

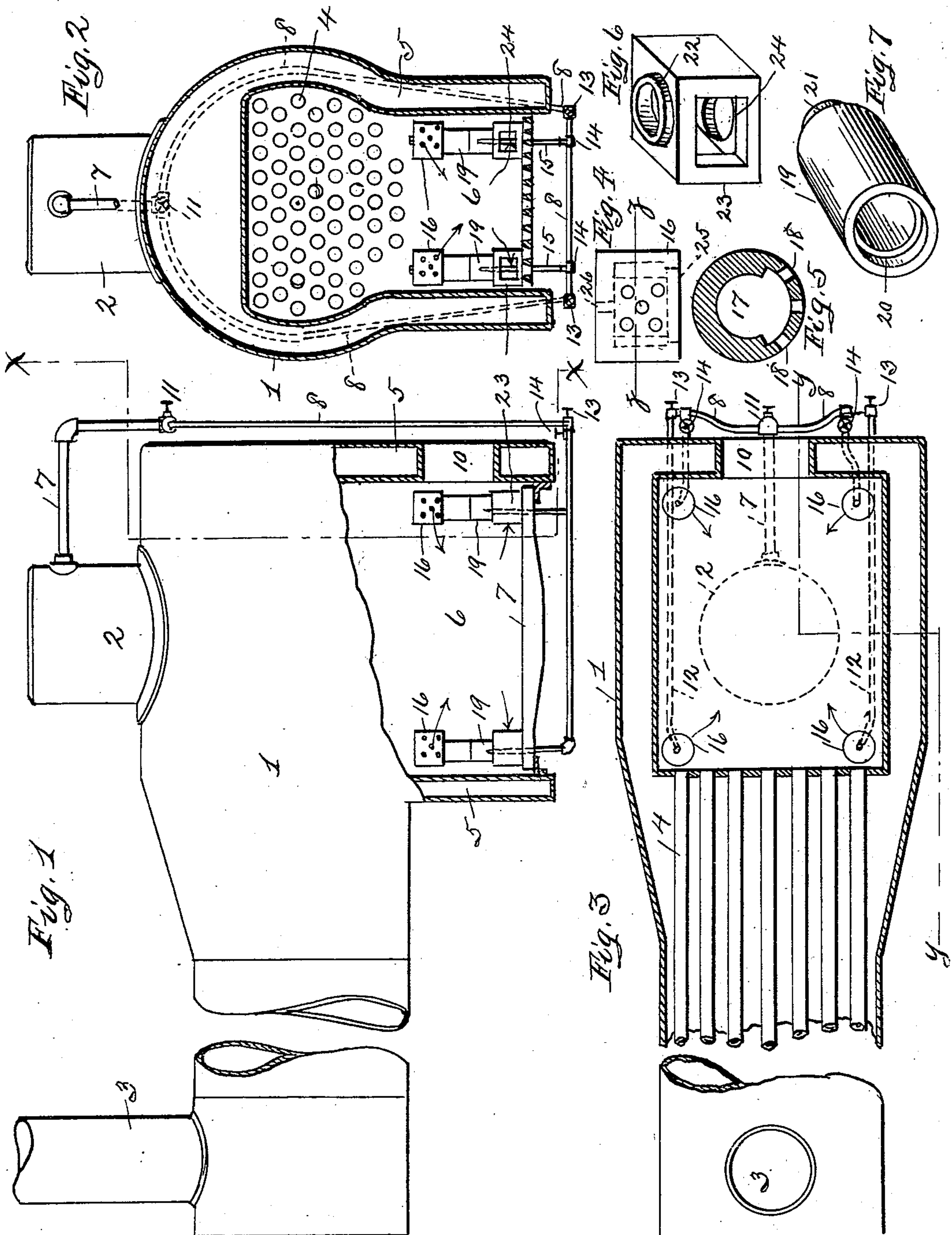
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J. A. CRAWFORD.
SMOKE CONSUMER.

APPLICATION FILED OCT. 17, 1902.

NO MODEL.



WITNESSES:
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JOHN A. CRAWFORD, OF ALLEGHENY, PENNSYLVANIA.

SMOKE-CONSUMER.

SPECIFICATION forming part of Letters Patent No. 751,059, dated February 2, 1904.

Application filed October 17, 1902. Serial No. 127,669. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. CRAWFORD, a citizen of the United States, residing at Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Smoke-Consumers, of which improvement the following is a specification.

This invention relates to an improved smoke-consumer for boiler or other furnaces; and it consists in the certain details of construction and combination of parts, as will be fully described hereinafter.

In the accompanying drawings, Figure 1 is a side elevation of a steam-boiler and fire box or furnace, partly shown in section, the same being constructed and arranged in accordance with my invention, the said section being taken on the line *yy* of Fig. 3. Fig. 2 is a sectional front elevation of the same, the section taken on the line *xx* of Fig. 1. Fig. 3 is a sectional plan view of the boiler. Fig. 4 is a front elevation of one of the cap-pieces of the combined hot-air and steam ducts arranged at each of the angles of the fire-box. Fig. 5 is a sectional plan view of the same, the section being taken on the line *zz* of Fig. 4. Fig. 6 is a perspective view of the base-piece of the same. Fig. 7 is a perspective view of one of the middle sections.

