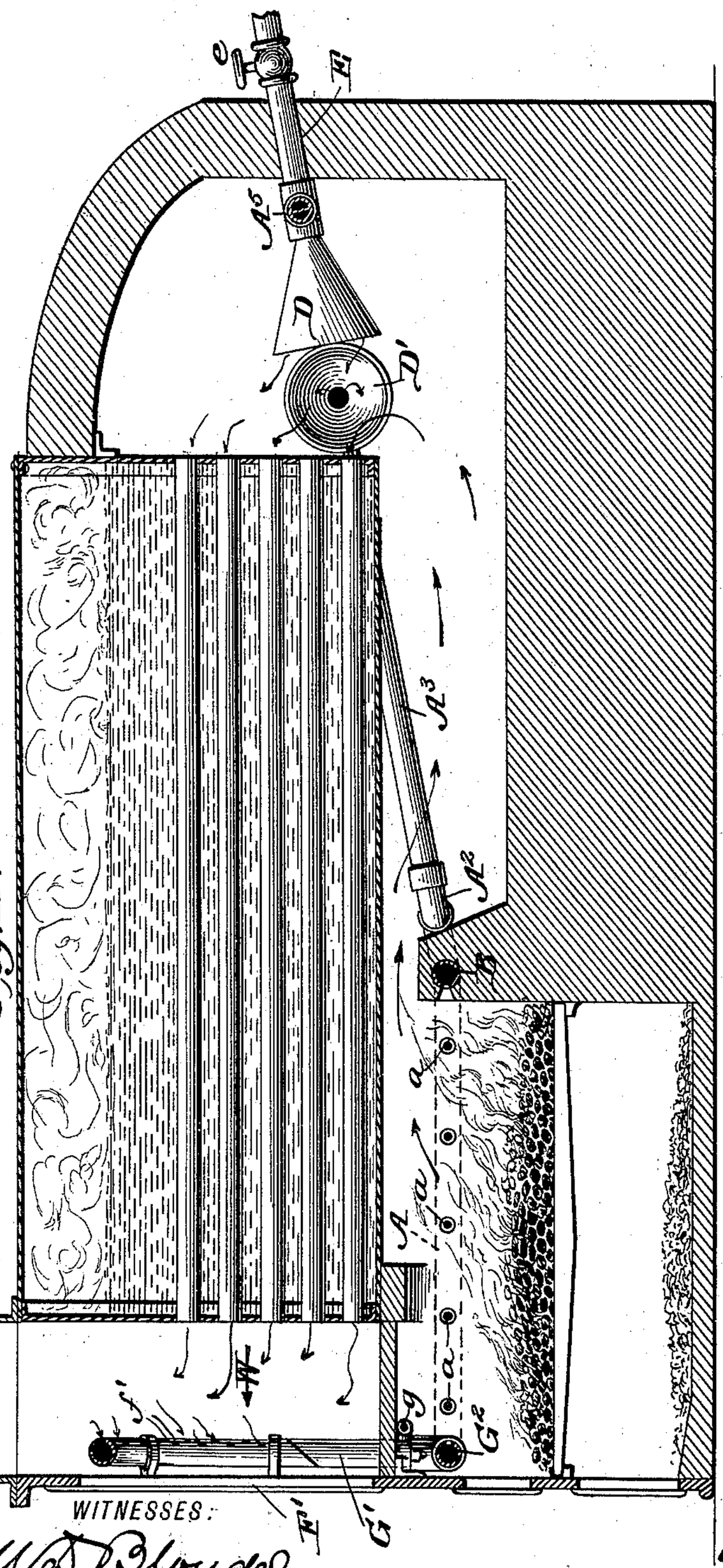
(No Model.) 2 Sheets—Sheet 1.

W. C. WELSH.

SMOKE CONSUMER.

No. 558,885. Patented Apr. 21, 1896.



