M. J. MOONEY.

FURNACE.

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1,136,828.

Patented Apr. 20, 1915.

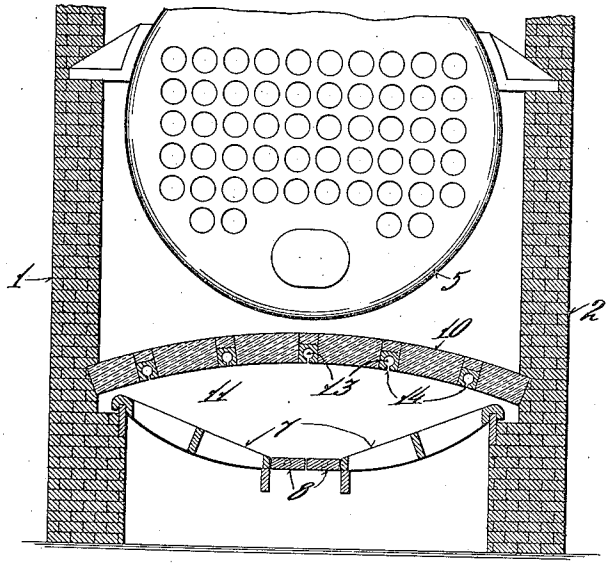


FIG. 1.

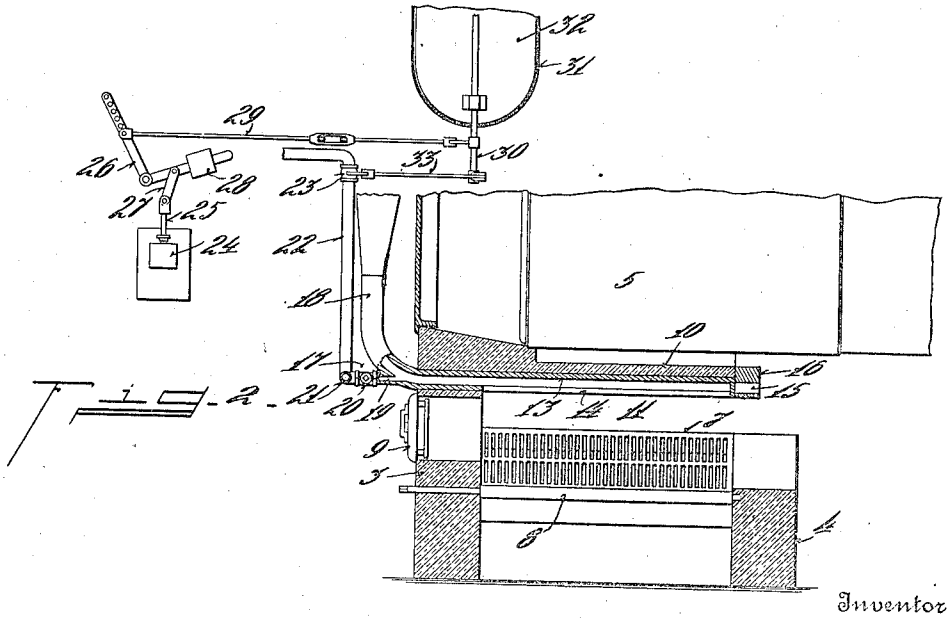


FIG. 2.

Witnesses

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# UNITED STATES PATENT OFFICE.

MONROE J. MOONEY, OF CINCINNATI, OHIO.

## FURNACE.

1,136,828. Specification of Letters Patent. Patented Apr. 20, 1915.

Application filed July 15, 1912. Serial No. 709,535.

*To all whom it may concern:*

Be it known that I, MONROE J. MOONEY, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Furnaces, of which the following is a specification.

My invention relates to an improvement in furnaces wherein a disintegrated fuel is distributed over the fuel bed, in a series of longitudinal sprays. Injector principles are utilized to feed the fuel through the nozzles conveying and distributing the same by fluid pressure, and siphonic action. The vapor fluid pressure may be air or steam, or a combination of both when a bituminous fuel is used, dependent largely upon the percentage of moisture and volatile matter contained in the fuel.

The velocity and density of the fluid pressure controlling the volume of fuel feed and the hydro-carbon mixture necessary to produce the proper combustion and maintain the thermal units within the furnace, is commensurate with the boiler pressures. The feed is automatically controlled by the furnace draft and boiler pressure, offering a material economy in fuel consumption as well as an increased efficiency together with a substantial elimination of smoke.

The object of my invention is to inject a disintegrated bituminous fuel with a vaporous fluid pressure into the combustion chamber of a furnace in a series of longitudinal sprays with the velocity of the fuel feed and volume of the fluid pressure automatically controlled to produce a proper combustion of the hydro-carbon mixture proportional to the boiler pressure, to maintain a constant boiler pressure, or variable according to the exigency of pressure consumption.

Another object of my invention is to provide a furnace of Dutch oven type with a series of nozzles combined with the upper surface wall, to inject jets of intermixed fluid pressure and disintegrated bituminous fuel over the fuel bed.

