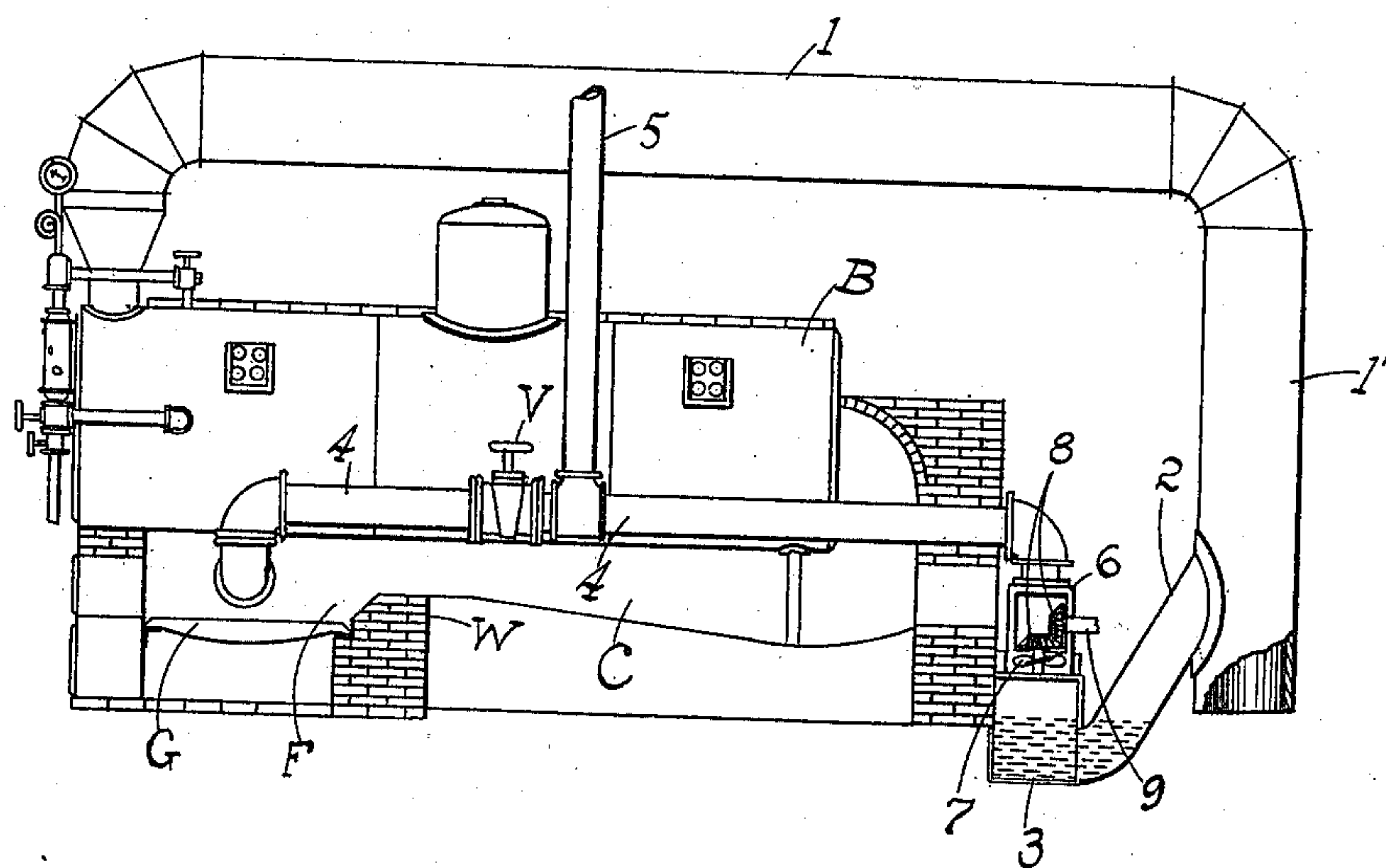


J. S. SMITH.  
SMOKE CONSUMING FURNACE.  
APPLICATION FILED NOV. 8, 1909.

963,953.

