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C. H. MOORE.

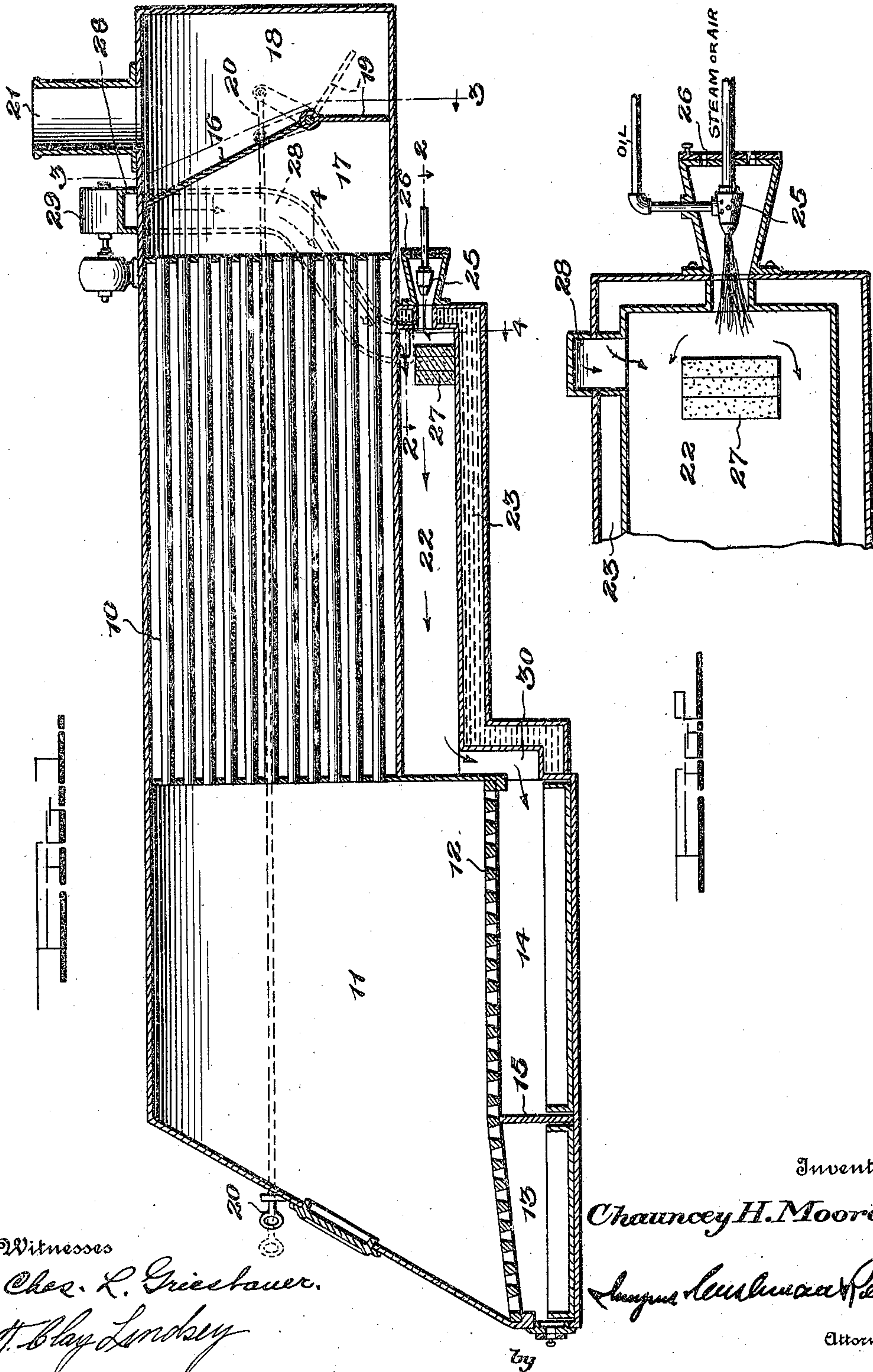
SMOKE CONSUMING FURNACE.

APPLICATION FILED FEB. 26, 1915.

1,154,877.

Patented Sept. 28, 1915.

2 SHEETS—SHEET 1.



Witnesses

Chas. L. Griestauer.

