

Nov. 26, 1935.

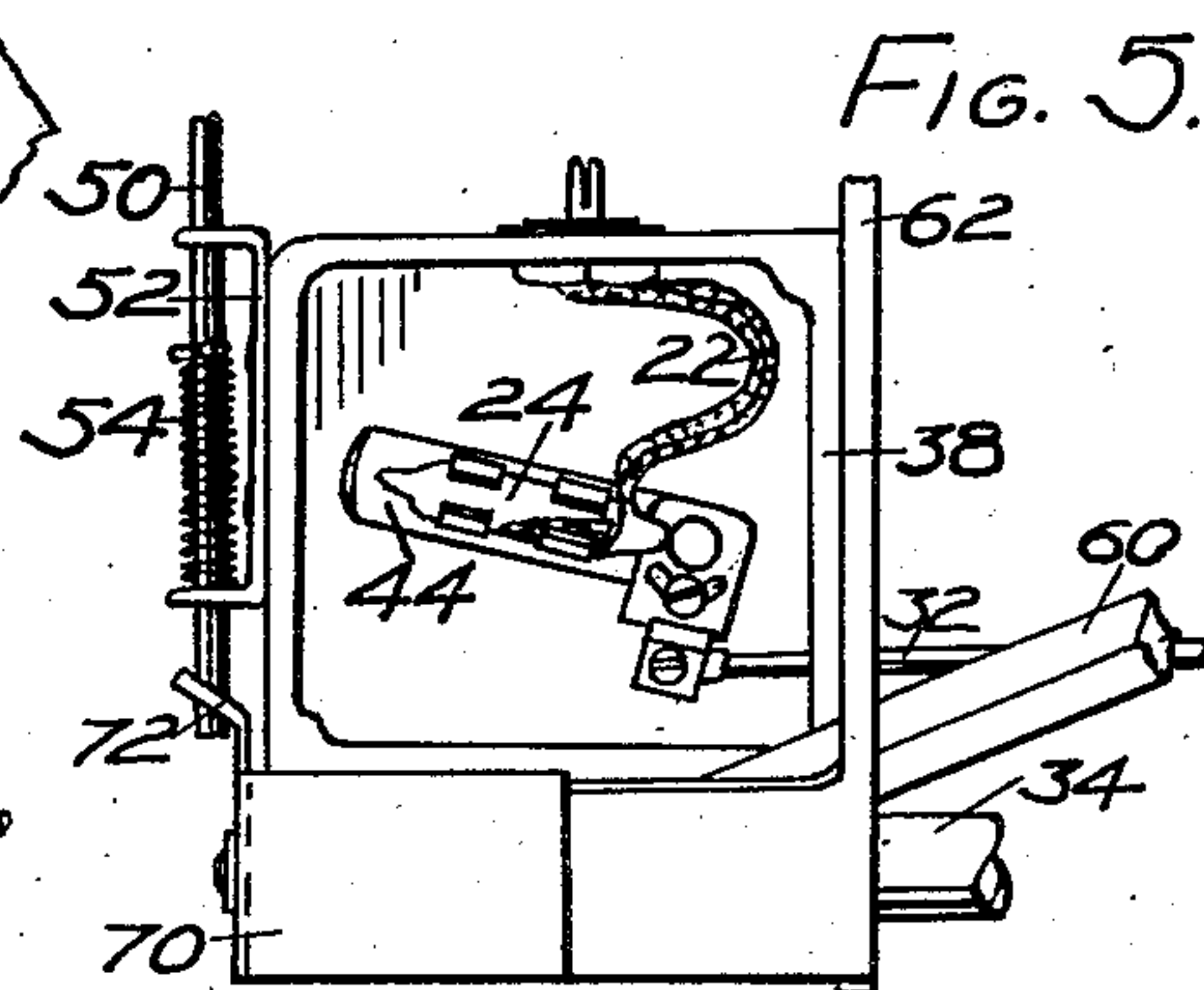
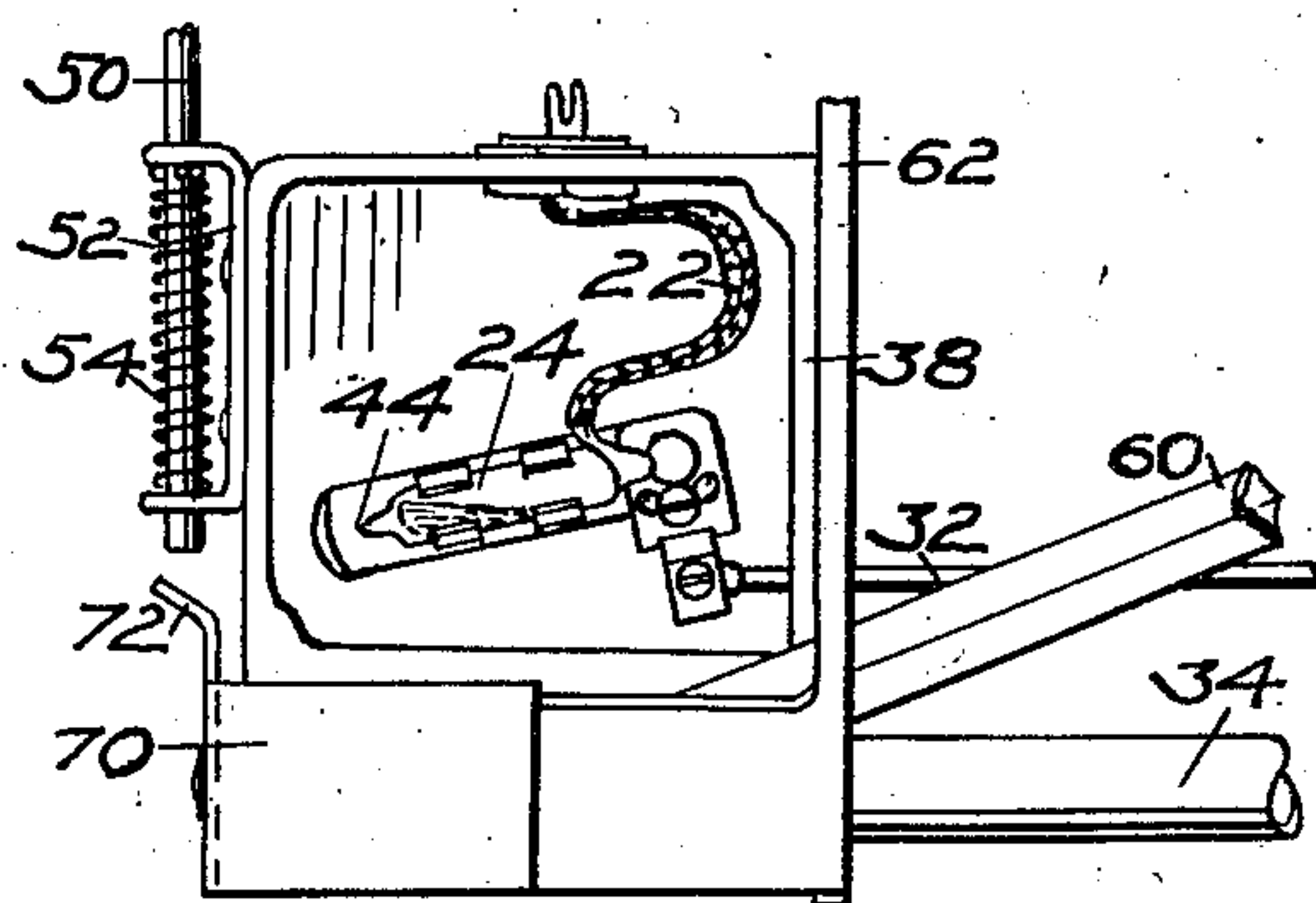
