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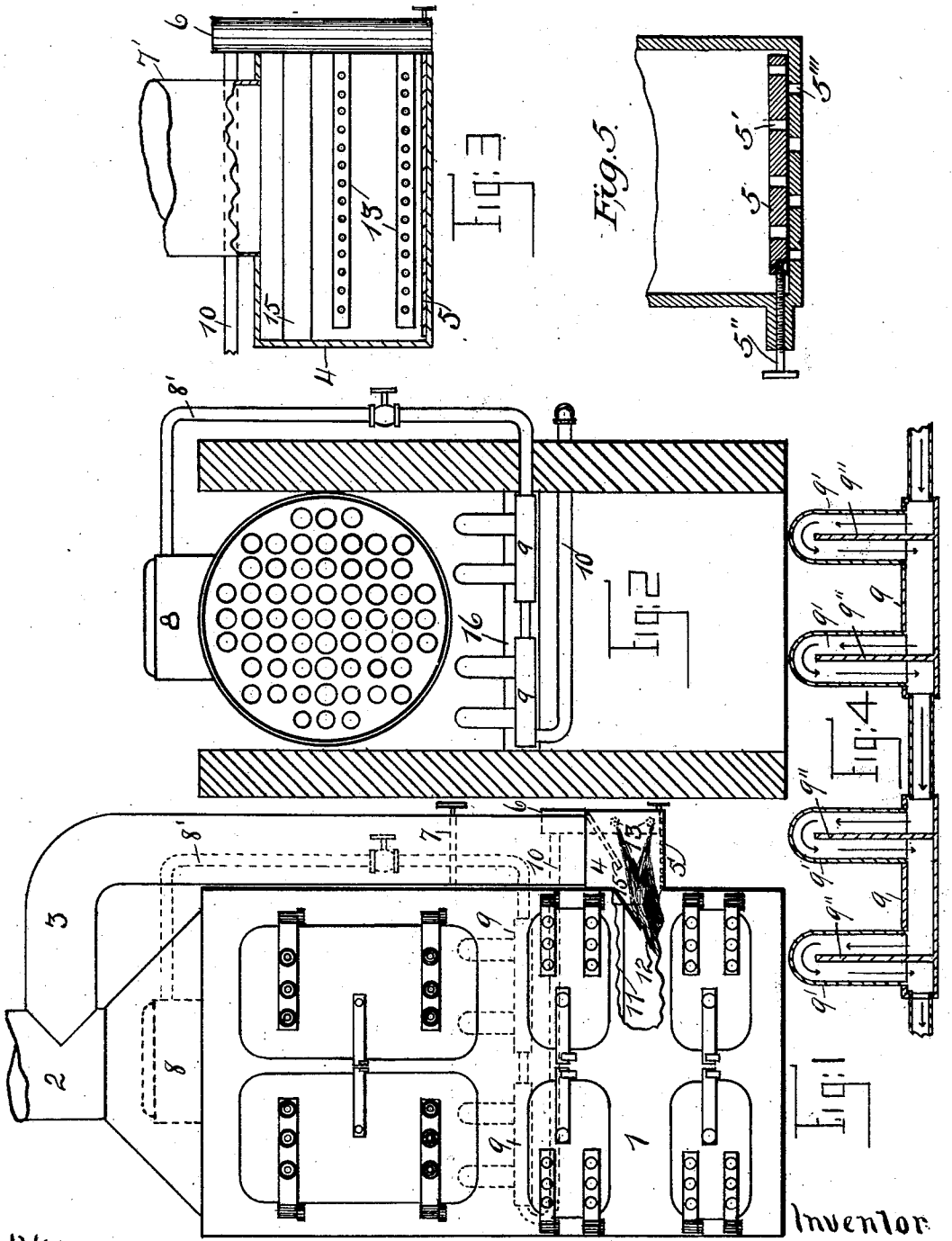
J. S. CHAPMAN.

FORCED DRAFT APPARATUS.

(Application filed Mar. 3, 1902.)

(No Model.)



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JOHN S. CHAPMAN, OF ALBANY, NEW YORK.

FORCED-DRAFT APPARATUS.

SPECIFICATION forming part of Letters Patent No. 703,539, dated July 1, 1902.

Application filed March 3, 1902. Serial No. 96,490. (No model.)

To all whom it may concern:

Be it known that I, JOHN S. CHAPMAN, a citizen of the United States, residing at Albany, New York, have invented certain new and useful Improvements in Forced-Draft Apparatus; 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, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

The object of my invention is to provide a new and improved forced draft for steam-boilers and one in which a portion of the heated gases from the chimney or stack is used in connection therewith.

In the drawings, Figure 1 shows a front elevation of a steam-boiler, preferably of the tubular return type; Fig. 2, a vertical section of the same seen from the rear; Fig. 3, a vertical section of the steam-receiving box; Fig. 4, a vertical sectional view of the superheaters; and Fig. 5, a vertical sectional view of the lower end of the box 4, showing the air-entrances thereto.

