J. W. ESTES.

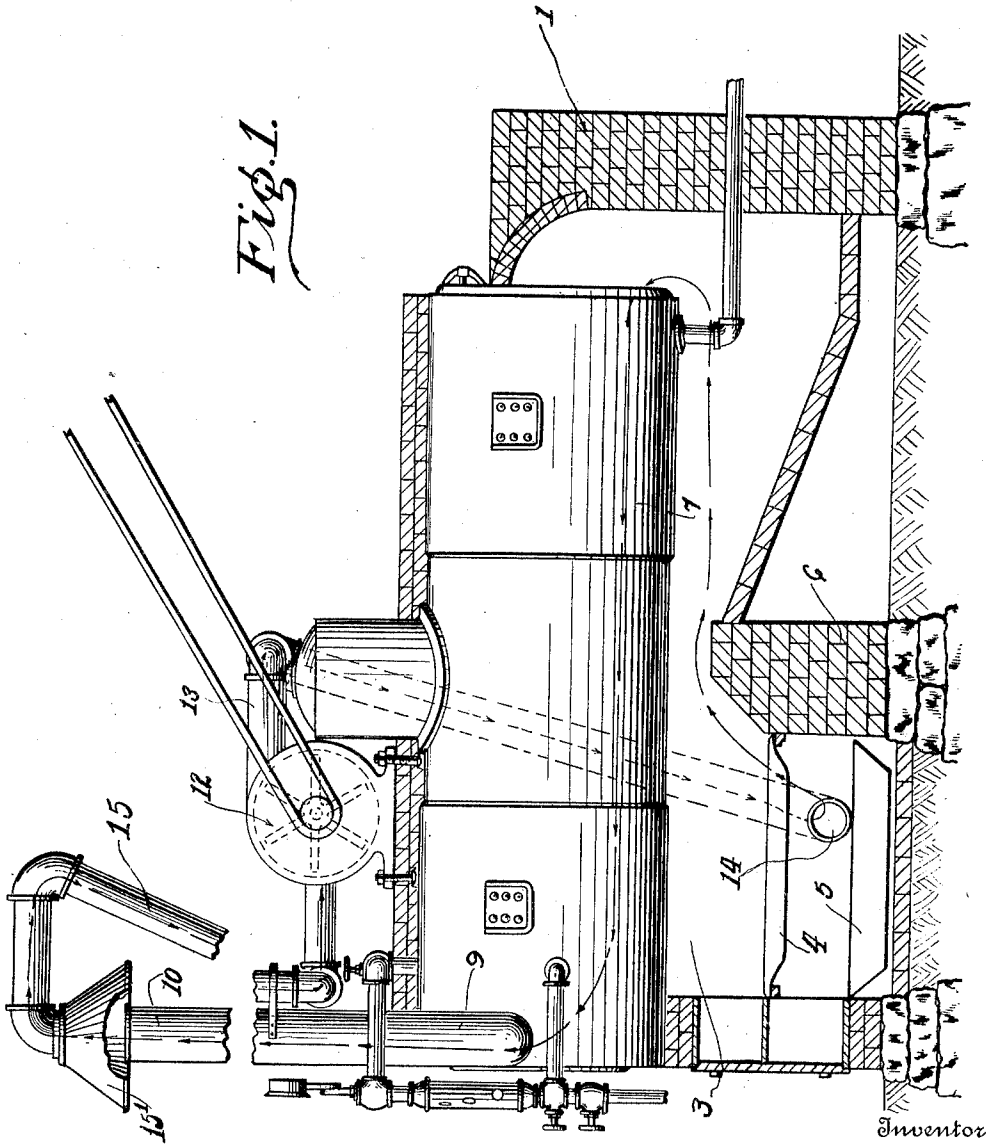
ARTIFICIAL DRAFT AND SMOKE CONSUMING SYSTEM.

APPLICATION FILED DEC. 8, 1910.

1,009,835. Patented Nov. 28, 1911.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

