud with said lever arm, 13, in the rotation of the wheel, 81, occurring upon release of the locking dog. Such encounter locks the lever for retracting the hammer from the bell, so that when the abutment, 80^c, runs off the encountered end of said lever arm, 130, the spring, 134, retracts said arm for the hammer stroke against the bell. And in the reverse or timer-setting rotation of the wheel, 81, the abutment, 80^c, encountering the pivoted arm, 130, of the lever, folds it back as the abutment passes it without operating the hammer-carrying arm of the lever.

I claim:—

1. In a construction for the purpose stated comprising a heating means and a carrier for contents to be heat-treated mounted for movement to and reverse movement from heat treatment position, the heating means consisting of two heating elements positioned for entrance of the carrier and its contents between them, one of said heating elements being mounted for movement toward and from the other, means for guiding the movable element in such movement consisting of transversely extending slots in opposite lateral members of said movable element, side plates for enclosing said heat treating device having abutments engaging said slots, and means for causing movement of said movable heating

element consisting of a longitudinally moving member having oblique slots, abutments protruding from said side plates engaging said oblique slots, and means for moving said longitudinally moving member at will; whereby the oblique slots serve as cams to propel the heating element directly in the direction of said transverse guide slots.

2. In a construction of the character indicated, in combination with a supporting structure, a carrier mounted thereon and guided for reciprocation therein; means for such reciprocation consisting of a gear rack carried by the carrier, a gear journaled on the support meshing with the rack, and means for rotating the gear; means for extending the reciprocation of the carrier beyond the position of engagement of the rack with the gear consisting of a supplemental gear journaled on the support in position for meshing with the rack while the latter is meshed also with the first mentioned gear, and an idler gear interposed between the first mentioned gear and the supplemental gear meshed with both said gears and out of mesh with the rack.

In testimony whereof, I have hereunto set my hand at Chicago, Illinois, this 20th day of September, 1929.

GEORGE BROWNING.