J. A. DOBLE.

FUEL BURNER CONTROL.

APPLICATION FILED SEPT. 4, 1917.

1,332,615.

Patented Mar. 2, 1920.

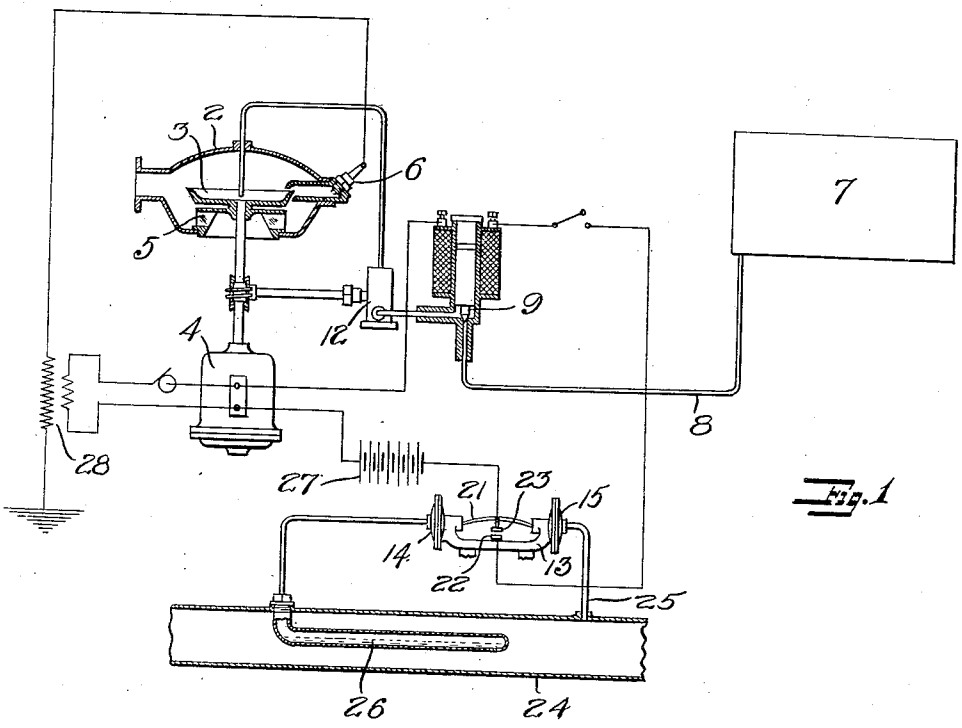


Fig. 1

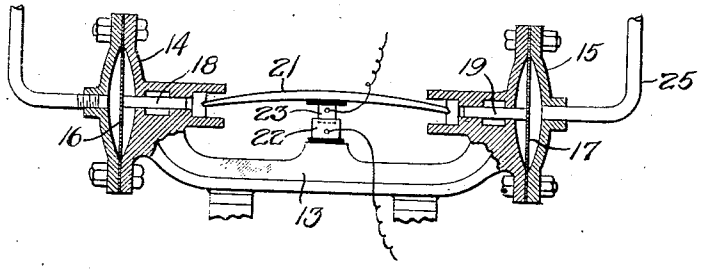


Fig. 2

Witness

J. B. Gardner

INVENTOR

J. A. DOBLE

By White & Post

ATTORNEYS

UNITED STATES PATENT OFFICE.

JOHN A. DOBLE, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO DOBLE LABORATORIES, OF SAN FRANCISCO, CALIFORNIA, A CORPORATION OF CALIFORNIA.

FUEL-BURNER CONTROL.

1,332,615. Specification of Letters Patent. Patented Mar. 2, 1920.

Application filed September 4, 1917. Serial No. 189,617.

To all whom it may concern:

Be it known that I, JOHN A. DOBLE, a citizen of the United States, and a resident of the city and county of San Francisco and State of California, have invented a certain new and useful Fuel-Burner Control, of which the following is a specification.

The invention relates to control systems for fuel burners and particularly to fuel burners used in connection with steam generators or other heat absorbing medium containing apparatus.

An object of the invention is to provide means for controlling the flow of fuel to the burner in accordance with conditions of temperature and pressure within the boiler.

Another object of the invention is to provide an apparatus which operates by variations of boiler temperature or pressure or both to control the operation of the burner.

The invention possesses other advantageous features, some of which, with the foregoing, will be set forth at length in the following description, where I shall outline in full that form of the invention which I have selected for illustration in the drawings accompanying and forming part of the present specification. In said drawings I have shown one specific form of the apparatus of my invention, but it is to be understood that I do not limit myself to such form, since the invention, as expressed in the succeeding claims, may be embodied in a plurality of forms. In the drawings I have shown the invention applied to a rotary burner for liquid fuel, but it is equally well applicable to other types of burners.

Referring to said drawings:

Figure 1 is a diagrammatic representation of the control system embodying my invention.

Fig. 2 is a vertical section through the pressure and temperature operated apparatus.

My invention is applicable to the control of fuel burners used in connection with steam generators, to control the burner in accordance with conditions of temperature and pressure within the generator. In accordance with my invention I provide a unitary structure which is operated by both temperature and pressure conditions to control the operation of the burner. Liquid fuel burners are often provided with electric motors which supply the necessary air to complete the combustion of the fuel and the apparatus of my invention operates not only to control the flow of fuel to the burner but to open and close the motor circuit in accordance with variations in boiler conditions. The invention is particudarly applicable to fuel burners used in connection with steam generators on steam-propelled vehicles, such as automobiles or motor trucks, but can be advantageously used in other environments where automatic control of boiler conditions is desirable.