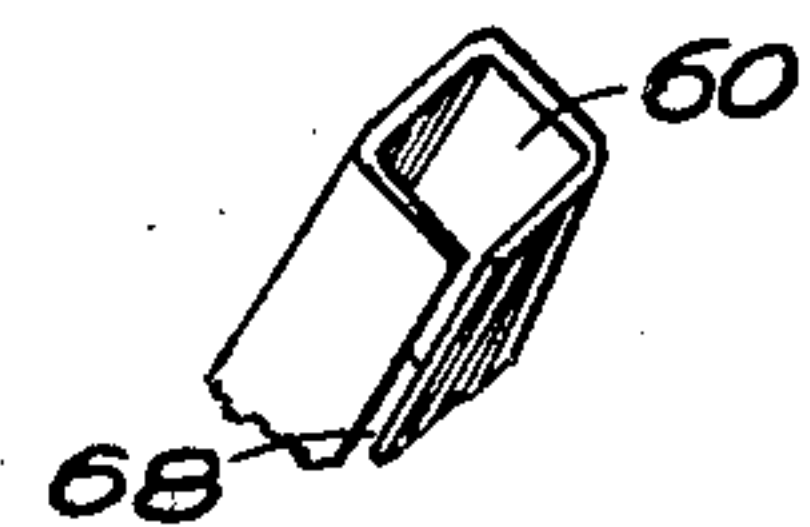
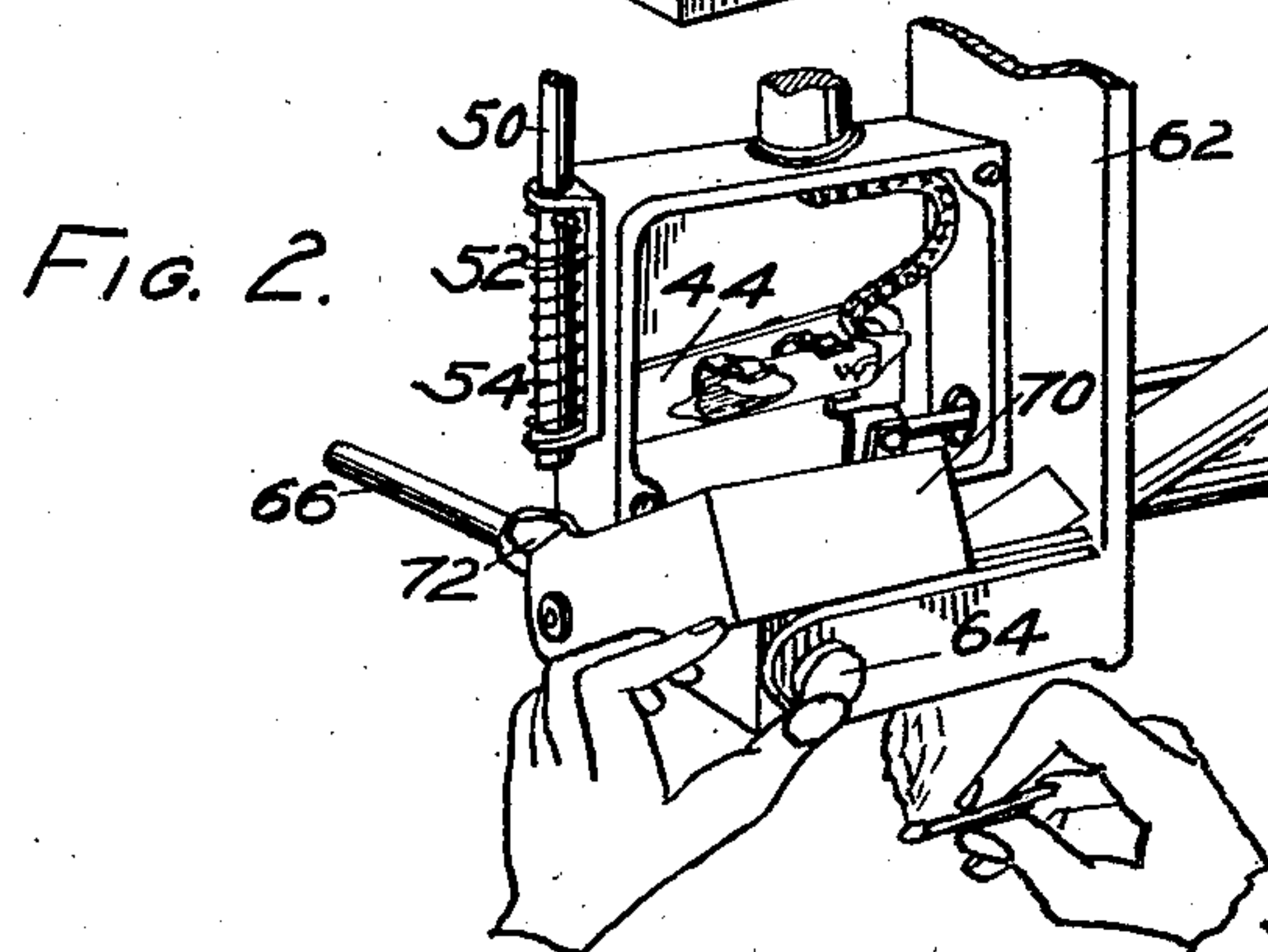
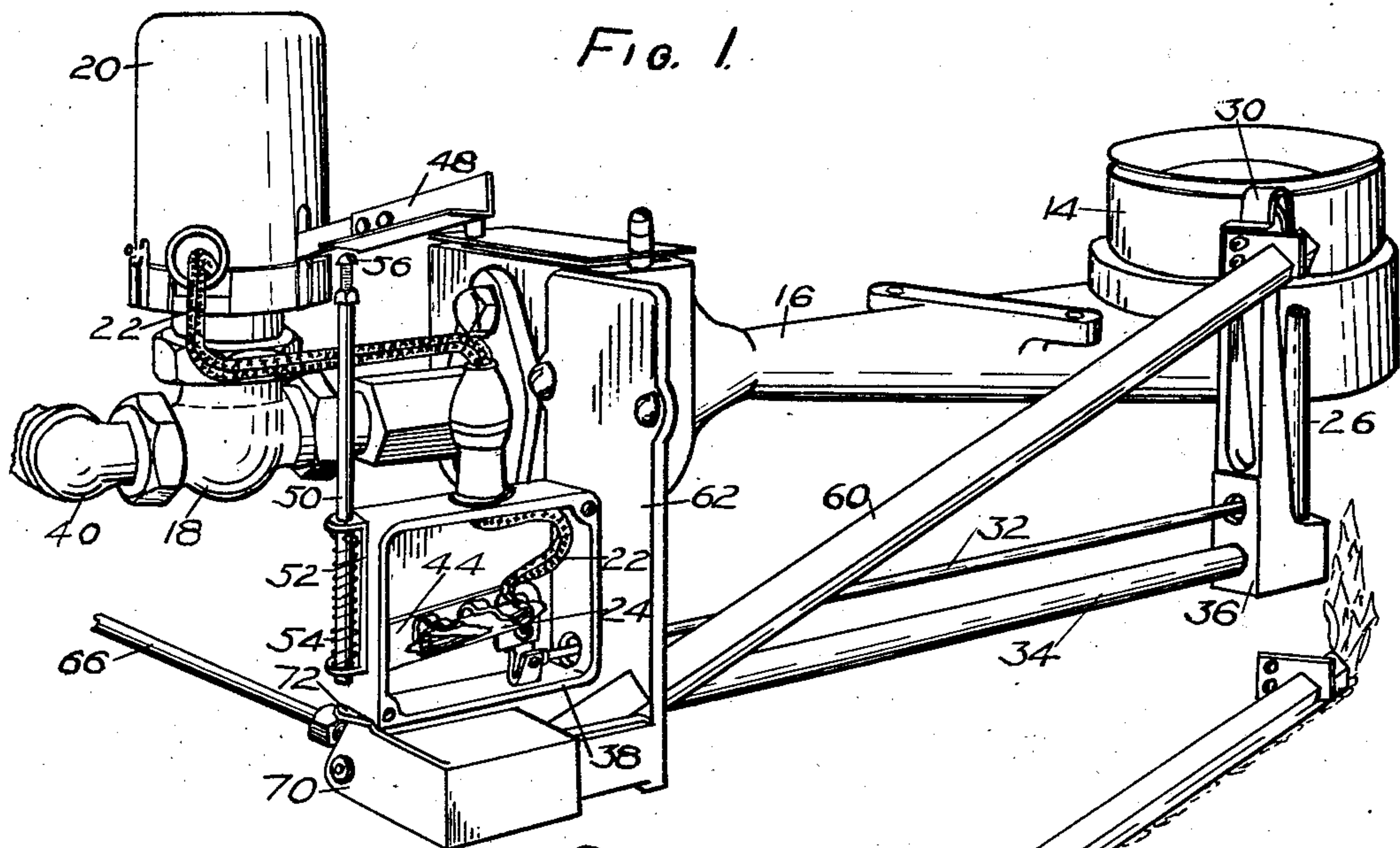
F. A. FURLONG

