

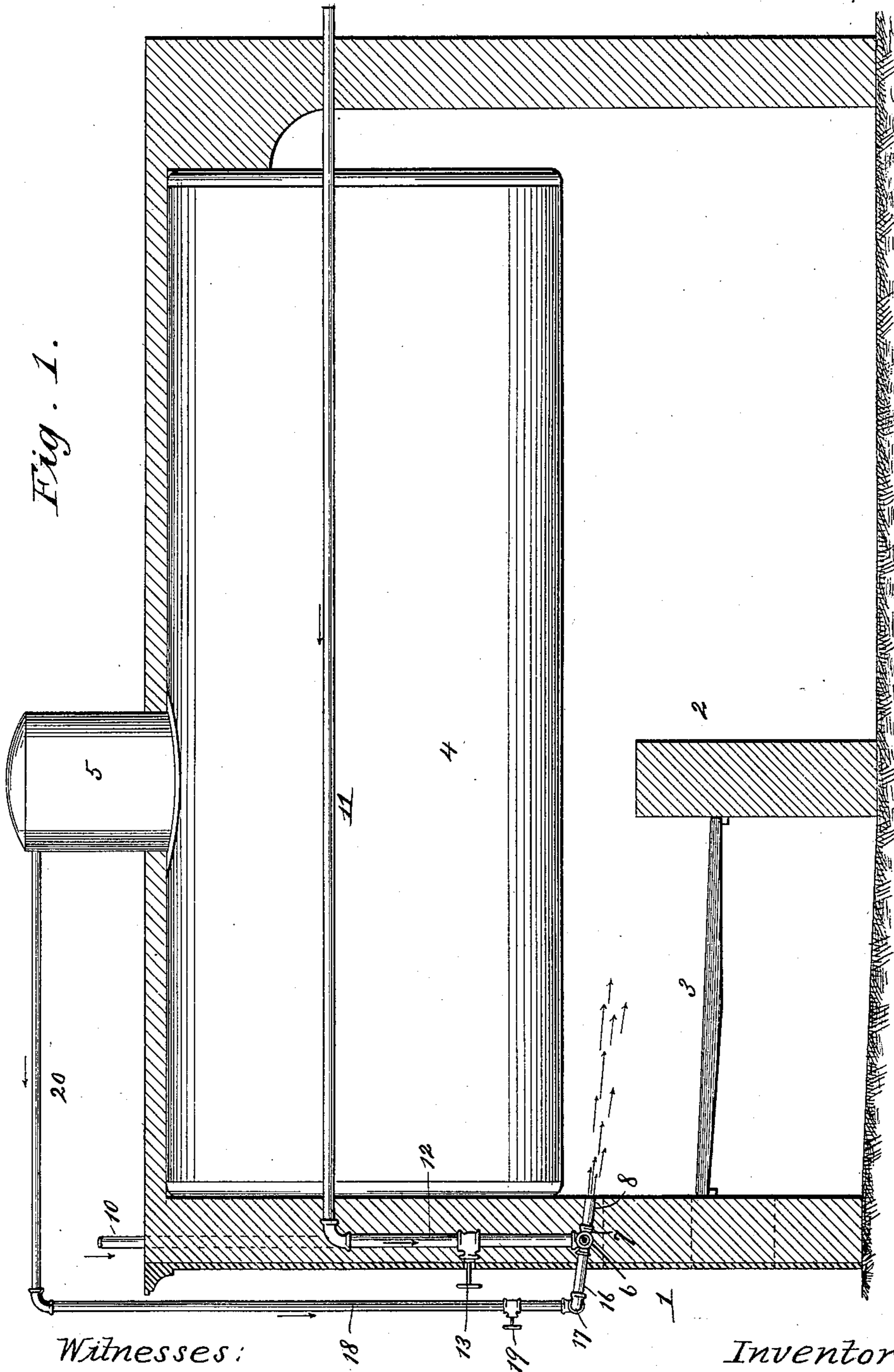
(No Model.)

2 Sheets—Sheet 1.

J. BRANDON & G. BEAL.
SMOKE CONSUMING FURNACE.

No. 594,675.

Patented Nov. 30, 1897.



Witnesses:

F. G. Fischer
G. F. Thayer

Inventors:

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By *Higdon & Higdon*,
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(No Model.)

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Fig. 2.