To construct a smoke-consumer in accordance with my invention and adapt the same for use in boiler and other furnaces, I provide a boiler 1, provided with the usual steam-dome 2, the smoke-stack 3, the fire-box 6, fitted with grate-bars 7, fire-door 10, and other well-known parts common to this class of steam-generators.

Arranged at each of the angles of the fire-box 6 and resting upon the grate-bars 7 are combined hot-air or fire and steam ducts formed from any suitable material, each of which consists of a box-shaped base-piece 23, having an inner compartment, openings at the front base and top, the latter being formed with a peripheral flange 22, which connects with central sections 19. These sections 19 are cylindrical in form and of a suitable length, having at one end a flanged male portion 21 and at the other a grooved female part 20,

adapted to fit neatly about the flange 22 of the base-piece 23. Placed upon the top of this central portion 19 is a cap-piece 16, cylindrical in form, provided with an inner compartment 17, open at the base and formed with a depression 25 to engage with the male portion 21 of the central section 19. A bolt-opening 26 at the top of this piece, together with another in the center of the base 23, serves as a means of connecting the several sections together, thus making a pipe, flue, or channel, which can be made as above described or any other suitable way. The said pipe, flue, or channel may be arranged in the boiler-walls or outside or in the bridge-wall or in the middle of the fire-box.

Connected to the steam-dome 2 and in communication therewith is a pipe 7, fitted with a valve 11, whereby the steam may be admitted or shut off from two branch pipes 8. These branch pipes lead downward to a point beneath the grate-bars and are there connected to a series of rearwardly-extending tubes 12 15, the inner extremities of which are each provided with upwardly-projecting steam-jets, the same entering some distance within the pipes, flues, or channels for hot air and steam, terminating at a point some distance above the base-openings 24. Each of these branch pipes 12 15 are fitted with valves 13 14, by means of which the steam may be regulated and controlled to the said jets.

In operation after the fire has been fairly started steam is admitted to the jets in each of the hot-air ducts, thereby creating a partial vacuum at the base, which will siphon the air from the ash-pit and fire and hot air from points on the level with the grate-bars 7 and discharge the same over the fire and above at the point of combustion. The passage of the air through these ducts and the fact of the same being drawn through the fire-bed the temperature will be such as to instantly ignite any unconsumed gases that are combustible which arise from the fire, thereby consuming the smoke particles. The amount of steam escaping from the jets is regulated by the valves 13 14, which are so arranged as to cut off any one or all of the jets and are under the charge of the fireman and

are manipulated to correspond to the condition of the fire.

Air, gases, or fire, mixed or unmixed, may be introduced to the point of combustion by other means than that above described, such as an independent furnace, or from any suitable source to make combustion.

By the use of this improved smoke-consumer water-gas is formed within the fire-chamber, and only as much steam should be admitted mixed with hot air and fire as will maintain incandescence. This will reduce the percentage of nitrogen and increase the hydrogen, thereby greatly enriching the gas, which is immediately consumed from contact with the fire-bed, adding largely to the heat units of the furnace, or, plainly speaking, the limited amount of steam that is needed for energy in passing through the heated pipes, flues, or channels becomes water-gas and greatly increases the power of the boiler or furnace and where no smoke-consumer is needed.

It is obvious from the foregoing description, taken in connection with the accompanying drawings, that various modifications and changes may be made in the details of construction without departing from the general spirit of the invention. Therefore I do not confine myself to the exact construction shown and described.

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

1. A smoke-consumer for boiler and other furnaces, comprising a fire-chamber and grate therefor, a series of ducts positioned within said chamber and resting upon said grate, a

steam-jet entering each of said ducts, the bottom of the latter being open to receive air through the grate and each having a circumferential inlet-aperture above and adjacent to the grate, and provided with perforated discharge-openings near the tops of the ducts, as set forth.

2. In a smoke-consumer for boiler or other furnaces, the combination consisting of the vertically-arranged ducts arranged at each angle of the fire-box and resting upon the grate-bars, said ducts having their bottoms open to receive air from below the grate and each having an inlet-opening in its wall above the grate, and exit-perforations near the tops of said ducts, a steam-jet entering the said ducts, pipes connecting the jets to the steam-dome, and suitably-disposed valves in the said pipes, whereby one or more of the jets may be cut off, and a means for holding the ducts in position.

3. In combination with a smoke-consumer constructed substantially as described, the sectional combined hot-air and steam ducts, consisting of a base portion 23, having an opening 24, at one side, an opening at the top having a peripheral flange 22, the hollow sections 19 connected thereto, and the hollow perforated cap-piece 16 provided with a perforated side, and means for jetting steam therein, as and for the purpose described.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOHN A. CRAWFORD.

In presence of—

C. C. LEE,
A. M. LEE.