L. DOILLET & P. R. FAURE.

SUPPLYING DEVICE FOR BOILERS WITH LIQUID FUELS.

APPLICATION FILED SEPT. 16, 1909.

1,006,920.

Patented Oct. 24, 1911.

2 SHEETS—SHEET 1.

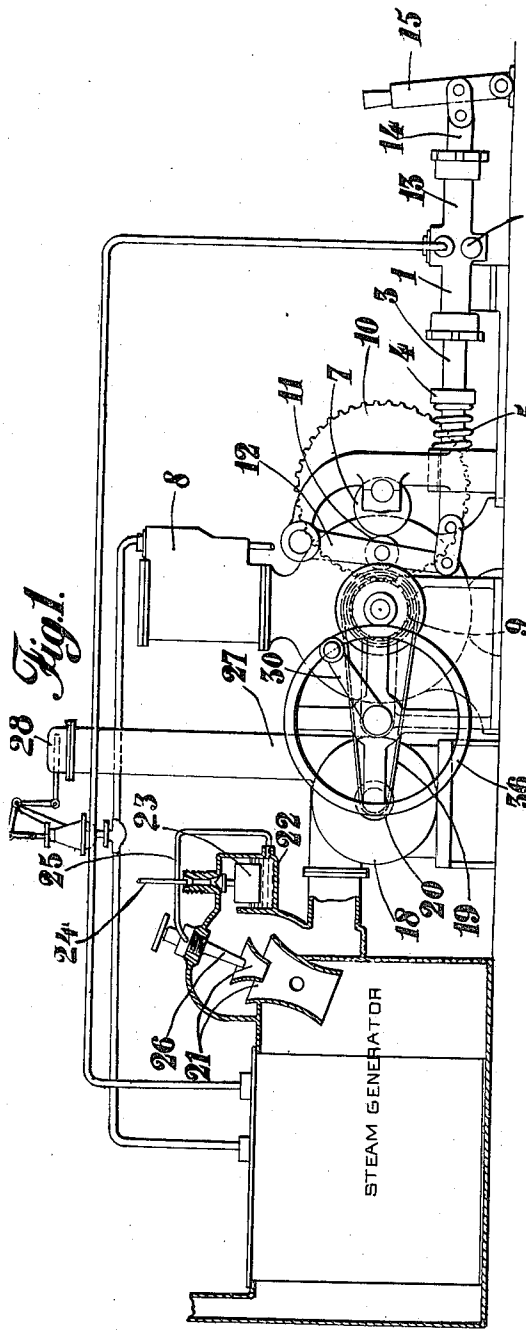

Fig. 1.