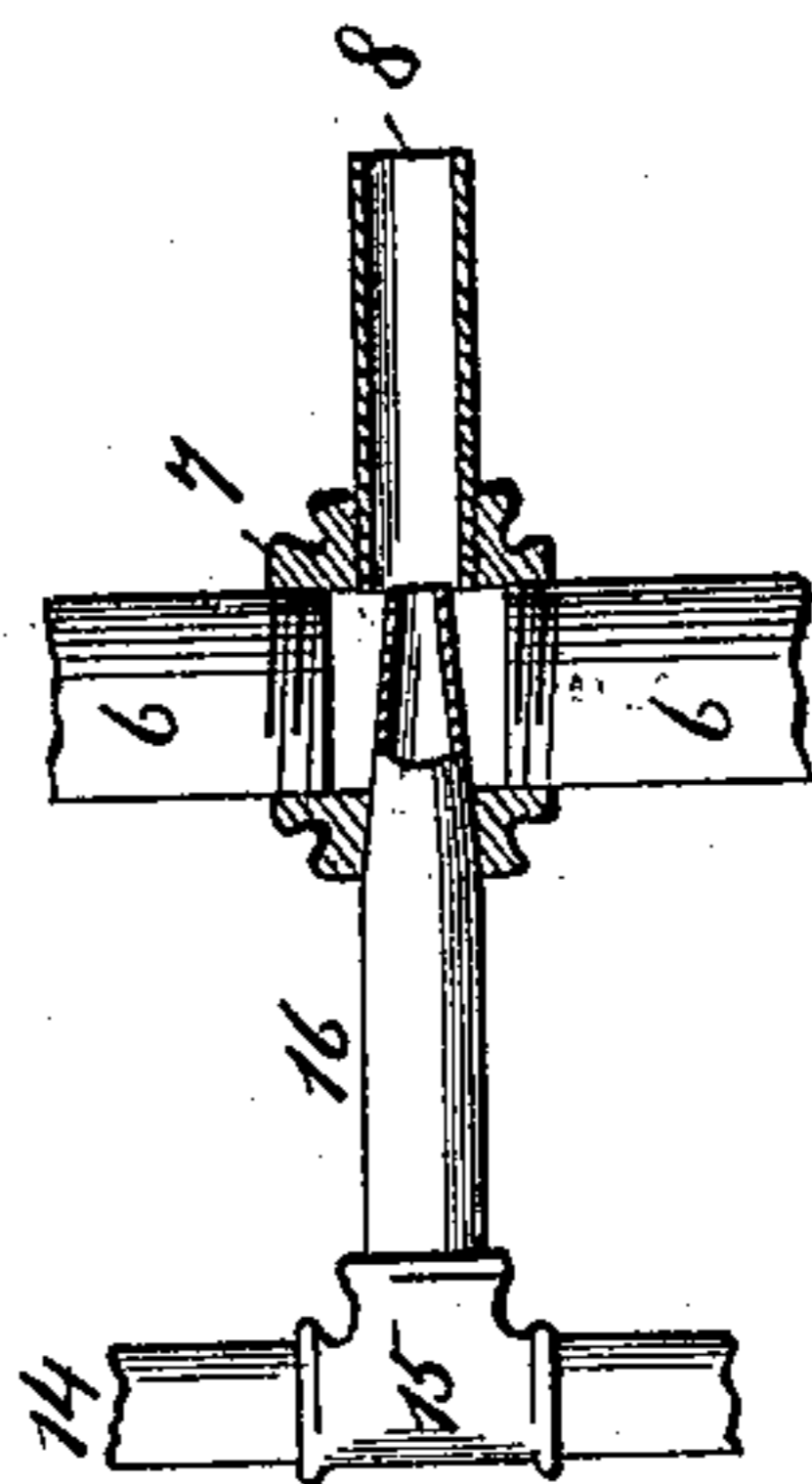