H. Clay Lindsey

Inventor

Chauncey H. Moore,

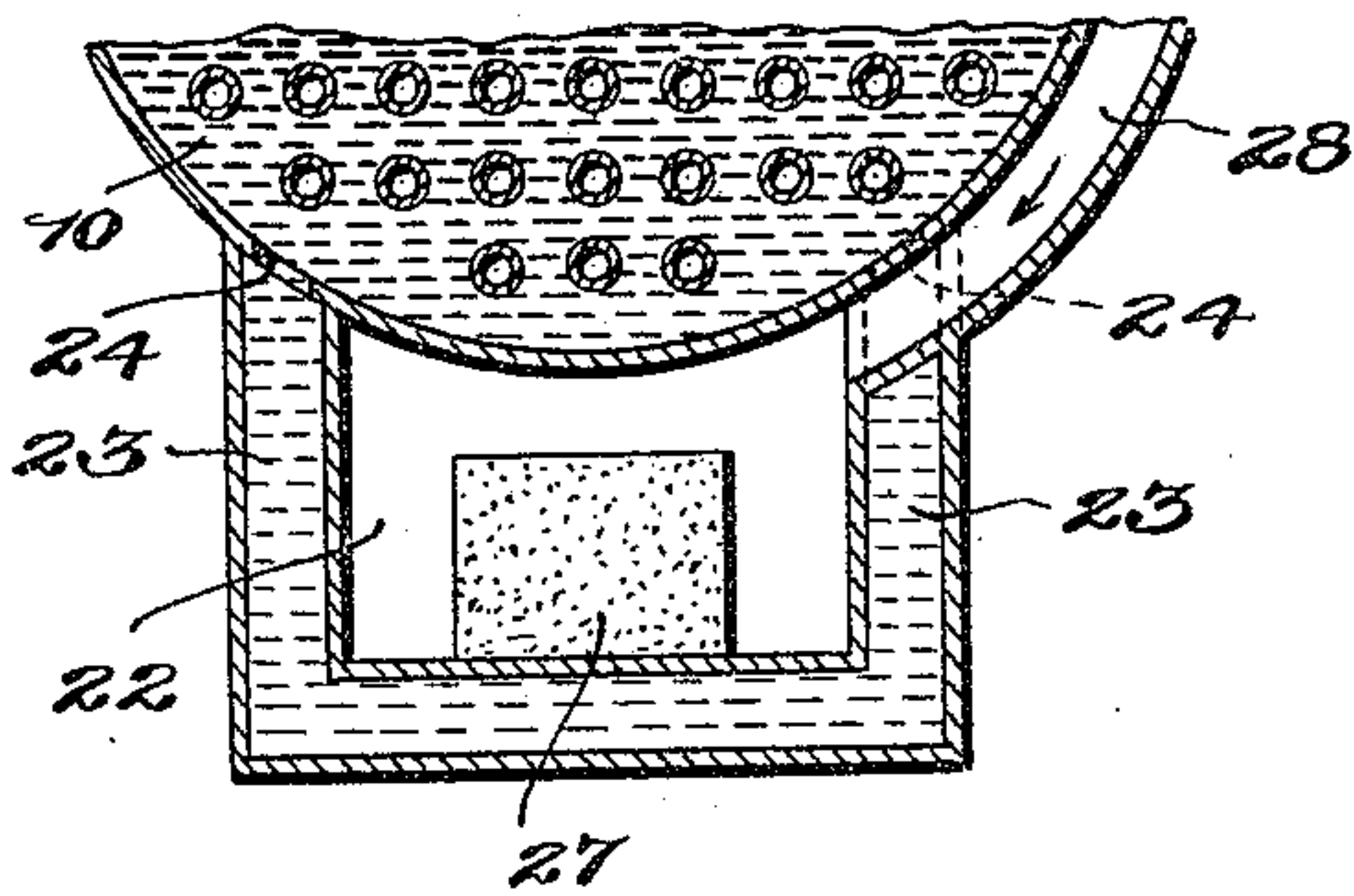
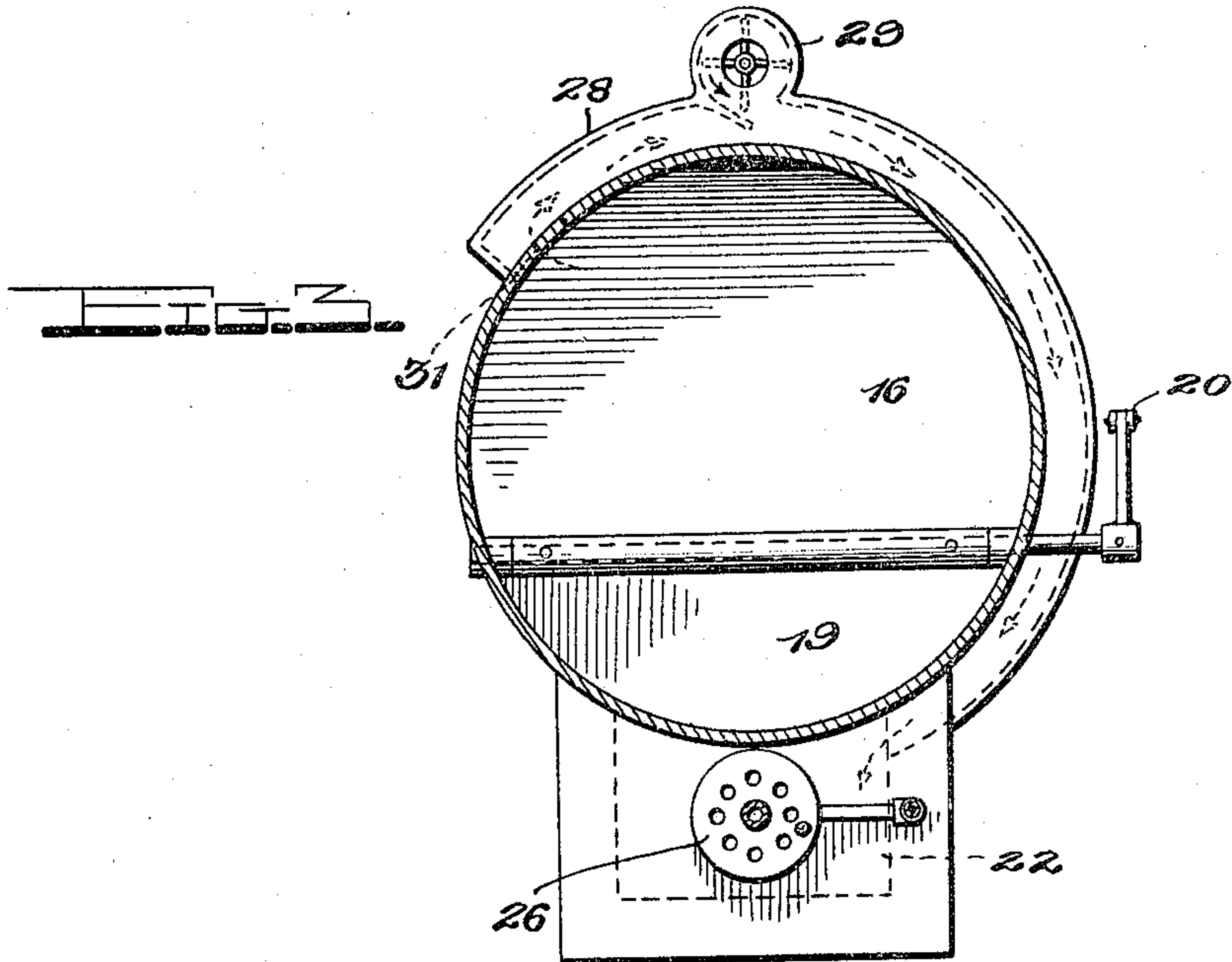
Augustus Leitch