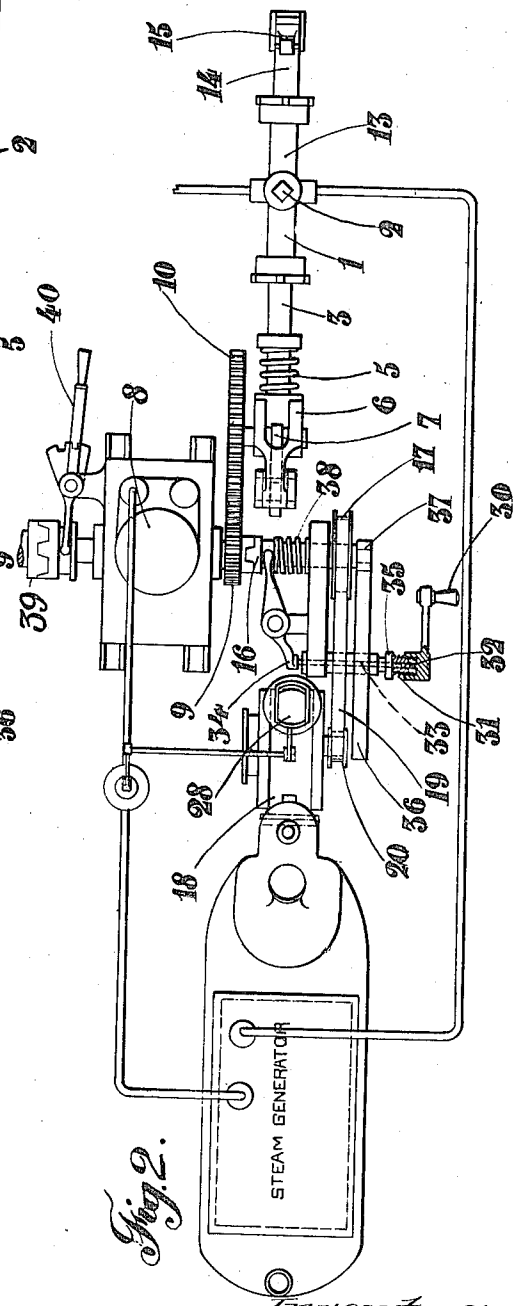

Fig. 2.

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Fig. 4.

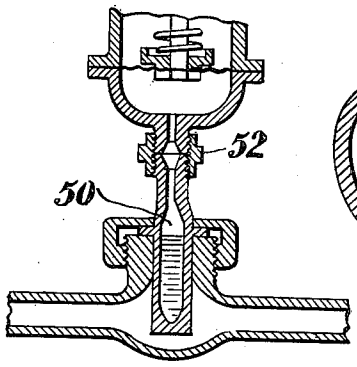


Fig. 3.

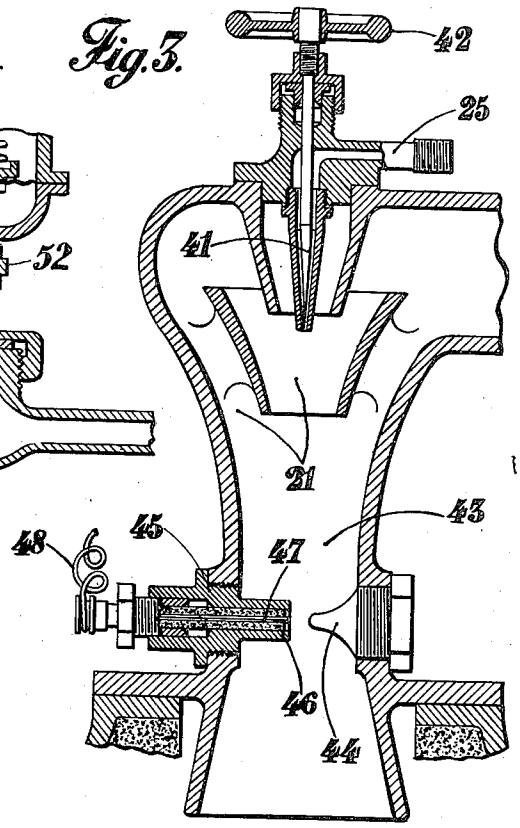


Fig. 5.

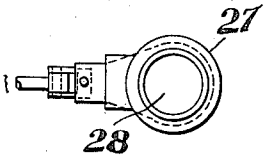
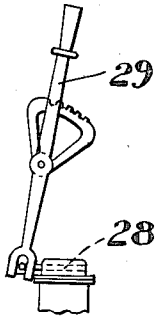


Fig. 6.



Witnesses

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LOUIS DOILLET AND PAUL ROBERT FAURE, OF PARIS, FRANCE.

SUPPLYING DEVICE FOR BOILERS WITH LIQUID FUELS.

1,006,920. Specification of Letters Patent. Patented Oct. 24, 1911.

Application filed September 16, 1909. Serial No. 518,087.

To all whom it may concern:

Be it known that we, LOUIS DOILLET and PAUL ROBERT FAURE, citizens of the French Republic, residing at Paris, Department of the Seine, in France, have invented certain new and useful Improvements in Supplying Devices for Boilers with Liquid Fuels, of which the following is a specification.

This invention relates to improvements in boiler feed and regulating devices and it proposes arrangements which are interposed between the engine supplied with steam from the boiler, and the boiler, to regulate the admission of water to the latter and also to regulate the admission of liquid fuel and air in constant proportions.