2,022,033

HEATING SYSTEM

Filed July 24, 1935

3 Sheets-Sheet 1



INVENTOR.
FRANCIS A. FURLONG
BY
McConkey & Booth
ATTORNEY.

Nov. 26, 1935.

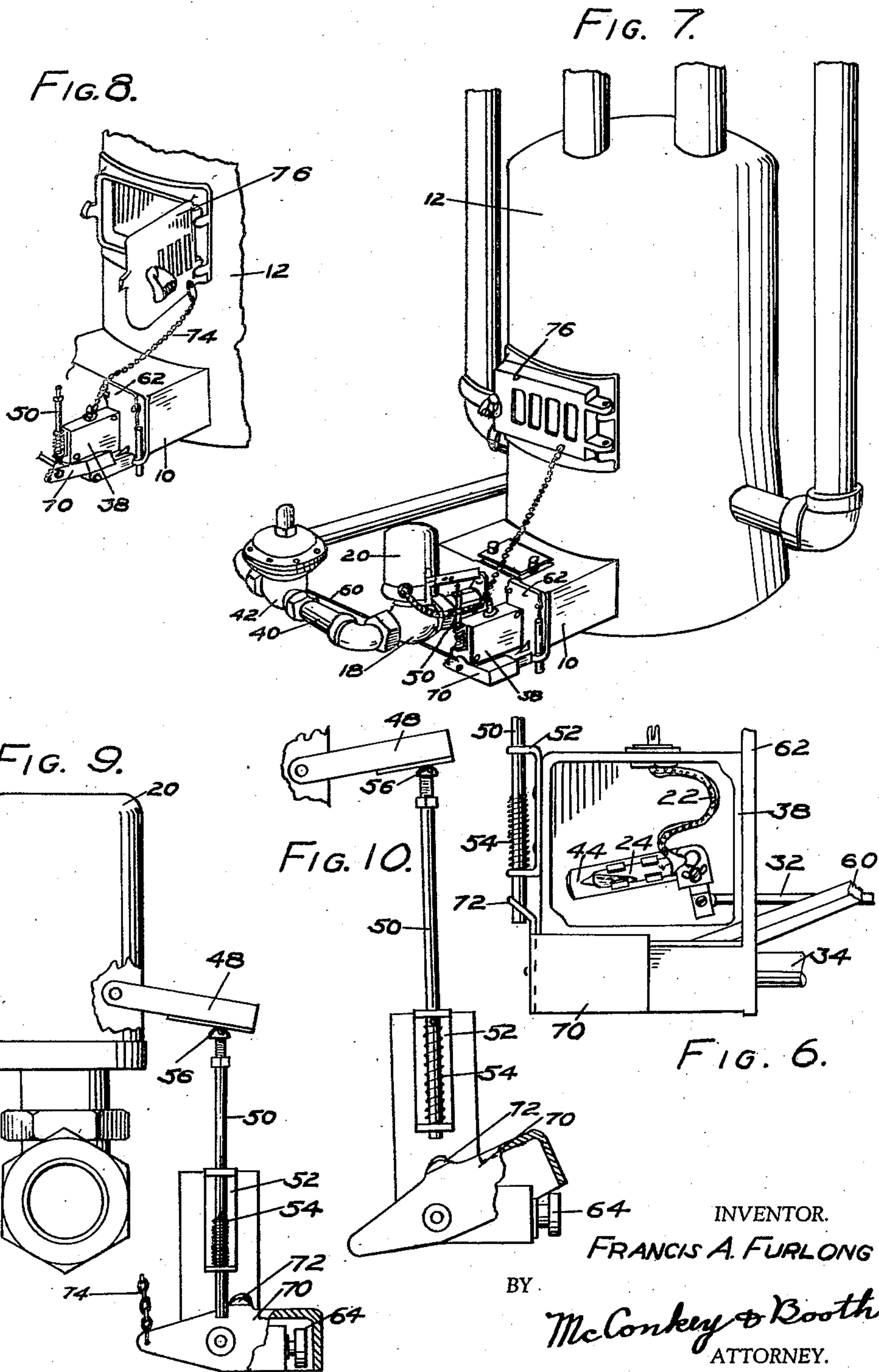
F. A. FURLONG

2,022,033

HEATING SYSTEM

Filed July 24, 1935

3 Sheets-Sheet 2



INVENTOR.

FRANCIS A. FURLONG

BY

McConkey & Booth
ATTORNEY.

Nov. 26, 1935.