The numeral 1 shows the boiler-front, and 2 the stack.

The pipe or flue 3 is connected with the stack in any desired manner and is carried to the top of the steam-receiving box or chamber 4 and is in operative connection therewith, preferably as seen in Fig. 1.

8 shows the steam-dome of the boiler, from which leads the steam-pipe 8′, passing into and through the walls of the furnace, preferably at a point just back of the fire-bridge 16, (see Fig. 2,) and is there connected to the superheaters 9 9, and from thence is carried by steam-pipe 10 to the vertical pipe 6 and into the perforated pipes 13, inside the steam-receiving box or chamber 4, the perforations being so formed that the jets of steam escaping therefrom will converge, as seen at 12. In the steam-receiving box 4 is a baffle-plate 15, so set as to prevent any steam escaping up the pipe 3 and so as to produce a somewhat-narrow outlet for the lower end of pipe 3, thus producing a sharper downdraft through that pipe, as the escaping steam 12 produces a more or less perfect vacuum in the steam-receiving box 4.

7 shows a damper in pipe 3.

5 indicates a movable blind or cover for the bottom of box 4, said box-bottom having openings therein, as seen at 5‴, and the blind also, as seen at 5′, the registering of the openings letting the air in. As shown in Fig. 5, the openings are closed. The blind 5 has a threaded rod 5″ protruding from the box, as seen in Figs. 1 and 3, whereby the openings in box 4 may be opened more or less or closed entirely. This arrangement is for the purpose of allowing more or less air to enter the box, as occasion may demand, with which to supply the fire on the grate 11 with oxygen. The superheater 9 is preferably constructed of a box or hollow bottom and tubes 9′, screwed or otherwise fastened thereto and having a baffle-plate 9″ therein, so as to compel the steam as it enters, as indicated by the arrows, to pass to the top of the tube and then down into the box and up and down the succeeding tubes, compelling it to travel a long circuitous route through the superheater, thereby not only superheating it, but separating it from any entrained water it may contain. If desired, the places of the baffle-plates 9″ may be taken by steam-pipes connected with base, so as to produce the same general course of the steam. As the superheater stands on or just back of the fire-bridge 16, it receives the heat from the gases and flame as they pass over the bridge and becomes highly heated.

The operation is as follows: The valve in steam-pipe 8′ being opened, the steam from the boiler passes to the superheater 9 and makes the circuitous path through the same (indicated by the arrows in Fig. 4) and from thence through steam-pipe 10 to vertical pipe 6 and from thence out of the perforated pipes 13 and through an opening in the side of the furnace-wall to a point under the grate-bars 11. As it passes with great force and swiftness through the steam-receiving box 4, it creates a partial vacuum in that box, which creates a downdraft in the pipe 3 and draws through it and under the grate-bars 11 more or less of the smoke and heated gases from the smoke-stack 2, and the open-

ings 5′ in the bottom of the box 4 being more or less opened at the same time fresh air is also drawn in and mixes with the superheated steam, smoke, and hot gases, and the pressure of the steam and its expansion when liberated under the grate-bars forces a draft through the fire and uses over again a part of the combustible portion of the carbon and gases from the smoke-stack 2. The fire-doors and ash-pit doors must be closed air-tight when my apparatus is being used. When my apparatus is not desired to be used, the valve in steam-pipe 8′ may be closed and the ash-pit doors opened, when the fire will receive its supply of air in the ordinary manner.

Having described my invention, what I claim is—

1. In a steam-boiler a conduit leading from the smoke-stack into a receptacle in connection with the space under the grate-bars; a baffle-plate in proximity to the lower end of the said conduit; a steam-pipe in connection with the boiler discharging in the said receptacle and practically across the discharge-mouth of the conduit so as to converge the steam at a predetermined point and means for admitting air to said receptacle in predetermined quantities, in order that a portion of the hot gases from the smoke-stack and a portion of the steam from the boiler and some air may be forced into and through the fire on the grates substantially as described.

2. A superheated-steam-draft-forcing device consisting of a conduit leading from the smoke-stack of a boiler to and discharging into a receptacle; a steam-pipe leading from the boiler to and discharging into said receptacle and practically across the mouth of the conduit; said steam-pipe being connected with a superheater arranged to receive the heat from the furnace-fire and superheat the steam as it passes through the same; means whereby the steam is caused to make a circuitous path through the superheater and means for admitting air to the said receptacle and mix it with the steam from the boiler and the heated gases from the smoke-stack and discharge them under the fire-grate substantially as described.

3. In an apparatus for producing draft by superheated steam, heated gases and air, consisting of a conduit leading from the smoke-stack to a receptacle; a steam-pipe leading from the boiler to said receptacle through a superheater located at the fire-bridge and arranged to receive the heat of the furnace as it passes the fire-bridge; means for introducing air to the receptacle and means for producing a downdraft in the conduit and for forcing the contents of the receptacle under the grate-bars under pressure substantially as described.

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

JOHN S. CHAPMAN.

Witnesses:

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