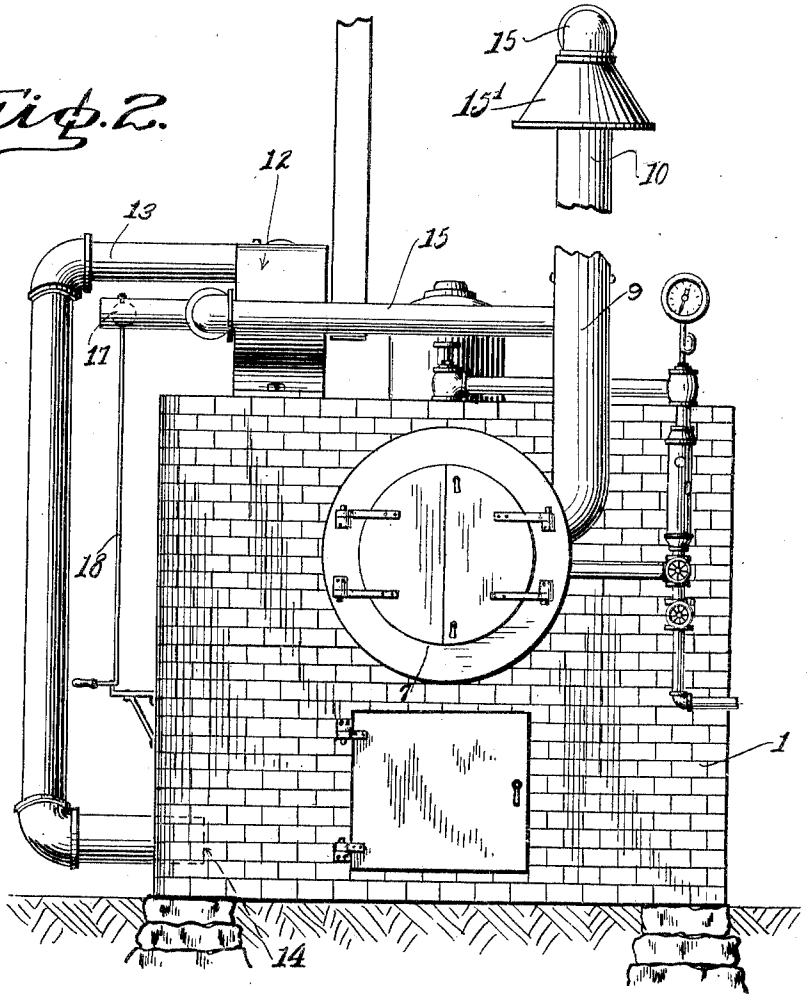
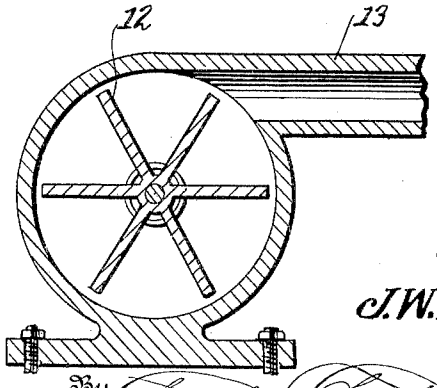


Fig. 3.



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ARTIFICIAL-DRAFT AND SMOKE-CONSUMING SYSTEM.

1,009,835. Specification of Letters Patent. Patented Nov. 28, 1911.

Application filed December 8, 1910. Serial No. 596,331.

To all whom it may concern:

Be it known that I, JOHN WESLEY ESTES, a citizen of the United States, residing at Davidson, in the county of Tillman, State of Oklahoma, have invented certain new and useful Improvements in Artificial-Draft and Smoke-Consuming Systems; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in furnace construction and has more particular reference to a combined smoke consumer and forced-draft apparatus designed especially for use on stationary steam boilers.

With this in view the invention consists primarily in the combination with a furnace of a combined suction and force air pump which will preferably be of the centrifugal type, the inlet side of said pump communicating with a bell positioned over the upper end of the smoke stack, the exhaust from said pump being delivered into the ash-pit of the furnace, and in an air valve positioned on the inlet pipe between the pump or fan and the bell.

The invention further consists in a certain construction, combination and arrangement of parts as are hereinafter more fully described, specifically pointed out in the appended claims and illustrated in the accompanying drawings which show a preferred embodiment of the invention.

Referring to these drawings, which are attached to and form a part of this application, Figure 1 is a side elevation in part section of a conventional return tubular boiler positioned in the ordinary type of brick furnace setting. Fig. 2 is a front elevation of the same, and Fig. 3 is a detail sectional view of the centrifugal fan or pump and the air valve.

Referring more specifically to these views, in which similar reference numerals designate corresponding parts throughout, 1 indicates in general the brick setting of the furnace proper which as shown is of the standard type having the upper combustion chamber 3 separated from the ash-pit by grate-bars 4, the rear ends of the grate bars being supported by the bridge-wall 6 which forms also the rear wall of the ash-pit 5. Supported in the setting above the furnace is the cylindrical return-tubular boiler generally designated as 7. In the front of the boiler is formed the smoke box and the uptake 9 communicates therewith leading the products of combustion finally into the stack shown fragmentally at 10.

