

A. G. KRIEG.
SMOKE CONSUMER FOR LOW PRESSURE BOILERS.
APPLICATION FILED JAN. 29, 1909.

988,358.

Patented Apr. 4, 1911.

2 SHEETS—SHEET 1.

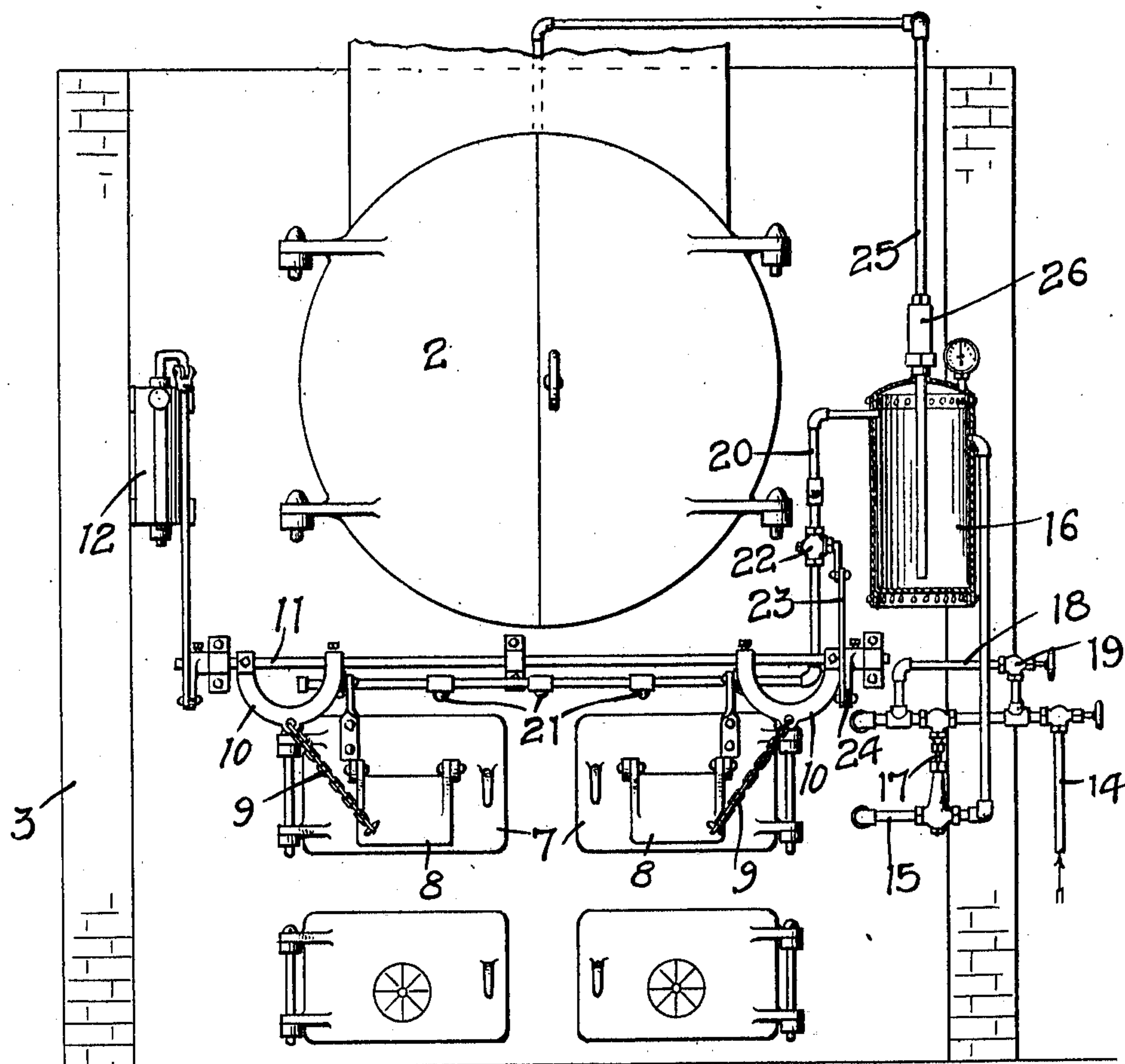


Fig 1.

