May 14, 1929. J. MATCOVICH 1,713,442

SAFETY DEVICE FOR HEATING CHAMBERS

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Fig 1

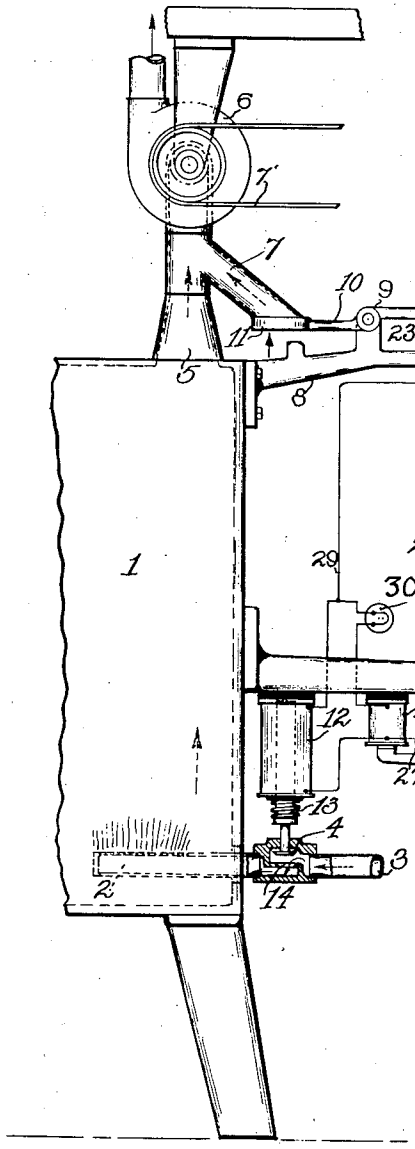
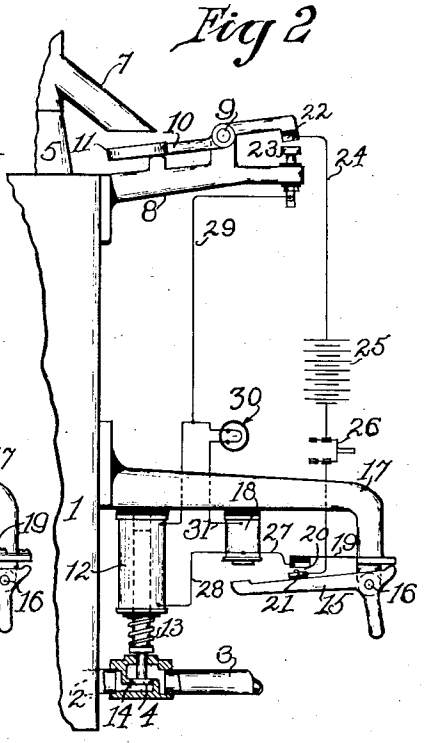


Fig 2



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UNITED STATES PATENT OFFICE.

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SAFETY DEVICE FOR HEATING CHAMBERS.

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This invention relates to a safety device and more particularly to one for controlling the supplying of liquid or gaseous fuel to chambers such as driers, ovens and the like, only at such times as a means for exhausting the fumes from the liquid or gaseous fuel from the chamber is operating, whereby collection of fumes or unburned gases within the chamber is precluded and explosion from this cause is reduced to a minimum, if not avoided.

The invention in its broadest embodiment consists in cooperatively associating with the chamber, such as an oven, a drier, casing, or the like, having a fuel supply and an exhaust outlet to the atmosphere, of a means for precluding the admission of liquid or gaseous fuel to the chamber until such time as the exhaust means is operating and to automatically preclude or shut off the admission of fuel, if, for any reason, the exhaust means should become inoperative.

It also consists in the arrangement of parts in such manner that the creation of a suction within the chamber positions the parts in operative relation, whereby the fuel feed controlling valve is adapted for movement to open position where it is held until such time as the parts are manually actuated to permit its closing or the chamber exhaust is interrupted.

The invention has for its principal object to provide in connection with a closed chamber having positioned therein a liquid or gaseous fuel burner, of means which will prevent the accumulation of explosive gases or products of combustion within the chamber in such quantities as are liable to explode; to provide a safety means which is incapable of manual operation until such time as the exhaust means is operating.

Another object is to provide an electrically controlled mechanism for accomplishing the above results and wherein the operation of the chamber exhaust means maintains the circuit in a position to be closed until such time as the exhaust means ceases operation.

To more fully comprehend the invention reference is directed to the accompanying drawings, forming part of this application and wherein—

Fig. 1 is a diagrammatic view in elevation of one embodiment of my invention, illustrating the chamber exhaust means in operation and the gas valve open.