Attorney

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Inventor

Chauncey H. Moore,

Witnesses

Chas. R. Greisbauer,
T. Gray Lindsey

By *Amey Cushman* Atty

Attorney

UNITED STATES PATENT OFFICE.

CHAUNCEY H. MOORE, OF BELLWOOD, PENNSYLVANIA, ASSIGNOR OF ONE-FOURTH TO GEORGE L. HOLTZAPPLE, ONE-FOURTH TO FRANK M. WEAVER, AND ONE-FOURTH TO ROBERT A. HOLDEN, ALL OF BELLWOOD, PENNSYLVANIA.

SMOKE-CONSUMING FURNACE.

1,154,877.

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To all whom it may concern:

Be it known that I, CHAUNCEY H. MOORE, a citizen of the United States, residing at Bellwood, in the county of Blair and State of Pennsylvania, have invented new and useful Improvements in Smoke-Consuming Furnaces, of which the following is a specification.

This invention relates to furnaces, and more particularly to an improved spark arrester and smoke consumer, and has as an object to provide a furnace in which the complete combustion of smoke, cinders and the like is insured, and the discharge of the same from the stack or chimney is prevented by passing the products of combustion, after the same has passed through the boiler, to a supplemental and auxiliary heater, which is separate and distinct from the main fire-box, and from thence to the main fire-box.

It is a further object of the invention to provide a supplemental and auxiliary fire-chamber immediately below the boiler of the engine to which the smoke and products of combustion are passed and where they are consumed or burned, the heat generated thereby being utilized to directly heat the water in the boiler and the water in a water jacket about the supplemental and auxiliary fire chamber, the water jacket being in communication with the water in the boiler.

The above and other objects of this invention will be more fully brought out in the following detail disclosure of one embodiment of this invention, the same being illustrated in the accompanying drawings in which,—

Figure 1 is a longitudinal section of a locomotive disclosing the present embodiment of my invention. Fig. 2 is an enlarged detail section taken on line 2—2 of Fig. 1 horizontally through the forward end of the supplemental and auxiliary combustion chamber. Fig. 3 is a transverse section taken on line 3—3 of Fig. 1. Fig. 4 is a vertical fragmentary section taken on line 4—4 of Fig. 1.