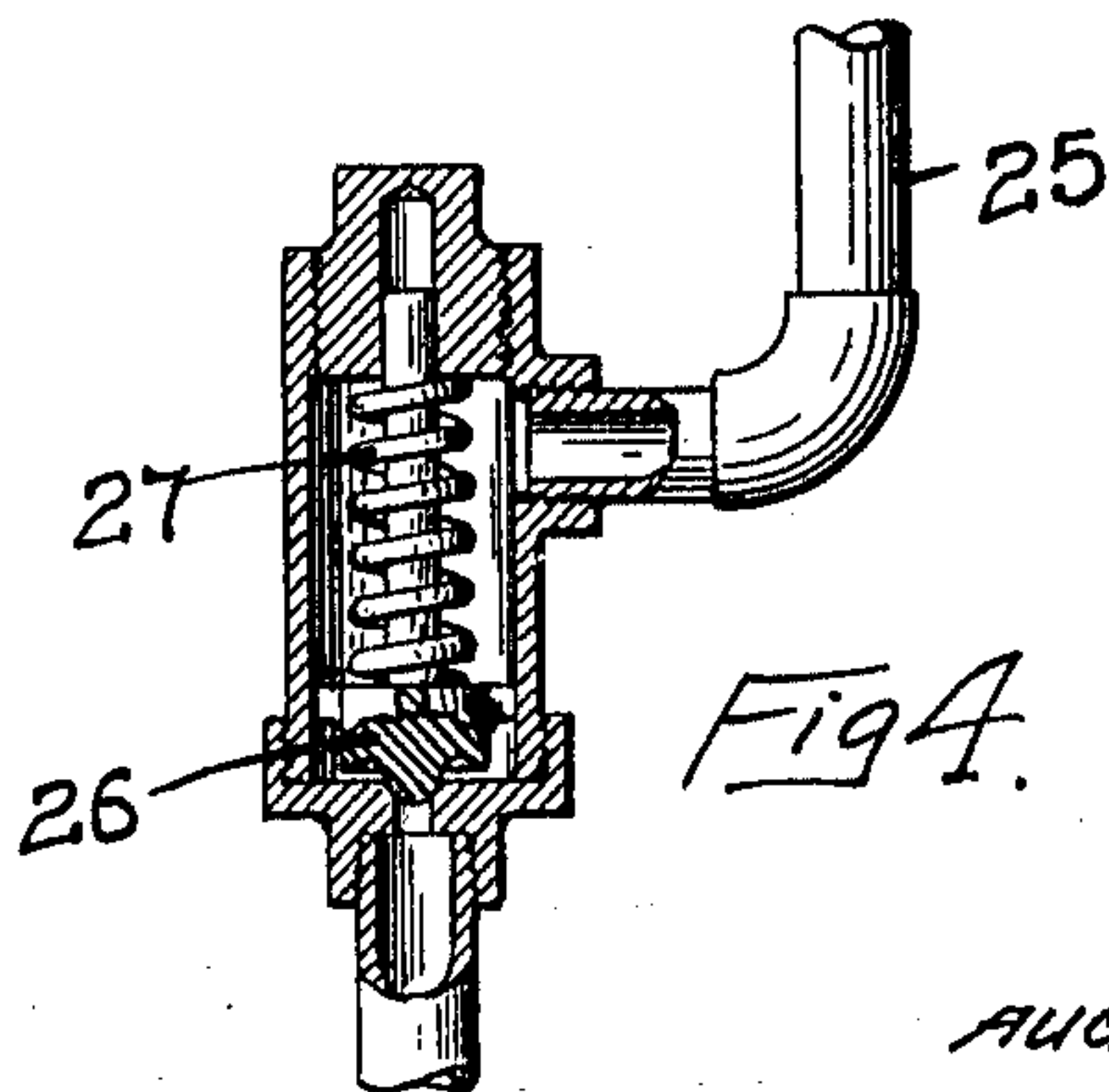


Fig 4.

WITNESSES
A. M. Walstrom
J. A. Byington

INVENTOR
AUGUST G. KRIEG
BY *Paul & Paul*
HIS ATTORNEYS

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2 SHEETS-SHEET 2.