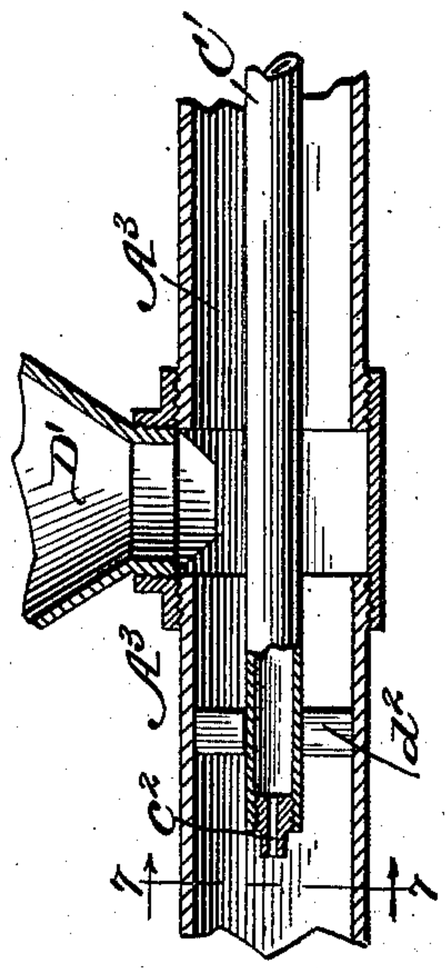


Fig. 6.

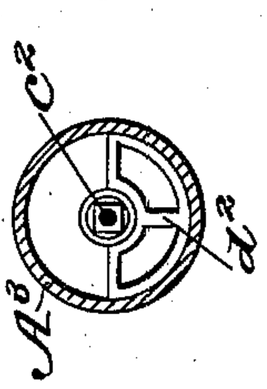


Fig. 7.

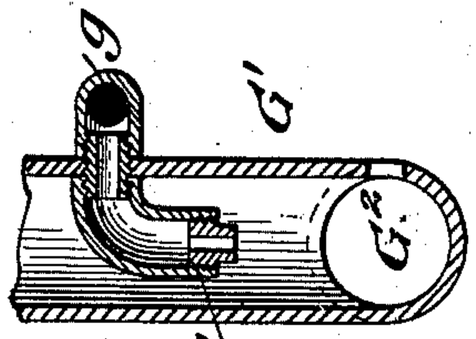


Fig. 8.

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(No Model.) 2 Sheets—Sheet 2.

W. C. WELSH.

SMOKE CONSUMER.

No. 558,885. Patented Apr. 21, 1896.

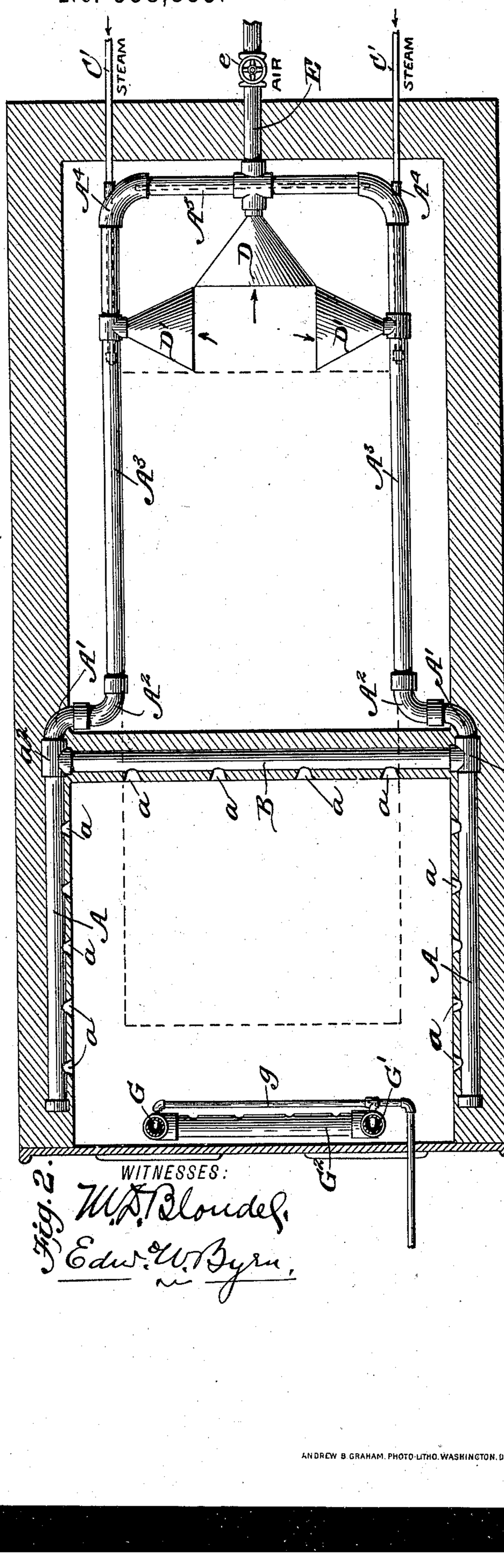

Fig. 2.