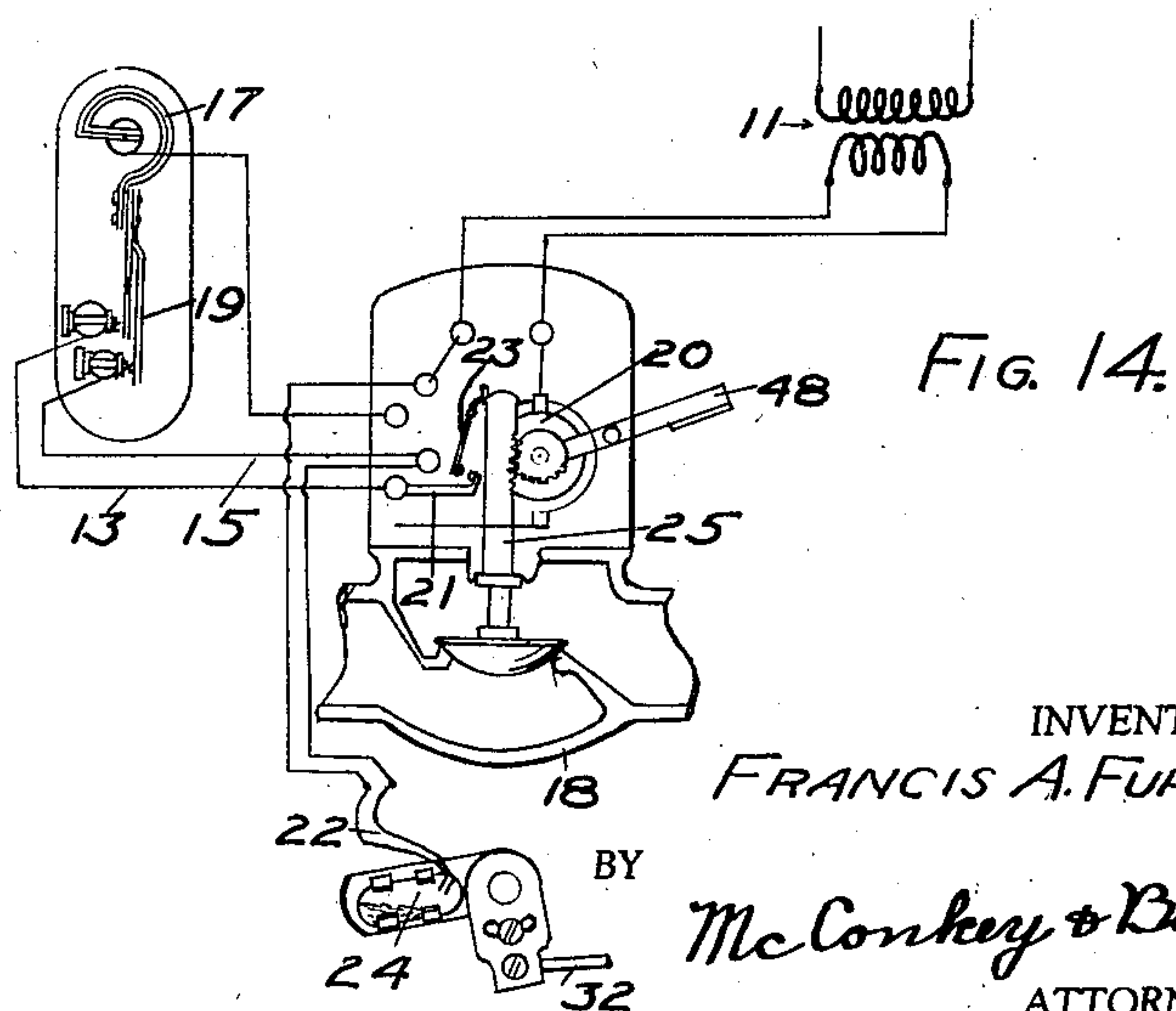
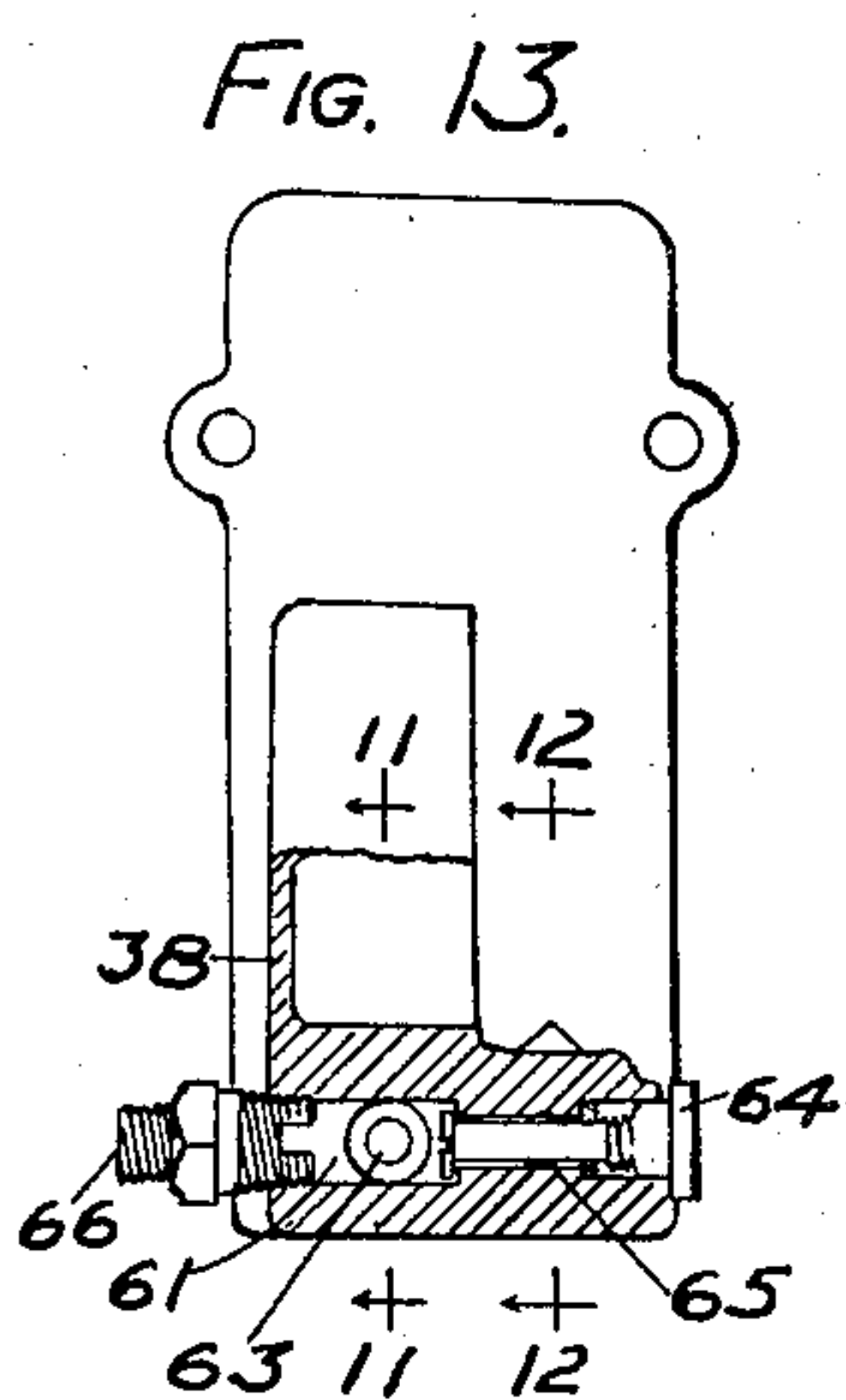