The burner shown comprises a casing 2 in which is arranged a rotatable disk or cup 3 which is secured to the shaft of the motor 4. Secured to the shaft or to the under side of the cup is the blower 5, which induces the necessary air for combustion. A spark plug 6 arranged in the casing furnishes the necessary spark for igniting the combustible mixture. Fuel is fed to the cup 3 from the supply tank 7, through the conduit 8, in which is arranged a solenoid-operated valve 9 and a measuring pump 12 which is geared to the motor shaft.

Mounted on some suitable structure adjacent the boiler, is a frame 13, on the opposite ends of which are arranged casings 14—15 each containing a diaphragm 16—17. Bearing against the diaphragm 16 and extending from the casing 14 is a rod or piston 18 and bearing against the diaphragm 17 and extending from the casing 15 is a rod or piston 19. These rods are alined and are movable toward and away from each other. Engaging the projecting ends of the rods and bearing against the rods is a resilient flexible element 21, the flexure or curvature of which varies with the longitudinal movement of the rods. Arranged at the center of the frame is an electrical contact 22 and arranged at the center of the element 21 and in position to contact with the contact 22 is a second contact 23. These contacts are insulated respectively from the frame and the element, so that the electric circuit is closed only when the contacts are in engagement, and the bending of the element due to a movement of either or both rods opens the circuit. The chamber behind the diaphragm in casing 15 is connected to the steam header 24 of the boiler by the conduit 25, so that the static boiler pressure is exerted behind the diaphragm 17 and consequently against the rod 19.

Arranged within the steam header is a sealed tube 26, partly filled with water, so that the pressure within the tube varies with the temperature of the steam in the header. The tube is connected to the chamber behind the diaphragm in casing 14, so that the pressure on the diaphragm 16 and consequently on the rod 18 is proportionate to the temperature of the steam. The rigidity of the element 21 is such that it is flexed sufficiently to open the circuit only when predetermined temperature or pressure conditions obtain in the boiler. The contacts 22 and 23 are preferably sliding contacts, disposed so that a relative movement between them is possible to a limited extent without opening the circuit. The contacts are arranged in circuit with the storage battery 27 or other source of power and with the motor 4 and the valve-operating solenoid 9, so that when the contacts are separated the fuel line is closed and the motor circuit opened. High tension current for ignition is derived from the spark coil 28, the low tension side of which is connected to the motor circuit, so that the ignition is cut off when the contacts are separated.

I claim:

1. The combination with a heat absorbing medium containing apparatus, of a fuel burner associated therewith, an electric motor associated with said burner, a circuit for said motor, separable contacts in said circuit, a flexible element carrying one of said contacts and means actuated by variations in temperature and pressure in said apparatus for varying the flexure of said element.

2. The combination with a heat absorbing medium containing apparatus, of a fuel burner associated therewith, an electric motor associated with said burner, a circuit for said motor, separable contacts in said circuit, a flexible element carrying one of said contacts, movable abutments engaging the opposite ends of said element, and means for subjecting one of said abutments to the pressure in said apparatus and the other abutment to a pressure corresponding to the temperature in said apparatus.

3. The combination with a heat absorbing medium containing apparatus, of a fuel burner associated therewith, an electric motor associated with said burner, a circuit for said motor, separable contacts in said circuit, a flexible element carrying one of said contacts, movable abutments engaging the opposite ends of said element, diaphragms engaging said abutments, and means for subjecting one of the diaphragms to the pressure in said apparatus, and means for subjecting the other diaphragm to a pressure corresponding to the temperature in said apparatus.

4. The combination with a heat absorbing medium containing apparatus, of a fuel burner associated therewith, an electric motor associated with said burner, a circuit for said motor, separable contacts in said circuit, a frame carrying one of said contacts, opposed chambers on said frame, diaphragms in said chambers, one of said chambers being connected to the apparatus so that the pressure therein corresponds to the pressure within the apparatus, the other chamber being connected to the apparatus so that the pressure therein corresponds to the temperature in the apparatus, movable abutments engaging said diaphragms, and a flexible element engaging said abutments and carrying the other of said contacts.

5. The combination with a heat absorbing medium containing apparatus, of a fuel burner associated therewith, a conduit through which fuel is fed to said burner, a valve in said conduit, a solenoid for opening and closing said valve, a circuit for said solenoid and means actuated by variations in temperature and pressure in said apparatus for opening and closing said circuit.

6. The combination with a heat absorbing medium containing apparatus, of a rotary fuel burner associated therewith, an electric motor for driving said burner, a circuit for said motor and a device in said circuit actuated by variations in temperature and pressure in said apparatus for opening and closing the circuit of the motor.

7. The combination with a heat absorbing medium containing apparatus, of an electrical device associated therewith, a circuit for said device, separable contacts in said circuit, a movable element carrying one of said contacts, and means actuated by variations in temperature and pressure within said apparatus for moving said element to open and close the circuit.

In testimony whereof, I have hereunto set my hand at San Francisco, California, this 24th day of August 1917.

JOHN A. DOBLE.

In presence of—
H. G. PROST.