The invention is illustrated in the accompanying drawings wherein—

Figure 1 is a view in elevation with parts in section, showing the boiler, the engine and the regulating devices aforesaid; Fig. 2 is a plan view of the same; Fig. 3 is a detail sectional view of the burner into which atomized fuel and air are conducted; Fig. 4 is a detail sectional view illustrating a thermostatically controlled valve by which the degree of air admitted into the burner is determined together with the thermostatic means for controlling the action of said valve; Fig. 5 is a plan view of the valve shown in Fig. 4; and Fig. 6 is a detail view showing a manually operable arrangement for controlling the valve shown in Fig. 4.

Similar characters of reference designate corresponding parts throughout the several views.

The apparatus for supplying water to the boiler includes a pump having a cylinder 1, a valve box 2, and a piston 3. The latter is provided with an adjustable collar 4 against which one end of a spring 5 bears, the other end of the spring bearing against a standard 6. The latter forms the support for a pivotally hung lever 12 and also for a shaft which carries a cam 7 arranged at the side of the lever and engaging a roller 11 provided midway thereof. The lever 12 is connected at its lower end to the piston 3. The engine which is supplied with steam from the boiler is designated by the numeral 8 and drives the shaft which carries the cam 7 through the gears 9 and 10. In normal operation the pressure stroke of the piston 3 is effected by the spring 5 and the suction stroke of said piston is effected by the cam 7. When the pressure of the steam attains some determined degree the load on the piston is greater than the force of the spring and at such a time the operation of the pump is interrupted, as is obvious. When, however, the pressure falls below the determined degree aforesaid, the operation of the piston is automatically resumed. The supply of water is thus automatically controlled by the boiler pressure through the intermediary of the arrangement described.

For the purpose of supplying an initial charge of water at the starting, a pump cylinder 13 is formed as an extension of the cylinder 1 and is operatively associated with the valve box 2. A piston 14 works in the cylinder 13, being operated by a hand lever 15 or equivalent device.

In order to supply the furnace with air and fuel in definite and constant proportions, an air delivering pump 18 is employed to force air into the burner shown in Figs. 1 and 3 and said burner is in communication with the fuel chamber 22 so that an action similar to the action of an injector is produced. The pump 18 is driven from the motor through the intermediary of a pulley 17, a pulley 20 provided on the pump shaft, and a belt 19 connecting the pulleys 17 and 20. The shaft which carries the pulley 17 is, in normal operation, directly connected to the engine shaft by a clutch 16.

The burner aforesaid is formed with two concentric air delivery passages 21, the inner passage 21 being coaxial with a spraying nozzle 26 arranged at the upper end of the burner and connected to a pipe 25 leading from the fuel chamber 22. The level of the fuel in the latter is kept constant by means of a float valve 23 which works with relation to the discharge end of a pipe 24 leading from a fuel reservoir.

It will be apparent that the air forced by the pump 18 through the passages 21 induces a circulation of liquid fuel through the pipe 25 and the nozzle 26 and the fuel as it issues from the nozzle is broken up and atomized as it mingles with the currents of air. The proportions of the air and liquid fuel forming the gaseous mixture are determined by means of a needle valve 41 operated by a hand wheel 42 and serving to regulate the efficient extent of the bore of the nozzle 26. When the valve 41 has been adjusted as may be desired in accordance with

the character of fuel used and the conditions of working, the proportions of air and liquid fuel forming the mixture will remain substantially constant throughout the operation of the engine. It is apparent, therefore, that the greater the pressure of air, the greater will be the quantity of liquid fuel supplied. Since the suction influence of the delivered air currents is constant and since the quantity of fuel supplied depends on and is in a determined proportion to the pressure of the air, it is sufficient for the purpose of regulating the fuel supply to regulate the pressure of the air forced by the pump. For this purpose the pump is provided with an escape pipe 27 and the quantity of air passing through the latter is determined by the position of a valve 28, the regulation of which may be effected either by a hand lever 29 shown in Fig. 6 or automatically by means of an arrangement to be hereafter described.