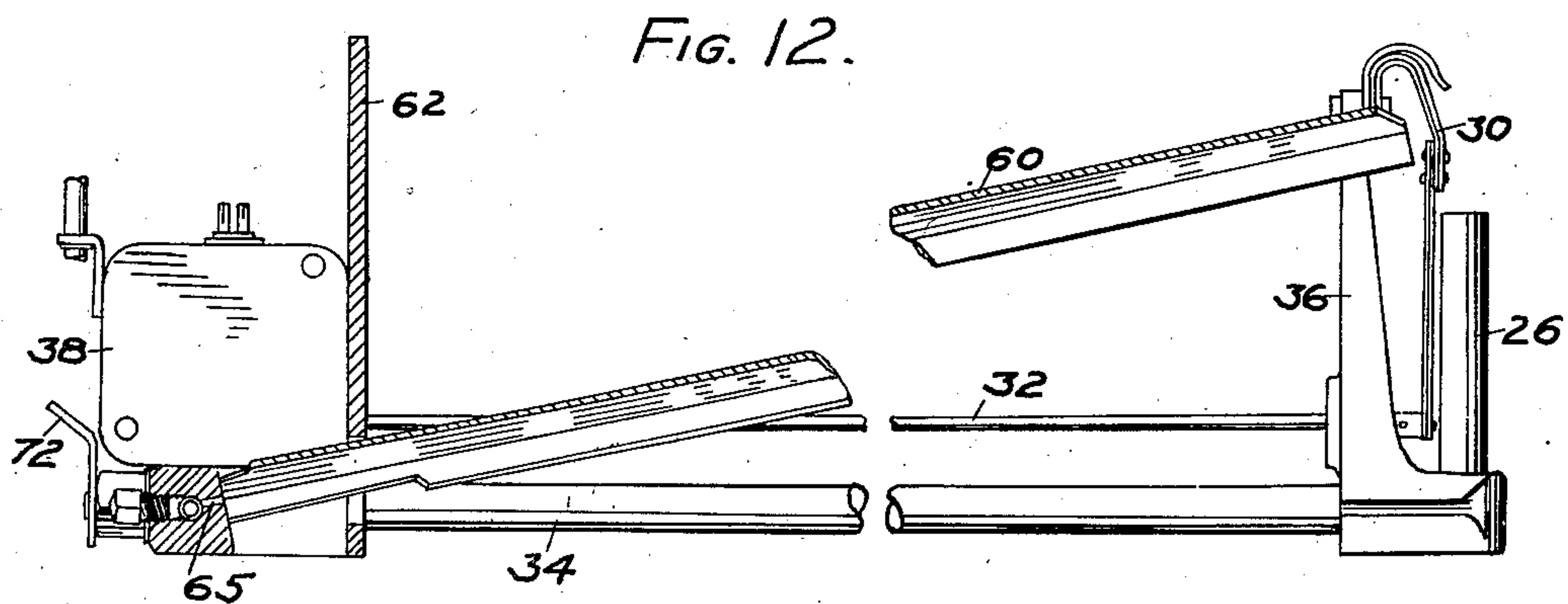
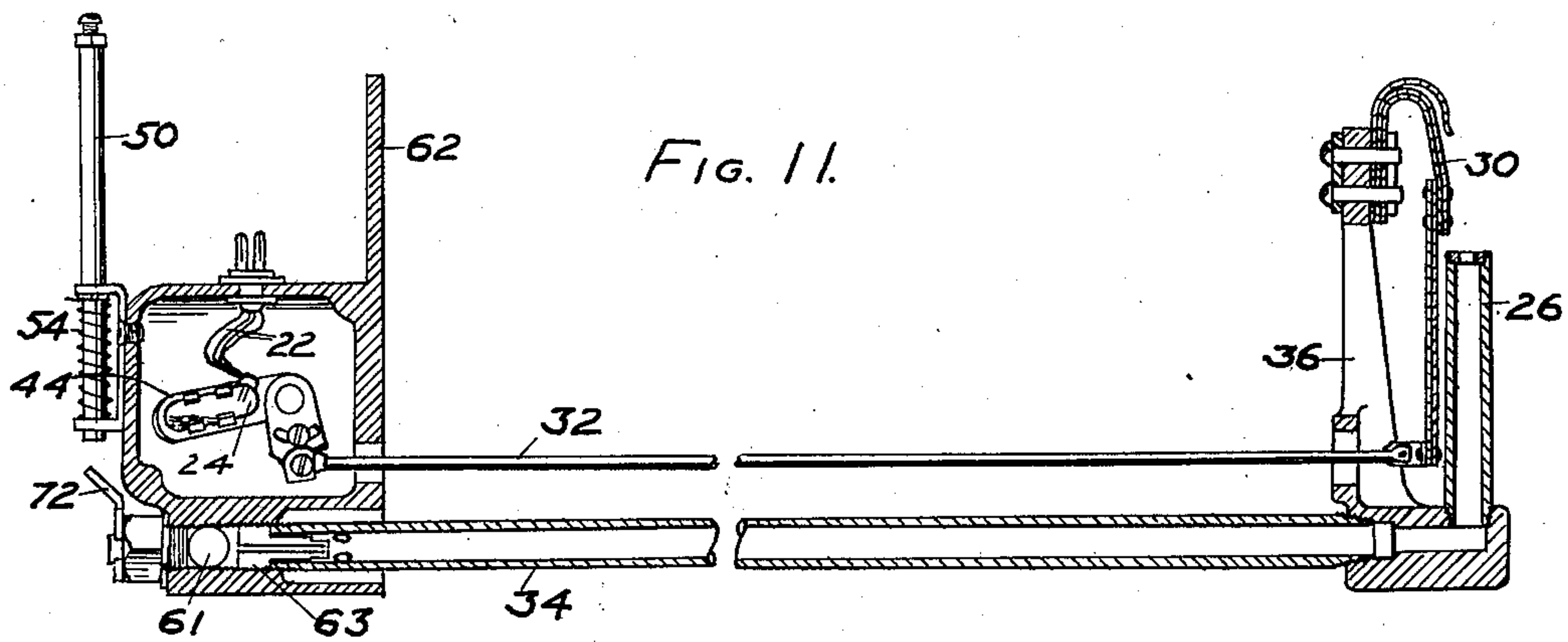
F. A. FURLONG