The features of my invention will be more fully set forth in the description of the accompanying drawings, forming a part of this specification, in which:—

Figure 1 is a central vertical section through the fire box of the furnace as applied to a boiler. Fig. 2 is a central vertical section on line *x*, Fig. 1, illustrating diagrammatically the stack damper regulator governed by the draft and boiler pressures.

1, 2 represent the side walls of a boiler furnace.

3 represents the front wall and 4 the hearth wall.

5 represents a horizontal type of boiler supported upon the side walls.

The furnace is of a Dutch oven type with the fire chamber beneath the boiler instead of projecting in front of the boiler customary in some types of Dutch oven furnaces. The style of furnace however, is optional, conditioned only in the provision of a reverberatory wall over the fire chamber, primarily for the reception of the fuel delivery conduits.

7 represents the grate bars, angularly disposed toward the medial line of the furnace which are mounted in any suitable manner.

8 represents shaker bars centrally positioned within the furnace and preferably pivotally mounted.

9 represents the fire door.

10 represents an arched roof built over the grate bars providing the intermediate combustion chamber 11.

13 represents conduits through which the fuel and air blast is conveyed, each having a longitudinal slot 14 formed therein directed toward the combustion chamber 11. The conduits serve as nozzles for jetting sprays of fuel and vaporous fluid into the combustion chamber. The rear end of each conduit is provided with a stud projection 15 seated within an arch plate 16, forming the terminal for the furnace roof 10 serving as a reinforcement for the roof as well as an edge lining therefor. The life of the arch is materially lengthened, as the arch plate 16 is a metal plate integral the entire width of arch, and removable, enabling the same to be readily renewed.

The forward end of the conduit, exterior of the furnace, is provided with an injector 17, in which 18 represents the fuel supply conduit, and 19 the fluid furnace conduit, the pressure producing a siphonic action at the junction of the conduits 18 and 19, drawing the disintegrated fuel into the conduit 13. The fuel conduit 18 leads to a suitable hopper, which is preferably common to all the fuel delivery conduits of the nozzles of the furnace.

The nozzles are all duplicates, each pro-

vided with the injector and with a valve 20 for manual independent control of each nozzle.

21 represents a pipe manifold connected with the various nozzles of the series, which is connected with the supply pipe 22.

The fluid admitted into the supply pipe 22 is automatically controlled by draft and boiler pressures. This is accomplished by connecting the valve 23 which controls the fluid within the supply pipe 22, with automatic damper regulator mechanism. This mechanism is diagrammatically illustrated herein, and its specific details of construction may be of any design now commercially approved and well known in the art.

24 represents a cylinder provided with a piston or plunger element, actuated by the steam pressure of the boiler; the pipe connection between cylinder and boiler are omitted in the drawings, but it may be of any well known form. In fact, any means may be employed for producing motion controlled by the steam pressure of the boiler.

25 represents a piston rod connected with a bell crank lever 26 through an intermediate link 27. One arm of the bell crank lever is provided with a weight 28, adjustable thereon, by which the pressure control is regulated.

29 represents a connecting rod, one end of which is connected to the bell crank lever 26, with its opposite end connected to a rock shaft 30, suitably journaled and projected into the boiler flue 31.

32 represents a damper plate secured to the shaft 30, for regulating the draft. The boiler pressure actuates the bell-crank lever 26 transmitting motion to the connecting rod and rock-shaft 30, swinging the damper 32 within the furnace flue, resulting in the proper regulation of the furnace draft.

33 represents a connecting rod providing an intermediate connection between the damper shaft 30 and the stem of the valve 23, whereby simultaneous control of the damper 30 and fluid pressure valve 23 is obtained, producing a correlative operation, in increasing, decreasing, or maintaining the thermal units of the furnace, coördinate with the boiler pressure. Thus, when the draft is opened the fuel supply to the furnace is increased and vice versa, the air or vaporous fluid pressure, fuel and draft conditions correlatively proportioned to support perfect combustion at all times, whether for a high or low degree of heat, and a definite boiler pressure approximately maintained, at an economy in fuel consumption, and substantial elimination of smoke and with the services of a skilled fireman dispensed with.

It is obvious that the general details of construction herein illustrated may be variously modified without effecting a departure from my invention, and the nozzle spray may be other than of longitudinal form.

Having described my invention, I claim:—

1. In a furnace, a combustion chamber, an arch forming the top of said chamber having a coincident liner plate at the rear end thereof, a series of nozzles longitudinally embedded in said arch supportingly engaged in said liner plate, each longitudinally apertured to jet a spray of fuel into said combustion chamber, and an injector on each nozzle exterior of the furnace combining two conduits, a fuel supply and a fluid pressure for advancing the fuel within the nozzle.

2. In a furnace, a combustion chamber, an arch forming the top of said chamber having a coincident liner plate at the rear end thereof, a boiler supported over said chamber and arch, a series of nozzles within said arch supportingly engaged with said plate and each longitudinally apertured toward the combustion chamber, an injector for each nozzle comprising two conduits, one a disintegrated bituminous fuel supply, and the second a fluid pressure supply, the fluid pressure advancing the fuel within the nozzle, and a valve controlling the fluid pressure to the injector.

In testimony whereof, I have hereunto set my hand.

MONROE J. MOONEY.

Witnesses:
OLIVER B. KAISER,
CLARENCE B. FOSTER.