944,933.

W. ACHESON.

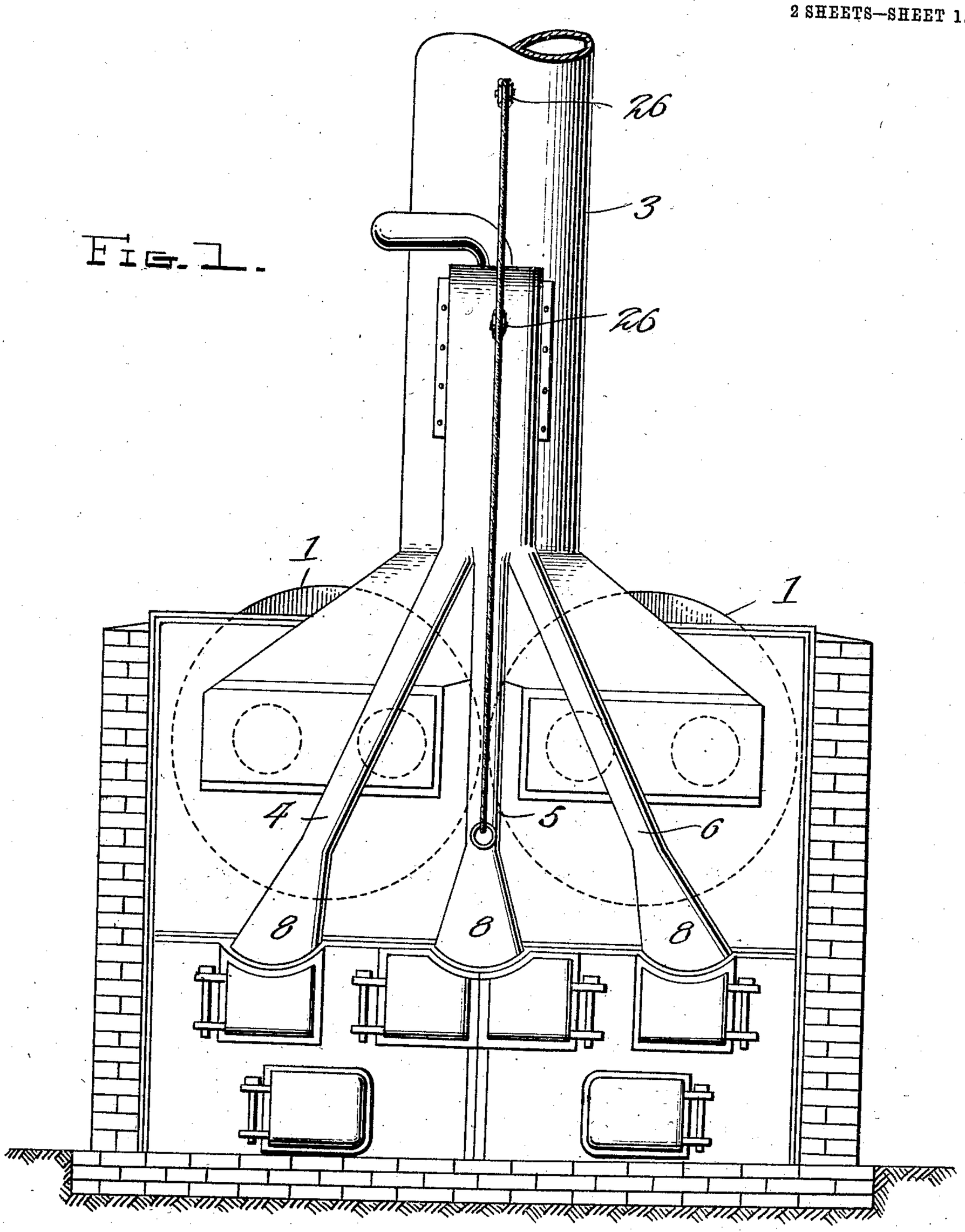
SMOKE CONSUMER.

APPLICATION FILED DEC. 7, 1907.