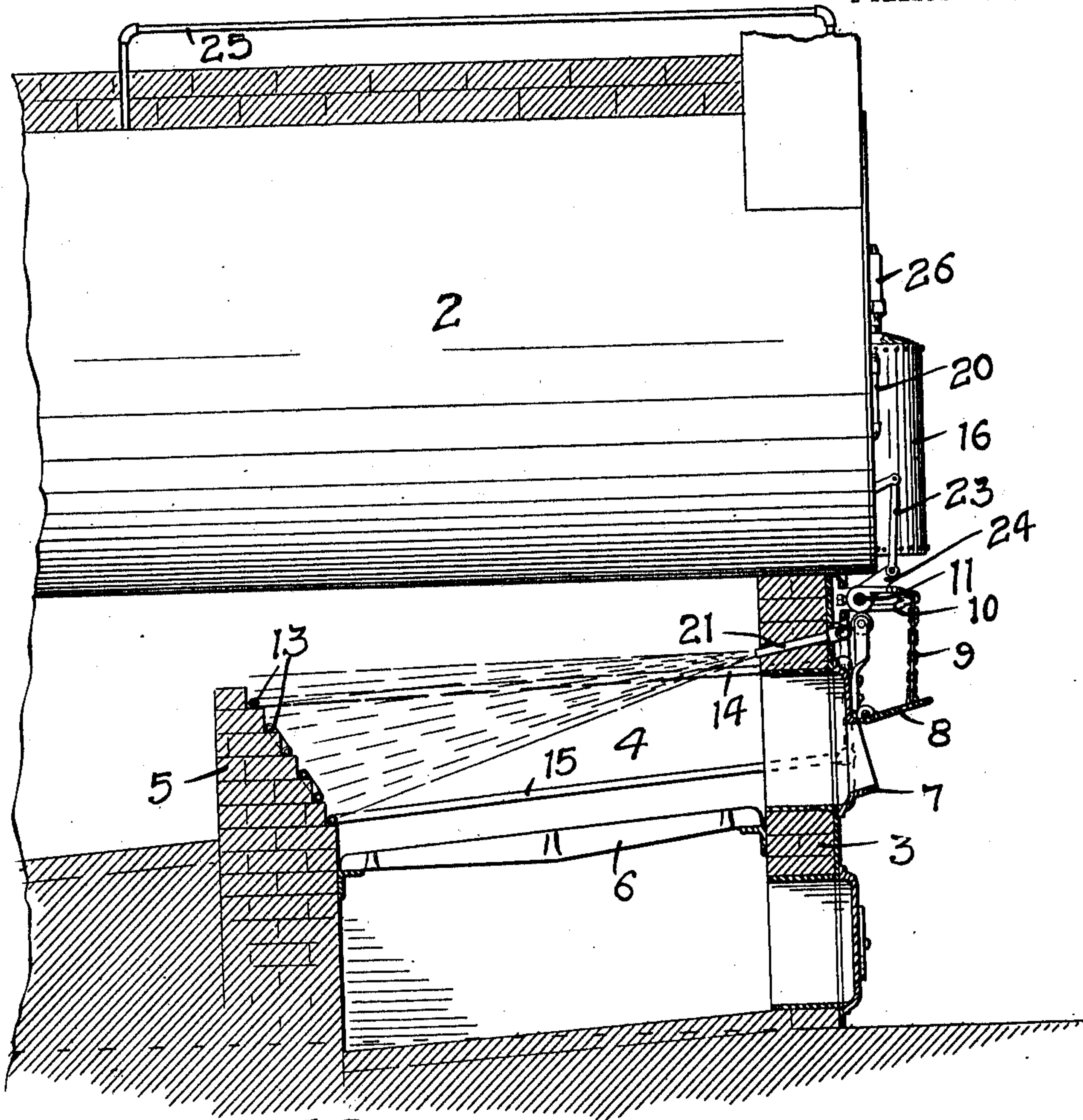


Fig 2.