Fig. 2 is a similar view illustrating the gas valve closed and the circuit broken at the manual contact and also at the point controlled by the chamber exhaust means.

Referring to the drawings, wherein like characters of reference designate corresponding parts—1 indicates a chamber, preferably an oven or drying chamber, in the present embodiment the same is adapted for use in the drying of can ends although it is to be understood that the invention is applicable to ovens, driers or heating chambers generally.

Within the chamber is positioned a burner 2, illustrated as receiving a supply of gaseous fuel from a pipe 3, the fuel flow being controlled by a valve 4. The chamber 1 is further provided with an exhaust 5 within which is positioned a suction fan 6 conventionally illustrated, and the inlet of the fan casing is provided with a lateral branch pipe 7. The fan 6 is adapted for operation from any suitable source of power, not shown, its rotor being illustrated as driven by a belt 7'.

Pivotally mounted on an arm 8 at 9 is a lever 10, one end of which is provided with a disk 11 lying beneath and adapted for closing the inlet end of the lateral branch pipe 7. The lever 10 is so balanced that the suction of the fan 6 at the inlet end of the lateral branch pipe 7 is sufficient to raise the disk 11 from its position in Fig. 2 to its position in Fig. 1, and maintain it so disposed until such time as the fan ceases to operate.

The valve 4 is opened and closed by the passage of current through a solenoid 12 associated with its stem, and a coiled spring 13 maintains the valve in contact with its seat 14 when the current flow through solenoid 12 is interrupted. A lever 15 is fulcrumed at 16 to an arm 17 and its end is adapted to cooperate with an electromagnet 18, illustrated as being mounted on the arm 17. The lever is provided with a handle 16' to facilitate its manual movement to close position in contact with magnet 18. The energizing of the magnet is sufficient to retain the lever in closed position, Fig. 1, until the lever is

either manually moved to open position or the lever moves by gravity to open position, Fig. 2, due to the interruption of the circuit energizing the magnet 18.

Carried by a spring arm 19 extended from the arm 17 is a contact 20 with which is adapted to engage a contact 21 carried by the lever 15. A contact 22 is carried by the end of the lever 10 and is adapted to engage a contact 23 on the end of arm 8, the contacts being insulated from their respective supports and the contact 23 being illustrated as adjustably mounted in its support.

The electromagnet, solenoid and contacts are included in and form part of an electric circuit, the circuit including a lead 24 connecting contacts 22 and 21, and in said lead is located a power source 25 which if desired may be of the usual 110 voltage, and a main control switch 26. The contact 20 connects with the electromagnet 18 through a lead 27 and said electromagnet 18 and solenoid 12 are directly connected by a lead 28.

From the solenoid 12 extends a lead 29 connected with the contact 23 and branching from the lead 29 through a resistance 30, illustrated as a lamp, preferably of a 50 watt capacity, is a lead 31 connecting with the electromagnet 18.

The lamp 30 affords a signal indicating whether the circuit is open or closed and compensates for the smaller capacity of the electromagnet 18 when used in a circuit of higher voltage than a circuit ordinarily used with an electromagnet of that type.

With levers 10 and 15 in their position, as in Fig. 1, the circuit to the solenoid 12 to maintain the valve 4 unseated and through the electromagnet 18 to retain the lever in closed position, may be traced from power source 25 through switch 26, contacts 20 and 21, lead 27, electromagnet 18, lead 31, resistance lamp 30 and to the power source through lead 29, contacts 22 and 23 and lead 24.

The current passing through electromagnet 18 will be sufficiently reduced by the resistance lamp 30 so as not to injure the magnet 18, and at the same time will be of a sufficient voltage to energize the magnet to retain the end of lever 15 in contact therewith. The glowing of the resistance lamp 30 indicates the completion of the circuit. The full voltage of the power source 25 also may be traced from the electromagnet 18 to solenoid 12 and therefrom to the lead 29 at a point beyond the resistance lamp 30 from which point the circuit follows the contacts 22 and 23 and lead 24 to power source 25. Should for any reason the circuit be broken between contacts 20 and 21 by the manual operation of the lever 15 or between contacts 22 and 23 by failure of the exhaust fan 6, the solenoid 12 will become de-energized and the spring 13 will seat the valve 4, as in Fig. 2, shutting off the gas supply to the burner.