Patented Dec. 28, 1909.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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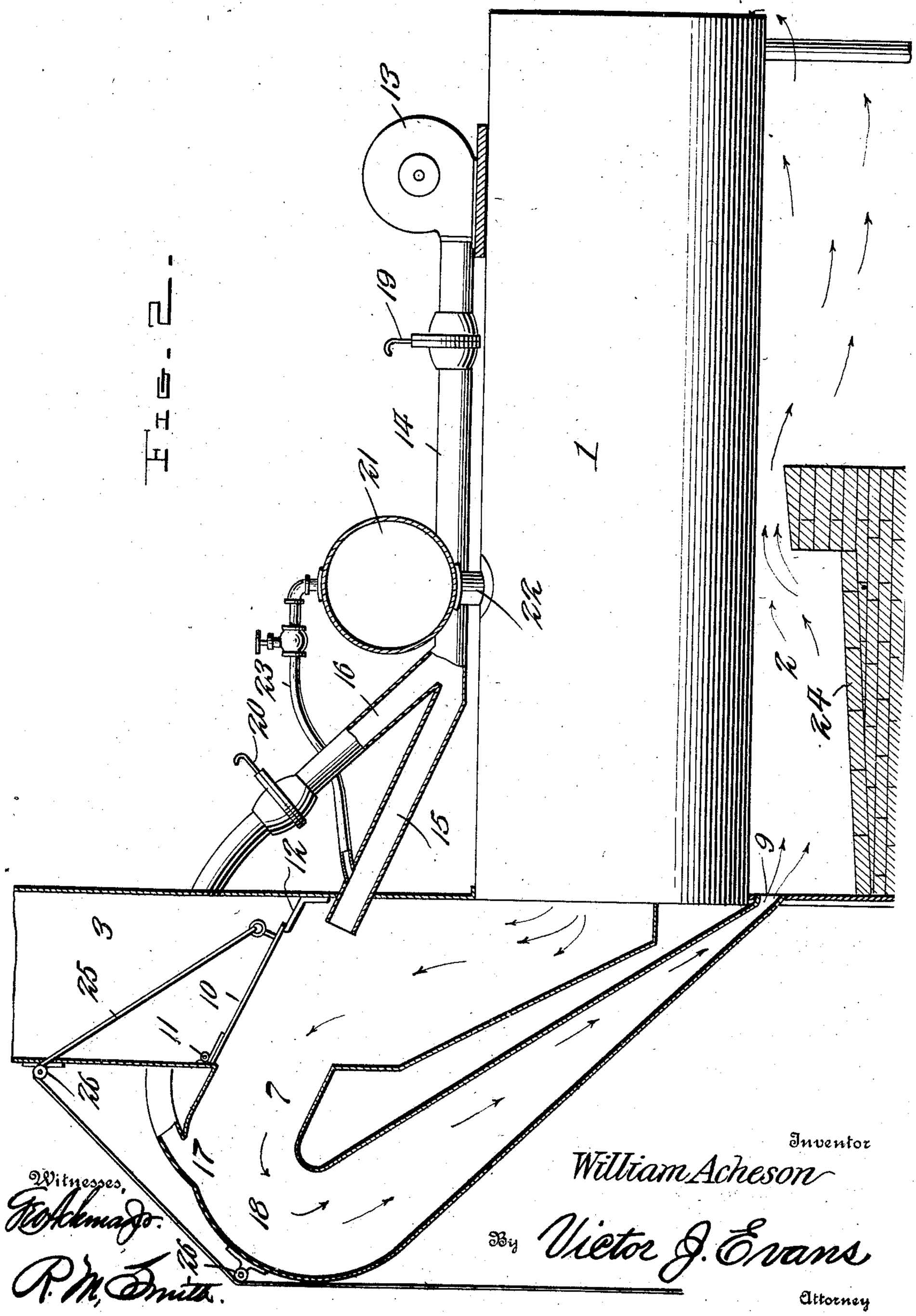
2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

WILLIAM ACHESON. OF PITTSBURG, PENNSYLVANIA.

SMOKE-CONSUMER.

944,933. Specification of Letters Patent. **Patented Dec. 28, 1909.**

Application filed December 7, 1907. Serial No. 405,539.

To all whom it may concern:

Be it known that I, WILLIAM ACHESON, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented new and useful Improvements in Smoke-Consumers, of which the following is a specification.

This invention relates to smoke consumers. the object of the invention being to provide effective means for promoting combustion in the fire chamber of a furnace in a simple and effective manner whereby the smoke is consumed, the apparatus embodying means whereby the currents of air and steam directed into the fire chamber may be varied and cut out as occasion requires.