2,022,033

HEATING SYSTEM

Filed July 24, 1935

3 Sheets-Sheet 3



INVENTOR.
FRANCIS A. FURLONG
BY
McConkey & Booth
ATTORNEY.

UNITED STATES PATENT OFFICE

2,022,033

HEATING SYSTEM

Francis A. Furlong, River Forest, Ill., assignor to
Autogas Corporation, Chicago, Ill., a corpora-
tion of Delaware

Application July 24, 1935, Serial No. 32,844

17 Claims. (Cl. 158—117.1)

This invention relates to devices for igniting the burners of heating systems, and is illustrated as embodied in a conversion gas burner intended for domestic use.

5 An object of the invention is to provide a novel lighter for the burner having means preventing its use unless the main fuel supply is turned off, and the heating system is otherwise ready to have the pilot lighted. This prevents explosions
10 due to lighting the pilot when the furnace is full of gas, on account of the fuel valve sticking when the pilot-controlled safety device attempts to turn off the fuel when the pilot goes out, and in fact I prefer to arrange the lighter so that
15 it cannot be operated even if the fuel valve is opened intentionally.

Preferably, when the pilot is out either because the entire heating plant has been out of use or because the pilot has been blown out accidentally
20 while in use, a switch or other control is automatically set to cause the main fuel valve or its equivalent to be shut off. After the pilot is lighted it heats up and actuates the control so that it permits the fuel valve to be opened, although
25 the actual opening of the valve is not usually controlled by the pilot but by other means such as a thermostat in the room to be heated.

This feature of the present invention also has to do with the novel construction of such a lighter
30 for conveniently relighting the pilot or its equivalent under these conditions, and to its arrangement so that it cannot be operated unless the fuel valve is shut off. If desired, it may also be arranged so that the lighter cannot be operated
35 unless the door of the furnace is open, to insure sufficient draft through the furnace to carry off any explosive mixture that may have accumulated therein.

Preferably the lighter uses the same gas or
40 other fuel as the pilot and the main furnace burner, the gas being shown as admitted at the lower end of an inclined novel lighter tube which is open along its bottom to admit air, and which terminates at a point where a flame issuing there-
45 from will ignite the pilot. The lower end of the lighter is shown in a conveniently accessible position outside the furnace, being provided with a manually operated valve which controls the admission of fuel to the lighter tube.

50 In the illustrated embodiment of the invention, access to this valve is controlled by a guard or safety device which cannot be removed unless the main fuel valve is shut. For example, the main fuel valve may have a part such as a verti-
55 cal plunger which is shifted downwardly by the

opening of the valve and which then extends into the path of movement of the guard so that the latter cannot be opened to give access to the lighter valve.

As pointed out above, the guard may if desired
5 also be connected to the door of the furnace so that it is positively held over the lighter valve unless the furnace door is open.

The above and other objects and features of the invention, including various novel combina-
10 tions of parts and desirable particular constructions, and especially certain advantageous constructions and arrangements of the parts of the lighter and its guard and the means for control-
15 ling the guard, will be apparent from the following description of the illustrative embodiment shown in the accompanying drawings, in which:

Figure 1 is a perspective view of the main burner, the pilot, the main fuel valve and its motor, the pilot-controlled switch for the motor,
20 and the novel lighter;

Figure 2 is a corresponding view of the lighter as it is being used to ignite the pilot, and with the guard raised;

Figure 3 is a perspective view of the upper end
25 of the lighter tube, showing the opening along the bottom to admit air;

Figure 4 is a side elevation of the pilot-controlled switch for the main fuel valve actuating means, with one side removed to show the switch
30 in side elevation;

Figures 5 and 6 are views like Figure 4 but with the switch in different positions;

Figure 7 is a perspective view of the heating plant, showing the guard held closed to prevent
35 lighting the pilot when the furnace door is closed;

Figure 8 is a partial perspective view corresponding to part of Figure 7, but showing how the opening of the door permits the guard to
40 be raised;

Figure 9 is an end elevation of the main fuel valve motor and the interlocking plunger and the lighter guard, looking from the left in Figure 1;

Figure 10 is a similar view, with most of the motor omitted, and showing the raising of the in-
45 terlocking plunger to release the guard when the fuel valve is closed;

Figure 11 is a sectional view of the lighter taken substantially on the line 11—11 of Fig-
50 ure 13;

Figure 12 is a view similar to Figure 11 taken substantially on the line 12—12 of Figure 13;

Figure 13 is a view from the left of Figures 11 and 12 with parts in section; and
55

Figure 14 is a diagrammatic view illustrating the electrical control circuit.

In the drawings my invention is shown embodied in a novel lighter for the pilot of a conversion burner 10 arranged in a furnace or other heating plant 12, as described in my prior application No. 679,521, filed July 8, 1933.

