July 19, 1949. E. B. MAIRE 2,476,448

STOKER TIMER

Filed Jan. 23, 1945

Fig. 1.

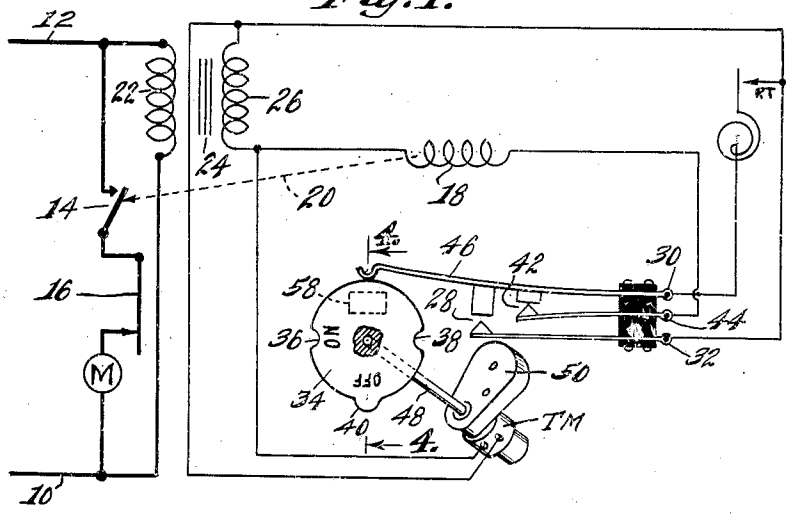


Fig. 2.

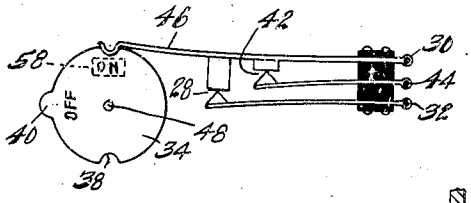


Fig. 3.

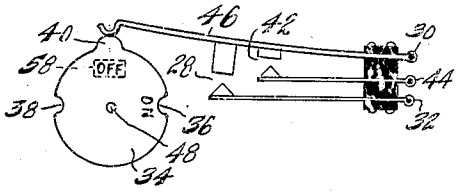
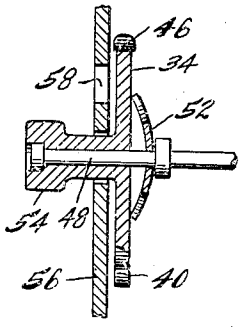


Fig. 4.



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UNITED STATES PATENT OFFICE

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STOKER TIMER

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2 Claims. (Cl. 236—46)

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My present invention relates to a stoker timer and particularly to one that is designed for the purpose of turning the stoker "on" at will or "off" at will as when cleaning the fire, with assurance that the control circuit will again be rendered operative a short period of time after it is turned "off" without attention of the operator.

One object of the invention is to provide a simple arrangement for turning a stoker "off," combined with the usual stoker timer for energizing the stoker periodically for hold-fire purposes, the timing mechanism that drives the hold-fire timer also driving my timer to insure that it will be brought back into operation without the necessity of the operator throwing a switch or performing some other operation for this purpose.

In connection with automatically stoked furnaces wherein the stoker is controlled by a room thermostat, it is desirable to insure that the room thermostat does not cause the stoker to operate while removing clinkers from the fire, as stoker operation forces air into the furnace and the operator is likely to get his eyes full of fly ash when the stoker operation starts. To insure against this, it has been common practice to provide a switch that cuts off the circuit to the room thermostat but it is necesary that the operator close this switch after he cleans the fire, otherwise the stoker cannot operate. It is accordingly an important purpose of my invention to provide a stoker timer arrangement wherein the circuit can be cut off, but it will automatically come back on after a time period sufficient for cleaning the fire, thus eliminating the possibility of forgetting to close a switch so that the stoker can continue to operate automatically.

A further object is to provide a stoker timer designed with a second timer switch in addition to the hold-fire timer switch, the second switch being operable to open the circuit to both the room thermostat and the hold-fire timer switch so that neither can cause operation of the stoker, the second timer switch, however, being operated by the timing mechanism so that it remains in the "off" position only a short period of time, thus insuring that the stoker will be brought back into automatic operation without further attention by the operator.

Still a further object is to provide the stoker timer arranged so that it can be manually set to an "on" position if the operator wants to observe the condition of the fire after he has cleaned it.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my stoker timer whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawings, wherein:

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Figure 1 is an electro-diagrammatic view of a stoker timer embodying my invention.

Figures 2 and 3 are views similar to a portion of Figure 1 showing the timer in different positions and

Figure 4 is a sectional view as on the line 4—4 of Figure 1 showing mechanical details of the timer cam and its manual setting mechanism.

On the accompanying drawing I have used the reference numerals 10 and 12 to indicate current supply wires for a motor M of an automatic stoker or the like. The circuit of the motor M is controlled by the usual motor switch 14 and limit switch 16 in series with each other. The motor switch 14 is adapted to be closed by energization of a relay coil 18, the mechanical connection being illustrated by the dotted line 20.

Current for the relay coil 18 may be supplied from the wires 10 and 12 either directly or through a step-down transformer, the primary of which is indicated at 22, the core at 24 and the secondary at 26. A room thermostat RT is provided for controlling energization of the relay coil 18 and there is also provided a timer switch indicated at 28. This may be termed a "hold-fire" timer switch as it is adapted to close the circuit periodically, for instance, once every half hour to thereby keep the stoker fire from going out, particularly when the weather is mild and there are but few calls for heat by the room thermostat.