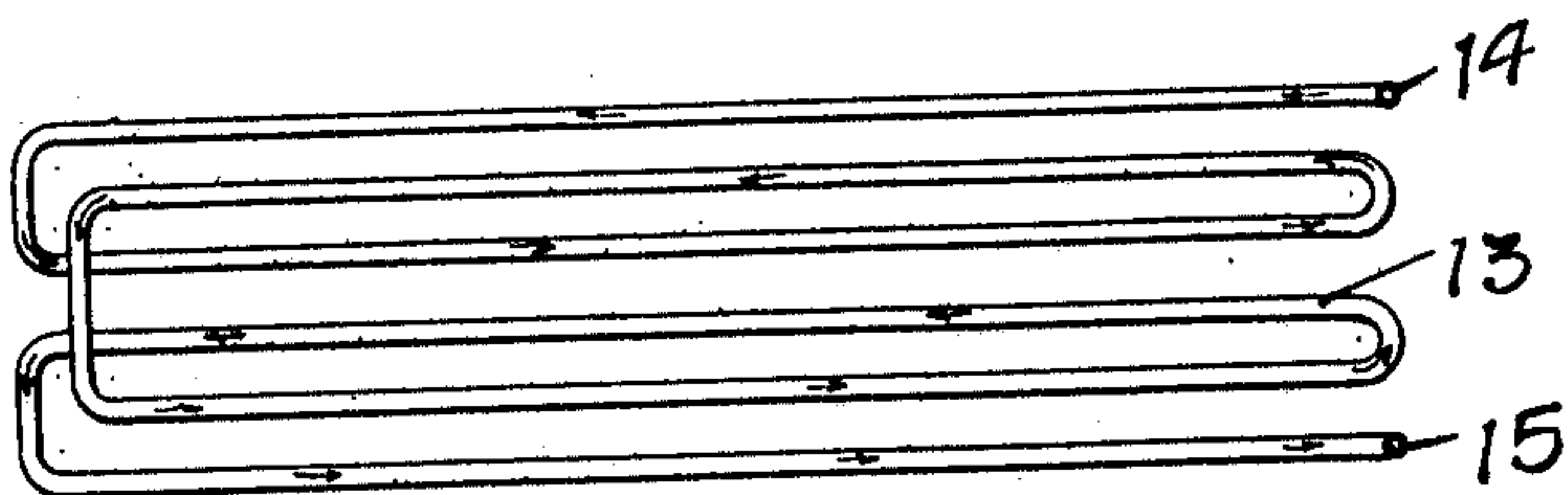


Fig 3.

WITNESSES
W. H. Walton
J. B. Byington

INVENTOR
AUGUST G. KRIEG
BY *Paul & Paul*
HIS ATTORNEYS

UNITED STATES PATENT OFFICE.

AUGUST G. KRIEG, OF MINNEAPOLIS, MINNESOTA.

SMOKE-CONSUMER FOR LOW-PRESSURE BOILERS.

988,358.

Specification of Letters Patent.

Patented Apr. 4, 1911.

Application filed January 29, 1909. Serial No. 474,986.

To all whom it may concern:

Be it known that I, AUGUST G. KRIEG, of Minneapolis, Hennepin county, Minnesota, have invented certain new and useful Improvements in Smoke-Consumers for Low-Pressure Boilers, of which the following is a specification.

My invention relates to smoke consumers adapted particularly for use on boilers where only a few pounds pressure is maintained and may also be used on heating plants of various kinds, such as steam, hot water and hot air.

The object of my invention is to provide means for generating a supply of steam, which will be automatically projected into the fire box over the fire when the fuel doors are opened. Generally when these doors are opened and a fresh supply of fuel placed on the fire, a large amount of gas will immediately be thrown off therefrom. A quantity of unconsumed carbon will be carried off by this gas and the whole, passing out of the boiler, will be discharged in a dense, black smoke from the stack. By directing jets of steam over the fire, air will be drawn in when the fuel doors are opened and mixed with the steam and an inflammable mixture produced, which will cause combustion of the gases, prevent the waste of such gases and the discharge of a black smoke from the chimney.

My present invention has particularly for its object the application of an apparatus of this kind to boilers or heating plants, which do not, in themselves, generate or produce a sufficient pressure of steam to provide jets to be projected over the fire.

A further object is to provide an apparatus of simple, economical construction, capable of application to any type of low pressure boiler or heating system, whether inserted when the boiler is new or after it has been in use.

Other objects of the invention will appear from the following detailed description.

The invention consists generally in various constructions and combinations, all as hereinafter described and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a front elevation of a boiler, illustrating my inven-

tion, partially in section, applied thereto. Fig. 2 is a longitudinal, vertical, sectional view through the fire box and the forward portion of the boiler setting. Fig. 3 is a detail view of the coil located in the rear of the fire box. Fig. 4 is a detail, sectional view of the relief valve provided in the top of the steam drum.

In the drawing, 2 represents a tubular boiler, 3 the setting therefor, 4 the fire box and 5 a bridge wall in the rear of the fire box.

6 represents the grates and 7 fuel doors having draft doors 8 of the usual type. These draft doors are connected by the chains 9 with yokes 10 that are secured to a rock shaft 11 mounted on the front of the boiler. The movement of this shaft is regulated by a dash pot device 12, similar to the one shown and described in my pending application, filed Jan. 17, 1908, Serial No. 411,236.