With the above and other objects in view, the invention consists in the novel construction, combination and arrangement of parts as herein fully described, illustrated and claimed.

In the accompanying drawings:—Figure 1 is a front elevation of a boiler furnace showing the invention applied thereto. Fig. 2 is a side elevation of the same partially in section.

In the drawings, 1 designates a steam boiler suitably mounted over a fire chamber 2 and having associated with one end thereof the usual smoke stack 3.

In carrying out the present invention, I provide a suitable number of return flues 4, 5 and 6, which at their upper ends merge into a common neck 7 which enters the smoke stack 3 as shown in Fig. 2 at a point above the base of the smoke stack 3. The lower ends of the return flues 4, 5 and 6 are expanded horizontally, as shown at 8 and fitted to correspondingly shaped return ports 9 which enter the fire chamber 2 above the fire. Just above the plane of the neck 7, a self-opening gravity-closed cut-off or damper 10 is arranged in the smoke stack 3. This damper may be of any suitable construction being shown as hinged at 11 to one side of the stack and resting on a suitable cut off ledge or shoulder 12. The cut-off or damper 10 is held normally closed by gravity but will readily open upward under pressure to allow the products of combustion to escape into and through the stack.

13 designates a blast fan from which an air pipe 14 extends toward the stack and has an upwardly inclined discharge portion or nozzle 15 which passes through the side wall of the stack and directs a blast of air upward along the bottom of the damper and directly into the neck 7. Another branch 16 leads off from the blast pipe 14 and extending around one side of the stack 3, enters the top of the neck at a point 17 in line with the curve or bend 18 where the return flues 4, 5 and 6 join the neck so as to induce a still greater draft than the one induced by the air discharged from the nozzle 15 into the stack. The blast pipe 14 is controlled by a gate or valve 19 and the branch pipe 16 is also controlled by a gate or valve 20 located therein, thus enabling the blast to be delivered either through the branch 15 or the branch 16 or simultaneously through both branches.

21 designates a steam dome connected with the steam boiler at 22 and having a steam blast pipe 23 which leads from the dome into the branch 15 of the air blast pipe 14, the object being to deliver a jet or blast of steam into the air as the latter is discharged into the stack, thereby increasing the current and strength of the blast and also heating the blast before it is distributed to the return flues 4, 5 and 6 and carried back into the fire chamber above the fire.

From the foregoing description it will be understood that the products of combustion passing into the stack are caught up by the air blast or air and steam blasts combined and returned to the fire chamber, the additional supply of oxygen thus afforded promoting perfect combustion in the fire chamber, the gases in the stack mingling with the inrushing air and thus producing a mixture which will readily ignite immediately upon entering the fire chamber. By arranging to have the air and steam enter the stack and the neck of the return flues at different angles, the air, steam and gas are thoroughly churned and mixed and then distributed over the fire.

Where the invention hereinabove described is employed, it is unnecessary to use any grate in the fire chamber thus enabling the bed on which the coals are burned to be made solid or composed of fire brick, as shown at 24, the upper surface of the brick being preferably coated with salt and sand mixed in suitable proportions to act as a heat retaining floor for the fire chamber.

25 designates a flexible connection having one end attached to the damper 10, said connection running over suitable pulleys 26 and extending down in front of the return flues

within convenient reach of an operator standing at the front of the furnace who may thereby open and close the damper as needed.

The damper may be slightly opened and allowed to remain so in order to provide for the final escape of the consumed gases.

I claim:—

The combination with a stationary boiler furnace having a fire box, fire bed and smoke stack at the same end thereof, of a U-shaped return flue arranged wholly at one end of the furnace and leading from the stack on an upward incline and then downward and entering the fire box above the bed thereof, an inclined self-opening gravity closed cut-off located in line with and forming a portion of the upper side of the return flue for opening and closing the stack at the point where the return flue intersects the stack, a blast fan, a plurality of air pipes leading from said fan one arranged to deliver a current of air into the stack at the initial end of the flue and another arranged to deliver a current of air into the return bend of said flue beyond the stack, and a steam blast communicating with one of said air pipes in advance of the point where said air pipe enters the return flue.

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

WILLIAM ACHESON.

Witnesses:

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