As more fully described in said application No. 679,521, the conversion burner in the form illustrated comprises a rectangular outer box supporting a ceramic radiant structure (not herein shown) heated by a main burner 14 to which a mixture of fuel and air is supplied through a Venturi tube or the like 16. While the present invention is applicable to lighters for other fuels, the furnace herein illustrated uses gas supplied to the Venturi tube 16 through a main fuel valve 18 arranged to be opened and closed by means such as an electric motor 20 controlled by electric connections 22.

The connections 22 form part of a control circuit fully described in my said prior application, and which includes a mercury safety switch 24 or its equivalent. The switch 24 opens the circuit automatically if the pilot goes out. The illustrated pilot includes a pilot burner 26 arranged in any desired manner to have its flame ignite the main burner 14.

Arranged to be controlled by the presence or absence of a flame on the pilot burner 26 is a loop-shaped bimetallic thermostat 30 pivotally connected at its lower end as described in said prior application to an actuating rod or the like 32. Pilot burner 26 may be supplied with fuel through a pipe 34 which also serves as a rigid connection between a head 36 carrying the thermostat 30 and a safety switch or other control box 38.

The pipe 34 connects to the main fuel line 40 between the usual pressure-regulating valve 42 and the main fuel valve 18, or ahead of the pressure-regulating valve if desired, so that the fuel for the pilot is not controlled by valve 18.

The thermostatically-actuated rod 32 is connected to a pivoted support or lever 44 carrying the mercury switch 24, and when the pilot is out it tilts the switch to the open position shown in Figure 4.

When the pilot is burning, the thermostat heats up and tilts the switch to the closed position of Figure 5.

Figure 14 illustrates the control circuit which controls operation of valve 18 and consequently the main burner. As shown one contact of the switch 24 is connected to one side of a transformer 11, the other side of which is connected to one side of the motor 20. The other side of motor 20 is connected through a lead 13 with the high contact of a double contact room thermostat, the low contact of which is connected through a lead 15 with the other of switch 24.

The room thermostat is constituted by a bimetal strip 17 rigidly fastened at one end and whose free end carries a second strip adapted to engage the high contact. A spring member 19 is secured to the strip 17 and is adapted to engage the low contact of the thermostat. Strips 17 and 19 are so connected that strip 19 will engage the low contact at a lower temperature than that at which strip 17 engages the high contact.

A fixed contact 21 is connected to the lead 13 in a position to be engaged by a pivotally mounted contact 23. The bimetal strip 17 is connected to contact 23 which is so positioned that it is adapted to be moved into engagement with contact 21

by upward movement of the stem 25 of valve 18. Thus contacts 21 and 23 are closed when valve 18 is open.

With the pilot burning and switch 24 closed, when the room temperature drops sufficiently to cause strip 17 to move into engagement with the high contact a circuit through the motor 20 will be completed from transformer 11 through switch 24, lead 15, strip 19, strip 17, lead 13, motor 20 and back to the transformer. At this time valve 18 will be opened admitting gas to the main burner.

As the room temperature rises strip 17 will deflect and move away from the high contact but strip 19 will remain in engagement with the low contact. In this position a circuit will be completed through the motor from the transformer through switch 24, lead 15, strips 19 and 17, contacts 23 and 21, lead 13 and through the motor back to the transformer. Thus the valve 18 will remain open until the room temperature rises sufficiently so that the strip 17 will move strip 19 away from the low contact when the circuit through the motor will be interrupted and the valve will close.

It will be apparent from an inspection of the circuit that unless switch 24 is closed motor 20 can never be energized to open the valve. Thus it is assured that unless the pilot is burning and switch 24 closed, no gas will be admitted to the main burner.

The motor 20 can normally (with the safety switch 24 in the position of Figure 5) be actuated to open valve 18 by depressing a manual switch lever 48, which is also depressed automatically by the automatic opening of the valve. With the valve open, the lever 48 is in the position of Figure 9; with the valve closed the lever 48 is in the position of Figure 10.

Lever 48 is arranged to engage and depress a safety plunger 50 guided vertically in a support 52 on the front of the switch box 38 and urged upwardly by means such as a spring 54. Plunger 50 may be made adjustable by providing a set-screw 56 in its upper end.

In order to facilitate lighting the pilot burner 26, a lighter tube 60 is mounted at one end on the head 36 and at the other end on a support 62 which carries the switch box 38 and which forms part of the end of the burner box 10 outside the furnace 12. The lighter tube is inclined upwardly and terminates adjacent and above the pilot burner 26, so that a flame issuing from the upper end of the lighter will ignite the pilot burner.

The lighter tube receives its fuel at its forward end under the control of a push-button valve 64 from the pipe 66 which also feeds the pilot burner pipe 34, and receives the air necessary for combustion of the fuel from an opening 68 along its bottom (Figure 3). As shown in Figures 11, 12, and 13, the pipe 66 discharges into a bore 61 in the lower part of box 38. A nozzle 63 communicates with bore 61 and pipe 34 to supply gas thereto and to the pilot. A small passage 65 leads off from bore 61 and opens into the lighter tube 60 to supply gas thereto, admission of gas to this passage being under the control of valve 64 as will be clear from Figure 14. With the valve 64 opened and a match held below the lower end of the opening 68, the mixture within the tube is ignited, the flame traveling up the tube (Figure 2) and igniting the pilot burner inside the furnace.

An important feature of the present invention relates to preventing the inadvertent opening of the valve 64 when the main fuel valve 18 is open,

thereby preventing the lighting of the pilot unless the main fuel supply is turned off. The means illustrated for this purpose includes a pivoted guard 70 which normally covers the pushbutton 64 and which must be lifted in order to operate the lighter. The guard 70 is shown provided with a projection 72 which engages the plunger 50 if the latter is depressed by the opening of the main fuel valve (Figure 5). If the main fuel valve is closed (Figure 4) the plunger 50 is out of the path of movement of the projection 72.

If desired, and as an additional safety measure, the guard 70 may be connected by means such as a chain 74 to the door 76 of the furnace or heating plant 12, as shown in Figures 7 and 8, so that the guard cannot be raised unless the door is open, thereby insuring sufficient draft to clear away or dilute to a safe condition any accumulated explosive mixture of gas and air.

Figure 4 shows how the opening of the main fuel valve is prevented when the pilot is out; and Figure 5 shows how (whether the pilot is lighted or not) the lighter cannot be actuated unless the main fuel valve is closed. Figure 6 shows that the various devices cooperate to prevent damage even when the pilot has just gone out, opening the switch 24, and the motor 20 has not yet closed the main valve, or when because of an accident or breakage of some kind the valve does not close as it should when the pilot has gone out.