Above the bridge wall I provide a pipe coil 13, to one end of which a water supply pipe 14 is connected. The other end of the coil communicates through a pipe 15 with a steam drum 16. A thermostat valve 17 connects the pipes 14 and 15 and is arranged to close the passage through the pipe 14 and normally prevent the entrance of water to the coil. The valve is arranged to open by the temperature of the steam and admit water to the coil and will remain open as long as the steam is of a predetermined temperature. When the valve is open, water will flow through the coil and as it is turned to steam in the coil, the pressure of the water will compel the steam to flow through the pipe 15 and up into the drum 16, where the steam will be held by the water pressure behind it. It will be understood of course that only a pressure of steam that is less than the water pressure can be generated and as the water will be constantly flowing to the coil as fast as the generation of steam takes place, there will be a constant supply in the drum to take the place of the steam that is drawn off and projected through the jets over the fire.

A by-pass pipe 18 leads around the valve 17 and is provided with a valve 19, by means of which the operator can admit water to the coil in starting the fire and before a suffi-

cient amount of steam has been generated to cause the opening of the valve 17. A pipe 20 extends from the upper part of the steam drum down to the steam nozzles 21, which project through the boiler front in position to deliver jets of steam over the fire. A valve 22 is arranged in the pipe 20 and has a link connection 23 with a crank arm 24 on the rock shaft 11. The valve 22 is thus open when the fuel doors are opened and closed gradually when these doors are closed. The pipe 25 depends within the steam drum and is provided with a regulating valve 26, which is normally held in its closed position by a spring 27, but is adapted to yield at a predetermined pressure and permit the escape of the steam from the drum. The pipe 25 communicates with the boiler, into which the surplus steam is discharged.

In operation, a supply of water is admitted to the coil through the by-pass pipe 18 and as it circulates through the coil, will be converted into steam and will flow out through the pipe 15 and up into the drum 16. When the temperature of the steam has reached a predetermined degree, the valve 17 will open and allow the water to flow freely through the pipe 14 to the coil. This will continue until the drum 16 is filled with steam and upon opening the fuel doors, the valve 22 will be opened and the steam allowed to flow to the jets 21 and from thence be discharged over the fire. Almost complete combustion will thereby take place and I am able to utilize steam under any suitable pressure to accomplish this combustion with a low pressure system.

I have illustrated the application of my invention to a low pressure boiler or one where the steam pressure is insufficient for connection with the fire box jets, but as heretofore stated, I contemplate using my invention in connection with heating plants of other types, such as hot water or hot air, where a coil may be located in the fire box and connected with a water supply for the purpose of generating steam for delivery to the fuel door jets. I may also utilize the steam from this drum for heating purposes and where the invention is applied to a commercial boiler or heater, sufficient steam may be obtained from the drum for light power purposes. The invention may also be used in connection with vacuum pumps, steam

driers or in fact anywhere where a small volume of steam is required.

I claim as my invention:

1. The combination, with a low pressure boiler fire box, of a heating coil arranged therein and having supply and return pipes, a thermostatic valve normally closing said supply pipe and exposed to the steam in said return pipe and adapted to open when the temperature of the same reaches a predetermined degree, a steam drum communicating with said return pipe, and steam nozzles mounted in the front of the boiler and having pipe connections with said drum.

2. The combination, with a boiler, its fire box and bridge wall, of a coil arranged upon said bridge wall having one end connected to a water supply pipe, a drum located near said boiler and having a pipe connection with the other end of said coil, a thermostatic valve located between said pipe connection and said supply pipe exposed to the steam in said pipe connection, said thermostatic valve regulating the flow of water through said supply pipe and into said coil and whereby the delivery of water to the coil is regulated by the temperature of the steam passing to said drum, and a nozzle having a pipe connection with said drum and adapted to receive the steam therefrom, substantially as described.

3. The combination, with a boiler and a fire box, of a coil arranged within the fire box and having a pipe connection with a source of water supply, a drum, and a pipe depending therein and leading to the boiler, a check valve provided in said pipe and normally resisting the passage of steam to the boiler, a pipe connected with said coil and leading to said drum and serving as a return pipe, a series of nozzles arranged in said fire box and having a pipe connection with said drum, means for regulating the delivery of steam to said nozzles, fuel doors for said boiler, and means operatively connecting said fuel doors with said regulating valve, substantially as described.

In witness whereof, I have hereunto set my hand this 20th day of January 1909.

AUGUST G. KRIEG.

Witnesses:

RICHARD PAUL,
J. A. BYINGTON.