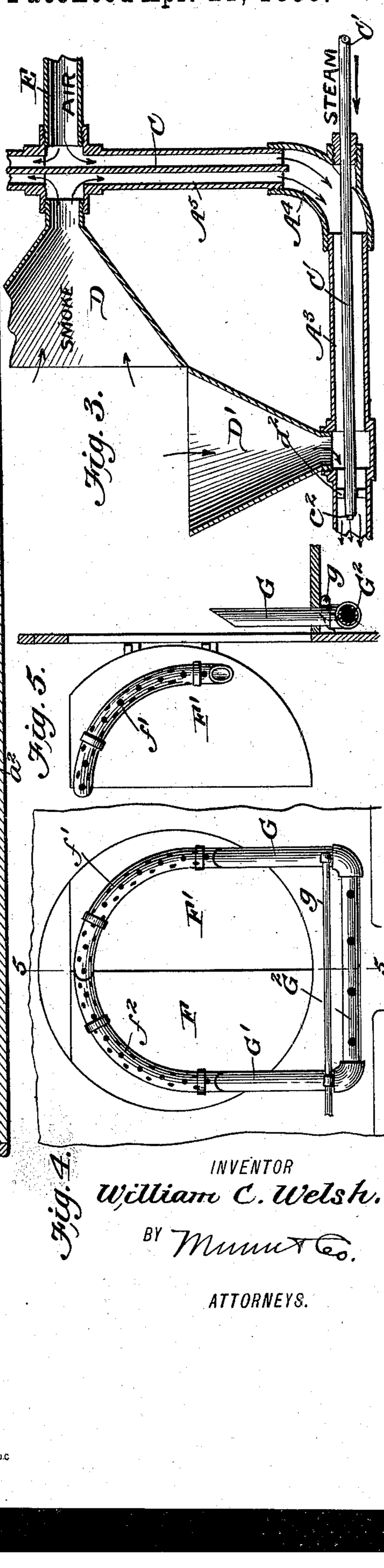

Fig. 3.

Fig. 5.

Fig. 4.

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SMOKE-CONSUMER.

SPECIFICATION forming part of Letters Patent No. 558,885, dated April 21, 1896.

Application filed December 24, 1895. Serial No. 573,207. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM C. WELSH, of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Smoke-Consumers, of which the following is a specification.

The object of my invention is to provide a smoke-consuming attachment for furnaces which shall enable them to perfectly consume the smoke, thereby economizing fuel and securing greater steaming capacity, and also avoiding the fouling of the atmosphere.

To that end my invention consists in the special construction and arrangement of steam-pipes, smoke-pipes with funnels, and air-pipe, the steam-pipes being arranged within the smoke-pipes and adapted to carrying by induction into the fire-box a mixture of smoke, steam, and air, as will be hereinafter more fully described.

Figure 1 is a vertical longitudinal section of the apparatus applied to a return tubular-boiler furnace. Fig. 2 is a horizontal section taken below the boiler. Fig. 3 is an enlarged horizontal section of the smoke and air induction apparatus. Fig. 4 is an inside view of the front end of the furnace, looking in the direction of the arrow W in Fig. 1. Fig. 5 is a vertical section taken through line 5 5 of Fig. 4, one of the doors F′ being open. Fig. 6 is an enlarged horizontal section showing the draft-inducing steam-nozzle in pipes A^3. Fig. 7 is a cross-section through the line 7 7 of Fig. 6; and Fig. 8 is a sectional detail of the lower end of pipes G or G′, showing the draft-inducing steam-nozzle in the same.

In the drawings, A and B, Figs. 1 and 2, are air-pipes about two inches in diameter, connected together by elbows a^2. These air-pipes are provided with orifices a, opening inwardly, of a diameter of one and one-half inches. The pipes A A are arranged in the side walls of the fire-box of the furnace, and the pipe B is arranged in the bridge-wall thereof.