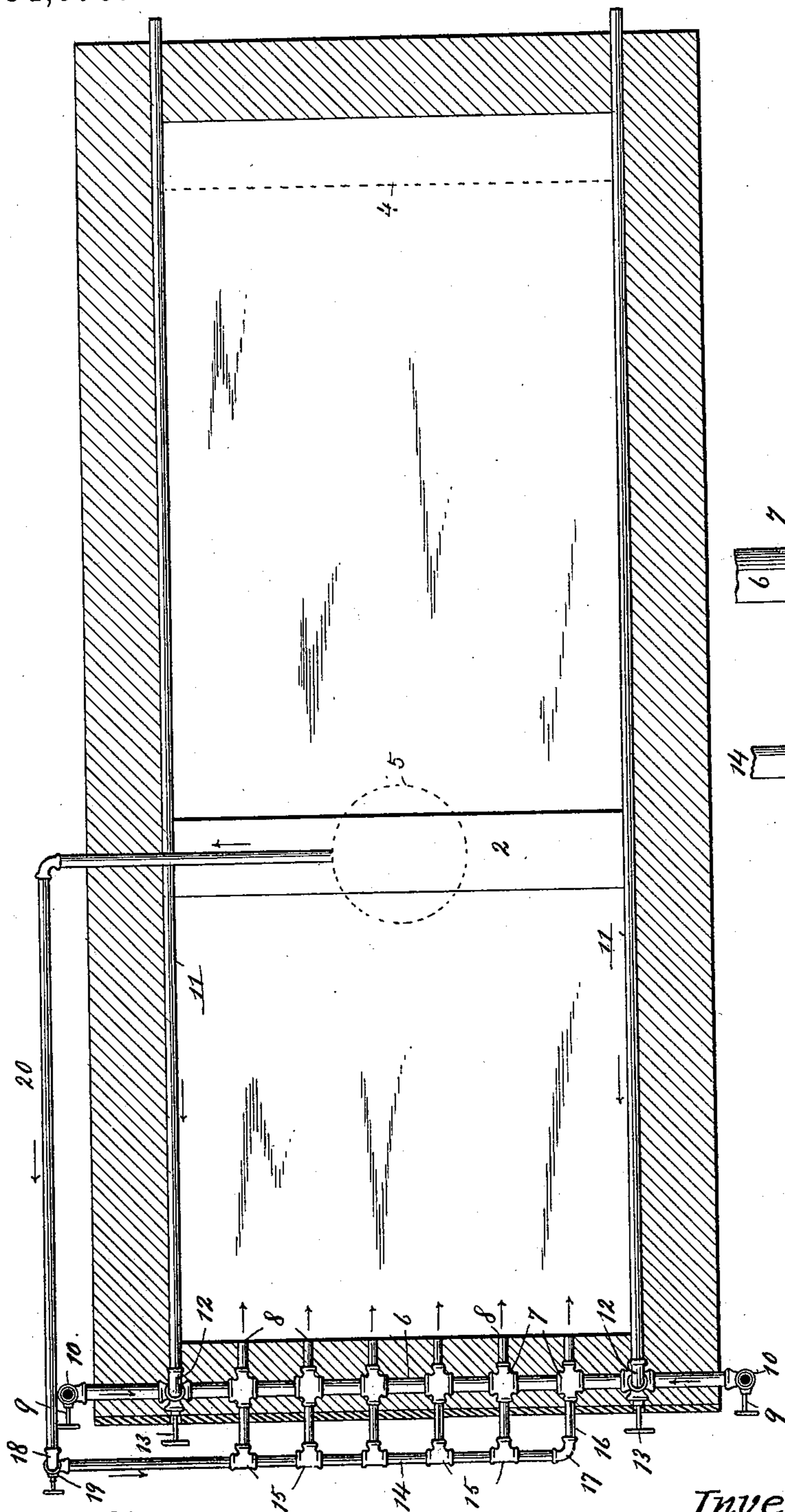