From the above arrangement of parts, it will be observed that should an operator desire to fire the burner 2 prior to the operation of the exhaust fan 6, the attempt would fail due to the fact that a manual movement of the lever 15 to circuit closing position would fail to complete the circuit as it would remain open between contacts 22 and 23. The operation of the exhaust fan 6 is necessary prior to the firing of the burner 2, as the action of the exhauster closes the circuit at contacts 22 and 23 and enables the manual movement of the lever 15 to close contacts 20 and 21 completing the circuit energizing solenoid 12 opening valve 4. The completing of the circuit energizes electromagnet 18 which retains the lever 15 in closed position, Fig. 1, until such time as the circuit is again either automatically broken by the failure of the fan or manually broken by the operation of the lever, when the magnet will be de-energized allowing the lever to fall by gravity to open position, Fig. 2.

Should the operator fail to ignite the gas issuing from the burner 2, no harm will be done, as the escaping gas or fuel will be drawn from the chamber by the exhauster and is precluded from collecting therein in sufficient quantity to cause an explosion should the operator at a subsequent time ignite the gas flow issuing from the burner 2.

I claim:—

1. A safety device for controlling the supplying of fuel to the burner of drying chambers and the like having a mechanical exhauster communicating with its interior; comprising a valve for controlling the supplying of heating medium to the burner, an electric circuit, means therein cooperating with the valve for maintaining the same open on the completion of the circuit, means for closing the valve on the breaking of the circuit, and means located at a plurality of points within the circuit for making and breaking the same, the operation of one of said means being controlled by the operation of said mechanical exhauster.

2. A safety device for controlling the supplying of fuel to the burner of a drying chamber or the like having a mechanical exhauster communicating with its interior; comprising a valve for controlling the supplying of heating medium to the burner, an electric circuit, means therein and cooperating with the valve for opening the same, means for closing the valve, and a plurality of means within the circuit for making and breaking the same, one of said means being automatically held in circuit closing position by the pressure created by said exhauster during its operation, and another

of said means adapted for manual operation to circuit closing position.

3. A safety device for controlling the supplying of fuel to the burner of a drying chamber or the like having a mechanical exhauster communicating with its interior and provided with a branch inlet communicating with the atmosphere; comprising a valve for controlling the supplying of heating medium to the burner, an electric circuit, means within the circuit and cooperating with the valve for opening the same, means for closing the valve, and a plurality of means for making and breaking the circuit, one comprising a movable closure for the branch inlet of said mechanical exhauster and adapted for automatic movement to close said inlet on the operation of said mechanical exhauster, and a circuit closing contact member associated with said closure.

4. A safety device for controlling the supplying of fuel to the burner of a drying chamber or the like having a mechanical exhauster communicating with its interior and provided with a branch inlet communicating with the atmosphere; comprising a valve for controlling the supplying of heating medium to the burner, an electric circuit, means within the circuit and cooperating with the valve for opening the same, means for closing the valve, and a plurality of means for making and breaking the circuit, one comprising a pivoted lever provided with a disk adapted for movement by the suction created by the operation of the mechanical exhauster to close said branch inlet, and a circuit closing contact movable into circuit closing position on the operation of said lever by the suction of said mechanical exhauster.

5. A safety device for controlling the supplying of fuel to the heating member of drying chambers and the like having a mechanical exhauster communicating with its interior; comprising a valve for controlling the supplying of heating medium to the heating member, an electric circuit, a pair of movable contact members within said circuit independently operatable for opening and closing the same, a pair of electromagnets within said circuit, one cooperating with the valve for positioning the same to supply heating medium to the heating member when said circuit is closed, and the other cooperating with one of said movable contact members for retaining the same in circuit closing position when the circuit is closed, the other of said movable contact members being movable into and from circuit opening and closing position, dependent on the operation of said mechanical exhauster.

6. In combination with a substantially closed chamber provided with a means for heating the same, a valve for controlling the supply of heating medium to the heating means, and an exhauster communicating with the interior of the chamber, and means operated by atmospheric pressure exterior of said exhauster and combined with the exhauster and valve to operate the latter, the rarefied condition of air within part of said chamber as created by said exhauster cooperating with the atmospheric pressure exterior of the chamber to control the valve controlling means to hold the valve in open position as long as said exhauster continues to operate and to maintain the differences in air pressure.

7. In combination with a substantially closed chamber provided with a means for heating the same, a valve for controlling the supply of heating medium to the heating means, and an exhauster communicating with the interior of the chamber, and means operated by atmospheric pressure exterior of said exhauster and combined with the exhauster and valve to operate the latter, the rarefied condition of air within part of said chamber as created by said exhauster cooperating with the atmospheric pressure exterior of the chamber to control the valve controlling means to hold the valve in open position as long as said exhauster continues to operate and maintain the differences in air pressure, said valve operating means automatically closing the valve upon equalization of the air pressures.

In testimony whereof I have signed my name to this specification.

JOSEPH MATCOVICH.