The timer switch 28 has its terminals indicated at 30 and 32 and the switch itself is open in Figure 1. The room thermostat, it will be noted, shunts the switch 28 or is connected to the terminals 30 and 32 so that either the room thermostat or the timer switch 28 can operate the stoker. One of the two operating positions is shown in Figure 2 wherein the switch 28 has been closed.

For closing the switch 28, a cam 34 is provided having depressions 36 and 38 for providing the "hold-fire" periods. These may be of suitable depth for hold-fire periods of desired length, for instance 3 or 4 minutes and of course may be adjustable whereas the cam 34 may be provided with one or three cam depressions if it is desired to have a hold-fire period once each hour or each quarter hour instead of each half hour as

illustrated on the drawing. This however forms no part of my present invention.

The particular details of my invention reside in a means to open the circuit to both the room thermostat RT and the hold-fire switch **28** in such a manner that the circuit can be closed again automatically instead of the operator having to remember to set the circuit again for stoker operation. I accomplish this in a very simple manner by adding to the cam **34**, a lobe **40** and I include a second timer switch **42** to be opened thereby. The switch **42** is connected between the terminal **30** and a third terminal **44**, the terminal **44** being connected in series with the relay coil **18**. When the lobe **40** therefore registers with the leaf spring **46** of the switches **28** and **42** as in Figure 3, it separates the contacts of the switch **42** so that no current can flow through the coil **18**.

The cam **34**, as shown in Figure 4, is mounted loosely on a shaft **48** which is rotated once per hour through step-down gearing mechanism **50** from a timer motor TM. The timer motor TM is driven continuously and accordingly rotates the shaft **48** continuously.

The cam **34** is normally clutched to the shaft **48** by friction means in the form of a friction element **52** of the cupped spring washer variety, yet the cam **34** can be rotated relative to the shaft **48** at will. This may be accomplished manually by means of a knob **54** mounted exterior of a housing **56** for the timer motor and the cam, and in which a small window **58** is provided. The cam **34** may then have legends on it such as "On" and "Off" as illustrated on the drawings, so that when it is desirable to clean the fire the cam can be rotated to the "Off" position of Figure 3 and the operator will then be assured that the control circuit of the stoker cannot be energized by closure of either the room thermostat RT or the timer switch **28**.

The size of the lobe **40** is such that it will take about 3 or 4 minutes for the lobe to pass the leaf spring **46** and again permit the timer switch **42** to reclose so that the operator has this period of time in which to clean his fire and such period of time is ordinarily sufficient for the purpose. At the same time the operator is assured that when he leaves the stoker, the circuit for it will be reestablished automatically and it is unnecessary for him to manipulate any control for this purpose. If, however, he wishes to observe the way the fire burns after cleaning it, he can rotate the cam manually to the position of Figure 2 wherein "On" shows through the window **58** and the stoker will operate the same as usual in connection with a hold-fire period.

An arrangement of the character disclosed is very simple to provide, and where a stoker timer for hold-fire purposes is already provided, it is merely necessary to add the switch **42** and the lobe **40** for operating it, the wire from the relay coil **18** being connected to the terminal **44** instead of to the terminal **30**. By then having the cam manually rotatable to any desired position on the shaft **48**, yet automatically rotatable with the shaft as it rotates when the cam is released, assurance is had that the stoker circuit will not be left in an open condition so that the stoker cannot operate after cleaning the fire.

An arrangement of this kind results in a 3 or 4 minute "Off" period in each hour during which the room thermostat cannot cause the stoker to operate. This, however, is not objectionable as

the stoker will operate as soon as the "off" period has passed and will continue to operate until the room thermostat is satisfied, thereby delaying the starting and stopping of the room thermostat control cycle without, however, preventing the cycle from being performed for substantially the same period that it would have operated if the room thermostat had closed at an other-than-"Off" position of the stoker timer. The advantages obtained by my stoker timer far overbalance this slight disadvantage with a very simple arrangement for accomplishing the shutdown period for cleaning and the operating period for observing the fire thereafter if desired.

Some changes may be made in the construction and arrangement of the parts of my device without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

I claim as my invention:

1. In a stoker timer, a timer motor, a cam, a friction drive between said motor and said cam, a stoker operating circuit, a room thermostat for energizing said circuit in response to temperature changes, a first timer switch for energizing said circuit periodically, said first timer switch being operated by said cam, a second timer switch operated by the same cam for preventing energization of said stoker operating circuit by either said room thermostat or said first timer switch during a cleaning period, said cam being manually adjustable independent of said timer motor to open said second timer switch and thereafter operated by said timer motor to close the second timer switch after a time period, said cam being also manually adjustable independent of said timer motor to a position for the first timer switch to energize said circuit for the purpose of observing the condition of the fire and then operable by the timer motor through said friction drive.

2. In a stoker timer, a stoker operating circuit, a switch having three switch blades, two of which are normally engaged with each other and the third one of which is normally disengaged from the first one, a cam for holding said first one in the normal position, a timer motor having a friction drive with said cam for rotating it, said cam having a depression to permit the first and third leaves to close a circuit and a lobe for causing the first and second leaves to open said stoker operating circuit, a room thermostat, the first and second leaves and said room thermostat being connected in series in said stoker operating circuit, and the first and third leaves being connected with the terminals of said room thermostat to close a shunt circuit around said room thermostat when it is open.

EDWARD B. MAIRE.

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