June 24, 1930. C. WILHJELM 1,767,636

PERIODIC CIRCUIT MAKER FOR ELECTRIC OVENS

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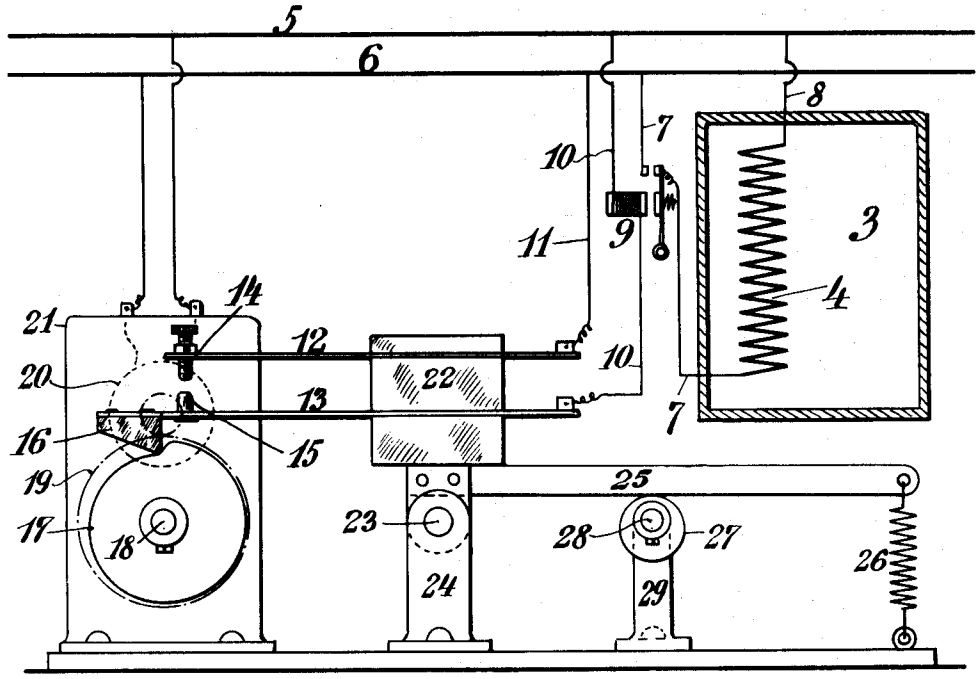


Fig. 1

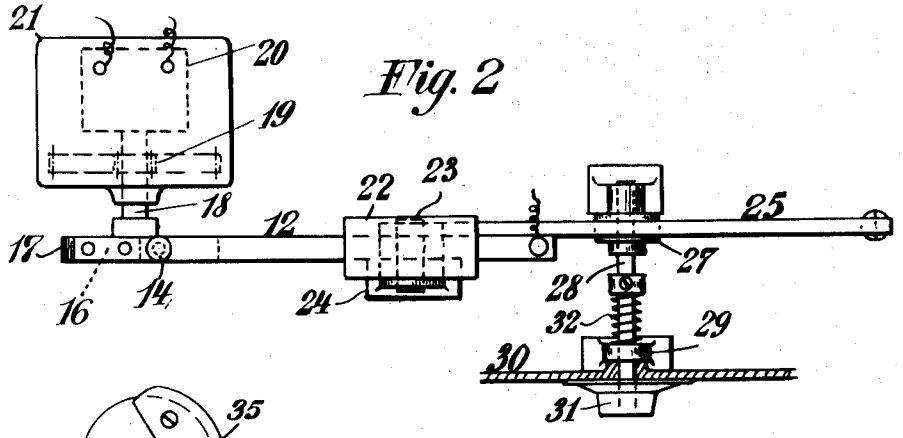


Fig. 2

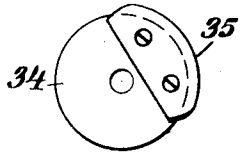


Fig. 3

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UNITED STATES PATENT OFFICE

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PERIODIC CIRCUIT MAKER FOR ELECTRIC OVENS

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This invention relates to temperature control apparatus for electric ovens and furnaces. The object of the invention is to provide a control apparatus of simple efficient design and construction, and either entirely automatic in response to temperature changes within the oven, or operable as an improved manually regulated apparatus.