Patented July 12, 1910.



WITNESSES:  
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# UNITED STATES PATENT OFFICE.

JOHN S. SMITH, OF ST. LOUIS, MISSOURI.

SMOKE-CONSUMING FURNACE.

963,953.

Specification of Letters Patent.

Patented July 12, 1910.

Application filed November 8, 1909. Serial No. 526,860.

*To all whom it may concern:*

Be it known that I, JOHN S. SMITH, a citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Smoke-Consuming Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention has relation to improvements to smoke-consuming boiler-furnaces; and consists in the novel details of construction more fully set forth in the specification and pointed out in the claim.

In the drawings, the figure represents a combined longitudinal section and elevation of a boiler and its furnace showing my invention applied thereto.

The object of my invention is to provide the ordinary boiler furnace with means for returning a portion of the unconsumed products of combustion into the fire-box, causing them in such return to become mixed with a certain percentage of moisture for intensifying the combustion when the mixture reaches the fire-box to be completely consumed.

A further object is to dispense with all smoke, to eliminate the usual smoke-stack, to regulate the generation of steam, to economize fuel, and to produce further and other beneficial results better apparent from a detailed description of the invention, which is as follows:—

Referring to the drawings, B represents a conventional return-flue boiler, G the grate, F the fire-box, W the bridge-wall, and C the combustion chamber. Leading rearwardly from the smoke-box of the boiler is a discharge-flue 1, which continues in the form of a vertical extension 1' from a suitable point of which leads a branch or shunt 2 discharging into a well or basin 3. From the top of the well leads a return flue or pipe 4 which discharges into the fire-box. In the path of the flue 4 is an ordinary gate-valve V adjacent to, and in front of which is a riser 5 which may be utilized for conducting a portion or all of the returned products into the atmosphere, depending on the degree to which the gate-valve V has been opened. At the entrance to the flue 4

is a chamber 6 forming the upper extension of the well 3, at the bottom of which extension is located an exhaust fan 7 to which rotation is imparted from the gears 8, 8, driven from a shaft 9 leading to any source of power (not shown).

The exhauster 7 serves a two-fold purpose, namely to produce the necessary draft in the fire-box, and when necessary, to return the majority of the unconsumed combustion products back to the fire-box. During the operation of the exhauster (which is kept running constantly) the products from the smoke-box are drafted through the flue 1, the heavy particles such as cinders, and large coal particles precipitating through and out of the leg 1', when they can be caught in suitable receptacles (not shown) and fed again into the fire-box. The smoke and unconsumed gases, with an incidental mixture of fine mechanically suspended particles passes over the surface of the water in the well or saturator 3, where a small percentage of aqueous vapor is carried over with the returning current of unconsumed products, the mixture being thence forced by the exhauster into and through the flue 4 and back into the fire-box, provided of course, that the gate-valve V is open. By partially closing the valve V (when the fire is hot) a portion of the returned products will be diverted out through the riser 5; by wholly closing the valve V, all the returned products will pass out through the riser. The exhauster however, will be kept running to generate the necessary draft in the fire-box to keep up the combustion of the fuel charge resting on the grate G.

With the present invention no smoke is possible, and whatever solid particles are precipitated from the leg 1' may be returned to the fire box with the ordinary fuel charge.

Having described my invention, what I claim is:—

In combination with a boiler and furnace therefor, a flue leading from the smoke-box of the boiler and terminating outside the furnace in a downwardly extending leg open at the bottom, a shunt leading from the leg, a well or saturator to which said shunt leads, a return-flue leading from the well to the fire-box, an exhauster interposed between the



return flue and the well, a branch or riser leading from the return flue at a point between the fire-box and exhauster, and a gas-control valve in the return flue at a point  
5 between the fire-box and the riser, the parts operating substantially as, and for the purpose set forth.

In testimony whereof I affix my signature, in presence of two witnesses.

JOHN S. SMITH.

Witnesses:

EMIL STAREK,  
FANNIE E. WEBER.