While one illustrative embodiment has been described in detail, it is not my intention to limit the scope of the invention to that particular embodiment or otherwise than by the terms of the appended claims. The present application is a partial continuation of my application No. 515,375, filed February 12, 1931, and of my application No. 695,248, filed October 26, 1933.

I claim:

1. A heating unit or the like comprising a main burner having a fuel-supply control device, a pilot burner adjacent the main burner, means responsive to the flame of the pilot burner to actuate the fuel-supply control device to shut off the fuel supply to the main burner when the pilot burner is extinguished, a door affording access to the interior of the heating unit, a lighter for the pilot burner, control means for the lighter, a guard controlling effective access to the control means, means operable by the fuel supply control device for preventing movement of the guard to give access to the control means when the fuel-supply control device is in open position, and means preventing movement of the guard to give access to the lighter and connected to be controlled by the position of said door.

2. A heating unit or the like comprising a main burner having a fuel-supply control device, a pilot burner adjacent the main burner, means responsive to the flame of the pilot burner to actuate the fuel-supply control device, to shut off the fuel supply to the main burner when the pilot burner is extinguished, a lighter for the pilot burner, control means for the lighter, a guard controlling effective access to the control means, and means connected to the fuel supply control device for preventing movement of the guard to give access to the lighter when the fuel-supply control device is in open position.

3. A heating unit or the like comprising a main burner having a fuel-supply control device, a pilot burner adjacent the main burner, means responsive to the flame of the pilot burner to actuate the fuel-supply control device to shut off

the fuel supply to the main burner when the pilot burner is extinguished, a lighter for the pilot burner, control means for the lighter and means connected to the fuel supply control device for preventing operation of the control means when the fuel-supply control device is turned on.

4. A heater comprising, in combination with a main burner having a fuel control valve and a pilot burner therefor having means including thermal means responsive to the temperature of the pilot and operative to control the position of said valve, and a lighter for the pilot burner having means operatively connected to the valve for preventing its operation when the valve is turned on.

5. A heater comprising, in combination with a main and a pilot burner arranged inside said heater, a door in said heater affording access to the space containing said burners, a lighter for the pilot burner, control means for the lighter, means for preventing operation of the control means, and a connection between said preventing means and the door whereby the preventing means is controlled by the position of said door.

6. A lighter comprising an upwardly-inclined tube having a fuel supply means and a control valve therefor at its lower end and having an air intake opening along its lower side substantially throughout its length, and a pilot burner assembly comprising a burner head and a control valve support having a rigid connection therebetween and which support the opposite ends of said tube, one end of said tube being supported in igniting relationship to the pilot burner.

7. A lighter comprising an upwardly-inclined tube having a fuel supply means and a control valve therefore at its lower end and having an air intake opening along its lower side substantially throughout its length, and a pilot burner assembly comprising a burner head, a support supporting the upper end of said tube in igniting relationship to the burner head and a control valve support supporting the lower end thereof, said supports having a rigid connection therebetween.

8. A heater comprising, in combination with a main burner having a fuel control valve and a pilot burner therefor, a lighter for the pilot burner having a control valve, and means operatively connected to the main burner valve for preventing access to the control valve of the lighter when the main burner control valve is turned on.

9. A heater comprising, in combination with a main burner having a fuel control valve and a pilot burner therefor, a lighter for the pilot burner having a control valve, and a pivoted guard operatively connected to the main burner valve for preventing access to the control valve of the lighter when the main burner control valve is turned on.

10. A heater comprising, in combination with a main burner having a fuel control valve and a pilot burner therefor, a lighter for the pilot burner having a control valve, a guard normally preventing access to the control valve of the lighter and movable to permit such access, and means operatively connected with the main burner control valve and guard for preventing movement of the guard for that purpose when the main burner control valve is turned on.

11. A heater comprising, in combination with a main burner having a fuel control valve and a pilot burner therefor, a lighter for the pilot burner having a control valve, and an operating motor

for the fuel control valve having a pivoted arm actuated by said motor and having associated therewith means including a guard preventing access to the lighter control valve when said fuel control valve is open.

12. A heater comprising, in combination with a main burner having a fuel control valve and a pilot burner therefor, a lighter for the pilot burner having control means, and an operating motor for the fuel control valve having a pivoted arm actuated by said motor and having operatively associated therewith means preventing the use of the lighter control means when said fuel control valve is open.

13. A heating plant comprising, in combination with a furnace having a side opening, a conversion burner assembly in the form of an elongated boxlike structure extending through said opening and including within said furnace a main burner and a constantly burning pilot burner therefor, and means for igniting the pilot burner including a lighter tube supported by the conversion burner assembly and having a normally closed valve mounted outside of the furnace, said lighter tube extending to a point inside of said furnace.

14. A heating plant comprising, in combination with a furnace having a side opening, a conversion burner in the form of an elongated boxlike assembly extending through said opening and having within the furnace a main burner and a pilot burner therefor, a main fuel valve for the main burner carried by said assembly outside the furnace, a lighter for the pilot burner carried by said assembly and operable from outside the furnace, control means for the lighter mounted on said assembly outside of the furnace and means operably connected to the main fuel valve for preventing operation of the lighter control means when the main fuel valve is turned on.

15. A heating plant comprising, in combination with a furnace having a side opening, a conver-

sion burner in the form of an elongated boxlike assembly extending through said opening and having within the furnace a main burner and a pilot burner therefor, means for turning on and off the fuel supply for the main burner, auxiliary means including means operable in response to the pilot flame for turning off the fuel supply means when the pilot goes out, a lighter for the pilot burner carried by said assembly and operable from outside the furnace, control means for the lighter mounted on said assembly outside of the furnace, and means operably connected to the means for turning on and off the fuel supply for the main burner for preventing operation of the lighter control means when the fuel supply means for the main burner is turned on.

16. A conversion burner comprising an elongated box-like casing, a main burner and a pilot burner therefor and means for igniting said pilot burner all arranged adjacent each other at the rear end of said casing, control devices for said main burner and said igniting means all arranged adjacent the front of said casing, and connections from the control devices respectively to the main burner and the igniting means all arranged inside said casing.

17. A conversion burner comprising an elongated box-like casing, a main burner and a pilot burner therefor and means for igniting said pilot burner and a thermostatic device operatively associated with the pilot burner all arranged adjacent each other at the rear end of said casing, control devices for said main burner and said igniting means and an auxiliary control device for the main burner all arranged adjacent the front of said casing, and connections from the control devices respectively to the main burner and the igniting means and from the auxiliary control device to said thermostatic device all arranged inside said casing.

FRANCIS A. FURLONG.