In order to burn poor grades of fuel and to keep the height of the stack within reasonable limits it is now considered good practice in many stationary plants to install a forced draft system of moderate power. In the present instance such a system is shown comprising a centrifugal pump or fan generally designated as 12 and which for the sake of economizing floor space is shown as secured to the roof of the boiler 7, the exhaust side of said fan being connected by the blast tube 13 with a port 14 in one side of the ash-pit 5. It will be seen that when the power is applied to the fan by means of a belted motor or any other suitable system a blast of moderate pressure will be delivered into the ash-pit of the furnace.

In burning long-flaming bituminous, lignites, and similar grades of coal under forced draft considerable annoyance is experienced from the presence of unconsumed carbon in the flue gases, particularly during the periods of firing up or when for any reason the fire is worked over.

It is a primary object of this invention to provide a system in which this difficulty may be in part obviated by returning a greater or a smaller portion of the flue gases to the ash-pit and passing them through the fuel bed again. In order to accomplish this result an induction pipe 15 is led from the inlet side of the fan to a point above the stack, and a bell-end 15′ formed on said pipe is projected over the stack opening. In order to control the proportions of the stack or flue gases and the fresh gases which the fan will deliver, an air-valve 17 is placed in the induction pipe at the elbow and disposed so as to lie directly opposite the central inlet port of the fan housing. By means of a suitable connecting linkage here designated as 18 this valve may be controlled by the fireman.

In the operation of the device the air-door or valve will under normal conditions remain wide open, and the fan will consequently deliver a practically fresh blast to the ash-pit. When excessive smoking indicates incomplete combustion the valve will be partially closed, the amount of closure varying with circumstances, and the gases

discharged from the stack will be drawn into the bell 15′ and thence through the fan and finally delivered under pressure to the ash-pit for a second passage through the fuel bed. As the proportion of CO_2 in the gases rises it will be necessary to open the air door damper wider. When normal conditions are restored the air door will as above stated be almost wide open and only an infinitesimal portion of the blast gases will be drawn from the stack.

A particular advantage of the bell construction arises from the fact that the bell will act as a species of separator to remove solid particles from the flue gases. As above stated under normal conditions only a small portion of the gases which escape from the top of the stack will be drawn through the induction tube, the greater proportion escaping around the edges of the bell which thus acts as a simple baffle. It will be seen that solid particles of carbon or the like which escape from the mouth of the stack will have at that point approximately the velocity of the gases, and owing to their greater weight this velocity will not be lost until they have reached or passed the elbow bend at the top of the bell. Beyond this point the diameter of the induction pipe is, as shown, relatively small and the velocity of even the small proportion of flue gases passing therethrough will be sufficient to carry along the solid particles.

It will be understood that an important feature of the present system is the construction of the induction pipe and air door with reference to the inlet port of the fan. It will be seen that by placing the air door directly in line with this port while the induction pipe is at right angles therewith, the opening of said door will almost entirely relieve the suction on said induction pipe and only the ejector action of the inlet blast as it passes the mouth of the induction tube will draw gases through said tube.

It will be seen from the above description that I have provided a combined forced-draft and smoke-consuming induced-draft system.

The system is adaptable to any type of closed-ash-pit furnace, is largely made up of parts standard to the art and may consequently be manufactured and operated at a reasonable cost.

What I claim is:

1. In a system of the class described, the combination with a furnace of the closed ash-pit type, provided with a stack, of a gas pump discharging into said ash-pit, an induction pipe communicating with the inlet side of said gas-pump, a valve, in said induction pipe opening to the atmosphere, and a bell on the end of said pipe positioned with its lower end spaced from and confronting the discharge opening of the stack of said furnace, said bell providing an air inlet at the top of the stack, and said system acting as a forced draft device when said valve is open.

2. In a system of the class described, the combination with a furnace, including a closed ash-pit and a stack, of a gas pump discharging into said ash-pit, a bell having its lower opening co-planar with the discharge opening of the stack of said furnace to provide an air inlet at the top of the stack, a pipe having its outer end open to the atmosphere and its inner end communicating with the inlet port of said gas pump, an air valve in said pipe adjacent its outer end causing said system to act as a forced draft device when said valve is open, and a branch pipe extending from said pipe at right angles thereto and between said valve and gas pump, said branch pipe leading to and communicating with the upper opening of said bell.

3. In a system of the class described, the combination with a furnace of the closed ash-pit type and provided with a stack, of a gas pump discharging into said ash-pit, an induction pipe communicating with the inlet side of said gas pump, a valve in said induction pipe opening to the atmosphere, and a device located at the top of the stack and adapted to catch the sparks and also provided with air inlet means, said system acting as a forced draft device when said valve is open.

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

JOHN WESLEY ESTES.

Witnesses:
T. N. CASTLEBURY,
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