At the time of starting the boiler it is necessary to actuate the pump independently of the motor. A preferred means for use in this connection includes a shaft 31 upon which a crank handle 30 may be threaded, the latter bearing against a stop collar 35. The shaft 31 carries a pinion 36 which meshes with a pinion 37 on the shaft which carries the pulley 17. The socket of the crank handle 30 is provided with an internal lug 32 which, when said crank handle is fitted in position, engages and displaces an axially movable stem 33, fitted in a bore of the shaft 31. The stem 33 bears against the end of a lever 34 and the other end of said lever is connected in the well known manner to the movable part of the clutch 16. When the crank handle is fitted on the shaft 31 and the stem 33 is displaced in the manner explained, the lever 34 is caused to effect the disengagement of the parts of the clutch 16, whereupon the shaft carrying the pulley 17 may be rotated free of the motor shaft. After the motor has commenced operation, the crank handle 30 is removed and a spring 38 effects the engagement of the parts of the clutch 16 as well as the restoration of the lever 34 and stem 33 to their normal positions.

In order that the motor may be dissociated from the transmission train a clutch 39, operable by a lever 40, is interposed between the motor shaft and said train.

The atomized fuel mixture issuing from the passages 21 is fired in an extension 43 of the burner. The firing device shown in Fig. 3, includes a projection 44, preferably of nickel steel and an opposed spark plug comprising a sleeve 45 fitted in the extension 43, a porcelain tube 46 disposed in the sleeve 45, and a conducting rod 47, passed through the tube 46 and connected by a wire 48 to a cut off device and a source of electricity, *e. g.* a magneto. The spark produced between the rod 47 and the projection 44 fires the gaseous fuel mixture as is obvious.

The regulation of the valve 28 may be effected automatically instead of manually. The automatic device is shown in Figs. 1 and 4 and comprises a casing in which is fitted a diaphragm 53, operating against a spring held stem 54, which latter is connected to the valve 28 in such manner that the movements of the latter are consequent to axial movements of the stem 54. The casing aforesaid is in communication by means of a passage 52, with a thermostatic controlling device which comprises a receptacle 50, containing a suitable liquid and fitted in the steam supply pipe 51. The pressure in the receptacle 50 depends on the temperature of the steam in the pipe 51 and effects and controls the movements of the diaphragm 53. It will be obvious that an increase of pressure in the receptacle 50 causes an upward movement of the stem 54 and a proportionate opening movement of the valve 28, while a decrease of pressure in the receptacle 50 provides for a downward movement of the stem 54 and a proportionate closing movement of the valve 28. The latter in accordance with its closing or opening movements provides for the admission of a greater or less degree of fuel to the burner and consequently regulates the intensity of the flame.

Having fully described our invention, we claim:

1. In combination, a boiler furnace, a liquid fuel atomizing device therefor, a pump to supply air to the said device, a liquid fuel chamber, a pipe leading from said chamber, a nozzle to which the pipe is connected and which projects into the atomizing device whereby the passage of the air through said device induces a discharge of liquid fuel into the same, the pump having a connection leading to the atomizing device and having also an air escape pipe and a valve for regulating the quantity of air passing through the escape pipe and thereby regulating also the quantity of air supplied to the atomizing device.

2. In combination, a boiler furnace, a liquid fuel atomizing device therefor, a pump to supply air to said device, a liquid fuel chamber connected to said device in such manner that the passage of the air through said device induces a discharge of liquid fuel into the same, the pump having an air escape pipe, a valve for regulating the quantity of air passing through the escape pipe and thereby regulating also the quantity of air supplied to the atomizing device, and means associated with the boiler and operating in accordance with temperature variations to automatically control the movements of the valve.

3. In combination, a boiler furnace, a liquid fuel atomizer and burner therefor, a pump to supply air for maintaining the action of the atomizer and burner, a motor supplied with steam from the boiler, gearing to connect the motor and the pump, a clutch for associating and dissociating the motor and the gearing, crank operated gears also associated with the gearing as a driving medium therefor, a crank handle associable with and dissociable from said crank operated gears, means operable by the crank handle when the latter is fitted into position to act on the clutch and cause the latter to disconnect the motor and the gearing, and a spring operable when the crank handle is dissociated from the crank operated gears to act on the clutch and cause the latter to connect the motor and the gearing.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

LOUIS DOILLET.
PAUL ROBERT FAURE.

Witnesses:
H. C. Coxe,
Georges Bovyie.