Smoke from the smoke-box behind the bridge-wall is fed to the pipes A B through elbow-pipes A′ A^2 and side pipes A^3 from three funnels D and D′ D′. The funnels D′ D′ connect with the side pipes A^3 and are circular and about twelve inches in diameter. The funnel D is somewhat oval in shape, being about eighteen inches along its major axis and twelve inches along its minor axis. This funnel connects with the cross-pipe A^5, which at its ends is connected by elbows A^4 to the side pipes A^3. The funnels and pipes A^3 and A^5 are arranged within the smoke-box and are exposed, while the pipes A and B in the fire-box are covered with fire-brick, except at the orifices.

In order to bring the funnels D D′ D′ into a sufficiently-elevated position in the smoke-box at the rear end of the boiler, so as to enable them to catch the smoke and unconsumed products of combustion before they enter the tubes of the boiler, said funnels are arranged high up and at or above the level of the lower edge of the boiler, and the pipes A^3, connecting therewith, are arranged at an incline and sufficiently far apart to permit the end of the boiler to dip down between them, as shown in Fig. 1. This greatly increases the effectiveness of the device and catches the larger portions of the smoke and unconsumed gases.

E is an inlet-pipe provided with a damper or valve e and connected with the cross-pipe A^5.

C′ C′ are steam-pipes, which enter the elbows A^4, as better shown in section in Fig. 3, and pass concentrically down the pipes A^3, the ends being sustained concentrically within the pipe A^3 by means of semicircular rests or supports d^2, Figs. 6 and 7. These steam-pipes C′ have perforated plugs c^2 in their ends, secured by screw-threads and adapted to form nozzles.

C is a partition-plate arranged longitudinally in pipe A^5. Steam entering the pipes C′ causes air to be drawn into the pipes A^3 through the pipe E and one-half of pipe A^5, and also draws smoke and the unconsumed products of combustion through the funnels from the smoke-box, which mixture of smoke, air, and steam is delivered through the numerous openings in pipes A A B into the fire-box, where the smoke is consumed.

If any smoke passes into the flues of the boiler without being caught by the suction-funnels, I prevent its escape to the smoke-stack as follows: Referring to Figs. 1, 2, 4,

and 5, F F′ are doors in the front plate of the furnace that open into the space in front of the boiler just below the smoke-stack. On the inner sides of these doors are fixed hollow curved and perforated pipe-sections f' f^2, whose ends are cut on a bevel and are adapted to register with each other and also with the lower stationary pipe-sections G G′ whenever the doors are closed. The pipe-sections G and G′ communicate with a horizontal pipe-section G^2, located in the fire-box and having holes in the same like pipes A and B and for the same purpose. In the pipe-sections G and G′ are downwardly-pointing steam-jet nozzles g, (see Fig. 8,) communicating with steam-supply pipe g, and when steam from pipe g creates a draft downwardly in pipes. G G smoke is drawn from the space in front of the boiler through the perforations in pipe-sections f^2 f' and is carried by the steam-jets down into horizontal pipe G^2 and into the fire-box.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with the boiler, and its casing forming a smoke-box at the rear end; of a set of funnels arranged in the smoke-box at or above the level of the bottom of the boiler, side pipes A^3 arranged upon opposite sides of the boiler and communicating with said funnels and extending through the fire-space from a position at or near the level of the bottom side of the boiler in an inclined position to the bridge-wall, pipes A A embedded in the walls of the fire-box and having discharge-orifices and communicating with the side pipes A^3 A^3, and air-inlet and steam pipes for creating a mingled blast of steam, air, and smoke through the pipe A^3 substantially as and for the purpose described.

2. The combination with the side pipes A^3 having inwardly-opening funnels, a cross-pipe connecting the side pipes and having a longitudinal partition in it, one side of which pipe has a funnel opening into the smoke-box, and the other side of which has an air-inlet pipe, and draft-inducing steam-pipes for forcing a mixture of smoke and fresh air into the fire-box substantially as shown and described.

3. The combination of the doors F F′ having in the smoke-chamber the perforated pipe-sections f^2 f', the stationary registering pipe-sections G G′ having at their lower ends a communicating horizontal pipe perforated and arranged in the fire-box, and downwardly-pointing steam-jet nozzles arranged in the pipe-sections G G′ substantially as and for the purpose described.

WILLIAM C. WELSH.

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