Fig. 3.

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UNITED STATES PATENT OFFICE.

JOHN BRANDON AND GEORGE BEAL, OF LEAVENWORTH, KANSAS.

SMOKE-CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 594,675, dated November 30, 1897.

Application filed January 16, 1897. Serial No. 619,442. (No model.)

To all whom it may concern:

Be it known that we, JOHN BRANDON and GEORGE BEAL, of Leavenworth, Leavenworth county, Kansas, have invented certain new and useful Improvements in Smoke-Consuming Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part thereof.

Our invention relates to smoke-consuming furnaces; and it consists in certain novel and peculiar features of construction and combination of parts, hereinafter described and claimed.

The object of the invention is to intensify the combustion by feeding to the fire heated air and steam that the products of combustion which would otherwise escape may be consumed. This of course would obviate the smoke nuisance in cities in a large degree at least and also would result in a more economical consumption of fuel.

In order that the invention may be fully understood, we will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 represents a vertical longitudinal section of a furnace embodying our invention. Fig. 2 is a horizontal section of the same. Fig. 3 is an enlarged section of parts of the apparatus.

In the said drawings, 1 designates a furnace.

2 designates the bridge-wall therein.

3 designates the grate.

4 designates a boiler supported therein in the customary or any other suitable manner.

5 designates the steam-dome of the boiler.

6 designates a pipe which extends transversely and horizontally through the front wall of the furnace. Said pipe consists really of a number of short sections joined together by means of tubular couplings 7, and projecting inwardly and slightly downward, by preference, from said couplings are the discharge pipes or nozzles 8. Said pipes or nozzles terminate flush with the inner surface of the wall of the furnace and are adapted to discharge the gas formed by a mixture of steam and hot air directly over the fire and into the products of combustion. The opposite ends of the pipe 6 are provided with controlling-

valves 9 and are connected with the lower ends of the vertical pipes 10. The pipes 10, which we term the "cold-air" pipes, extend, preferably, up through the building to the outer air.

11 designates a pair of hot-air pipes which extend longitudinally through the furnace and against the sides of the boiler. The rear ends are open to receive air, while their front ends are coupled to the vertical pipes 12, built in the front wall. The pipes 12 are coupled at their lower ends to the pipes 6 at opposite sides of the series of nozzles 8 and are controlled by means of valves 13.

14 designates a horizontal pipe composed of sections connected together by three-way couplings 15, and said couplings are provided with discharge-nozzles 16, which project into the couplings 7 and terminate at the mouth of the nozzles 8, thus extending clear across the passage of the couplings and the pipe 6, for a purpose which will be presently explained. One end of the pipe 14 is provided with an elbow 17, from which projects the end nozzle 16 into one of the couplings 7, while the opposite end of said pipe 14 is coupled to a vertical pipe 18, controlled by a valve 19, and said pipe in turn is coupled to a pipe 20, which communicates with the interior of the steam-dome 5. By this arrangement it is obvious that when steam is up and the various valves are open the pressure within the boiler forces the steam through the nozzles 16 and 8, and thereby creates a suction action in the pipe 6, which obviously draws air through pipes 10 and 11 and discharges it mixed with steam into the products of combustion as they rise from the fire.

This arrangement of steam-pipes acts on the principle of a steam-injector, as will be readily understood. The air is heated by being drawn through the pipes 11, which extend through the furnace and in direct contact with the highly-heated boiler. The fresh cold air which is drawn down through the pipes 10 mixes with the hot air drawn up through the pipes 11 and is discharged therewith at a suitable temperature over the fire, as indicated by arrows in Fig. 1. It will be seen by this arrangement also that commingled jets of air and steam are distributed over the entire sur-

face of the fire, so as to be more effective and reliable in the consumption of the entire product of combustion.

5 It will be noted that by conducting air from the outside of the building to the furnace better results will be had than by utilizing the interior air altogether, as the latter has been deprived of a portion of its oxygen.

10 If it is found that too much air is blown into the furnace for the quantity of steam, or vice versa, the valves of course may be manipulated accordingly—that is to say, if too much air is drawn in the valves may be closed partly.

15 From the above description it will be apparent that we have produced a smoke-consuming furnace which is positive and reliable in operation and which is simple, durable, and comparatively inexpensive of construction.

20 Having thus described the invention, what we claim as new, and desire to secure by Letters Patent, is—

25 The combination, substantially as hereinbefore described, with a furnace, of a transverse pipe set in the front wall of the furnace, consisting of a number of sections 6, and coup-

lings 7, nozzles 8 secured to said couplings and arranged to discharge into the fire-box, a valve-controlled pipe, 10, connected to each end of the said transverse pipe, and open to 30 the entrance of outside air at their opposite ends, a pair of valve-controlled pipes 12, set in the front wall of the furnace and coupled to the transverse pipe at their lower ends, a pair of hot-air pipes 11, resting against the 35 boiler and having their front ends coupled to the upper ends of pipes 12, and their rear ends open, a second transverse pipe, 14, parallel with the other and arranged in front of the furnace, nozzles 16, projecting from said pipe 40 into the couplings 7, and clear across their transverse passages, and valve-controlled pipes connecting the transverse pipe 14, to the steam-dome of the boiler, substantially as described. 45

In testimony whereof we affix our signatures in the presence of two witnesses.

JOHN BRANDON.
GEORGE BEAL.

Witnesses:

HENRY SHINDLER,
RICHARD J. O'LEARY.