With this object in view my invention is embodied in an apparatus as hereinafter more fully explained and as illustrated in the accompanying drawing in which

Figure 1 is a diagrammatic view of an electric oven equipped with a temperature control apparatus embodying the invention.

Figure 2 is a plan view of the apparatus with parts omitted and broken away.

Figure 3 shows a modification of the contact operating cam.

Referring to the drawing the reference numeral 3 denotes an electric oven having the heating element 4 suitably connected in the main heating circuit comprising the line wires 5 and 6, and the connecting wires 7 and 8.

The numeral 9 denotes a relay in the main heating circuit for opening and closing the latter in a well known manner. The relay is included in the relay circuit comprising the line wires 5 and 6, connecting wires 10 and 11 and contact elements 12 and 13 which are normally broken. The contact elements carry suitable contacts 14 and 15, one of which or both may be adjustable.

Means are provided for automatically closing the relay circuit to energize the relay so as to close the main heating circuit for a predetermined period of time during a given time interval. During such period the full current load will pass through the heating element in the oven.

As one embodiment of my invention, one of the contact elements 12 and 13 carry a tooth 16 or other like member of nonconducting material adapted to contact with a timing cam 17 whereby to close the relay circuit at the contacts 14 and 15 in an obvious manner.

The timing cam is mounted on a shaft 18 operated through a reducing gearing 19 from a small electric motor 20 connected to the line in the usual manner. The motor and its operating parts are enclosed within a suitable housing 21. It is obvious that when the cam 17 is rotated, the relay circuit will be closed once to each revolution of the cam and the full current load pass through the heating element 4.

Means are provided for adjusting the position of the contact elements with relation to the cam in such a manner that minute adjustment may be made. To this end the contact elements are suitably mounted in a block or support 22 of nonconducting material and pivoted at 23 on a stand 24. An arm 25 is fast on the support 22 and extends to one side of the pivot 23. The arm is held by a spring 26 on an eccentric 27 fast on an adjusting shaft 28 suitably supported in a stand 29.

A casing may be provided to enclose the entire apparatus and is indicated at 30 in Figure 2. The shaft 28 extends through the casing and is provided with a knob 31 on the outside. 32 is a friction device for maintaining the shaft 28 in adjusted position in a well known manner.

In operation the cam 17 is timed by selecting a suitable motor and providing the proper reducing gearing to rotate at a given speed, for instance once in every minute. Consequently, once in every minute the relay circuit will be closed by the contacts 14 and 15 for a given period depending upon the length of the effective cam surface and the position, that is nearness, of the contacts to the cam.

The length of the effective cam surface is designed to suit the local condition and the distance of the contact from the cam may be minutely adjusted to suit the oven requirements by rotating the eccentric 27 to raise or lower the arm 25 and thus lower or raise the contacts.

The closer the contacts are to the cam, the longer the period during which the relay is energized and the heating circuit closed, and vice versa.

The requirements of the oven being known, it is an easy matter to adjust and set the shaft 28 to accurately position the contact elements accordingly. The apparatus provides such

easy and minute adjustment that the full load from the line may be sent through the heating coil either steadily or for such period of time that the temperature in the oven will vary little if any from the desired constant.

Should the temperature drop, the apparatus may be instantly and accurately set to increase the frequencies and durations of full load impulses in the heating circuit, and vice versa.

This invention, therefore, provides for automatically maintaining a constant temperature under constant working condition, coupled with the advantages of minute adjustments as the local conditions may require.

The apparatus is very simple and economical in construction and operation. An added factor of adjustability may be introduced by using an adjustable cam 35 on a disk 34 to be mounted on the shaft 18.

It is a distinguishing feature of this invention that no current is wasted in the operation thereof. The motor is very small and consumes very little current. Likewise, the operation of the relay is inexpensive.

The disclosure herein is illustrative only. Changes and modifications may readily be made within the principle of the invention and the scope of the appended claim.

I claim:

An electric circuit closing device comprising a support, a member pivoted thereon, a pair of normally open contacts carried by said member to the one side of the pivot, an arm on said member extending to the opposite side of the pivot, a motor driven cam for closing said contacts at regular intervals, an eccentric in engagement with said arm and means for adjusting the eccentric to regulate the position of the said contacts with respect to the said cam.

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