In the drawings is disclosed a locomotive fire-tube boiler 10, a combustion chamber 11 at the rear end of the boiler, a grate 12 and ash pits 13 and 14, the ash pits being

separated by a vertical transverse wall 15 for a purpose hereinafter disclosed.

At the forward end of the boiler 10 is a smoke box having a diaphragm or partition wall 16 inclined downwardly and forwardly, and passing to within a short distance of the bottom of the smoke box, whereby the latter is divided into chambers 17 and 18. The opening beneath the diaphragm 16, through which communication between chambers 17 and 18 is established, is adapted to be closed by a damper 19 hingedly mounted upon the lower end of the diaphragm 16, the damper being connected to a rod 20 which may extend to the cab of a locomotive or to any other convenient place where the attendant may operate the same to open or close the damper. When it is desired to start the fire on the grate 12, the damper 19 is raised into the dotted position shown in Fig. 1, so that the chamber 17 communicates with chamber 18 and a draft is obtained through the fire-tube chambers 17 and 18 and the stack 21. The damper 19 is maintained in open position until the fire is well-started and sufficient steam pressure is obtained for operating the hereinafter described fan, after which the damper must be closed.

Immediately beneath the boiler and extending substantially throughout its length is a combustion chamber 22 which, as shown in Fig. 4, is substantially rectangular in cross-section. The wall of the boiler 10 serves as the covering wall of the chamber 22, and the side walls and bottom of the fire chamber are provided with a water jacket 23. Any suitable means may be provided whereby the water in the water jacket 23 is adapted to communicate with the water in the boiler, in the present instance, ports or openings 24 are disclosed as passing through the wall of the boiler 10.

The combustion chamber 22 is provided at the forward end thereof with an oil burner 25 which burner is connected by means of pipes to a supply of oil and a source of steam. While the steam may be obtained from any suitable source, it is preferable to use the steam generated in the boiler of the engine. The oil when led into the chamber 22, vaporizes and with the steam, together with the air admitted through the diaphragm or

damper 26 forms an intense heat which will burn or consume the products of combustion led into the chamber. A baffle plate 27 is provided immediately in front of the opening through which the burning oil and steam pass for the purpose of spreading the flame from the burner and causing the same to come into contact with the walls of the combustion chamber and the boiler, so as to more readily heat the water within the same. It will be noted that by providing such a fire chamber in the location above set forth the heat generated by the burning of the smoke is used to heat the water within the boiler 10 and the water jacket 23 whereby the heating surface of the furnace is materially increased, while, at the same time, no part of the calorific properties of the fuel, which is used to heat the boiler, is lost. It will be further noted that by providing the oil burner 25 in a chamber, distinct and separate from the main fire-box, the burner is not injured by the heat generated in the main fire-box, and that it cannot be damaged by the fireman when he stokes the fire on the fire-grate 12.

The smoke and cinders are conducted from the chamber 17 of the smoke box to the combustion chamber 22 by means of a passage or pipe 28 which is provided on the outside of the boiler 10. At the top of the boiler and in the passage 28 is provided a fan 29, the suction side of which is connected with the chamber 17 as shown by the arrow 31, and the outlet or discharge side of which leads to the combustion chamber 22. The products of combustion from the combustion chamber 22 pass rearwardly through the same and by means of a passage 30 into the ash pit 14, thence through the grate 12 where, should any unburned portions remain, the latter are consumed together with the fuel upon said grate.

The operation of my device is as follows: After the fire is well started and the damper 19 is lowered so as to prevent communication between chambers 17 and 18, as above set forth, the fan 29 is operated and a draft is produced thereby through the ash pit 13, the portion of grate 12 over pit 13, combustion chamber 11, the fire tubes in the boiler 10, and the products of combustion pass from the smoke-box chamber 17 through the passage 28 into the fire chamber 22 where the products of combustion are burned and the heat utilized to heat the water in the boiler 10 and the water in the jacket 23, and from the chamber 22 the gases are further forced through the passage 30 into ash-pit 14 and through the grate 12 where should any unburned portions of the products of combustion be present they will burn with the fuel upon the grate 12.

While the present embodiment of this invention discloses my improved spark ar-

rester and smoke consumer in combination with a locomotive boiler, it is, of course, to be understood that it may be applied to a stationary boiler or to any other suitable form of steam boiler furnace, the present disclosure being for the purposes of illustration only. It is obvious that the structure is susceptible of further modification in form, proportion and arrangement of parts within the scope of the claims without departing from the principle of the invention.

What I claim is,—

1. In a smoke consumer and spark arrester, the combination with a furnace having a boiler and the usual smoke box, of a chamber extending longitudinally beneath the boiler throughout substantially the entire length thereof and communicating with the smoke box, said boiler forming a closure wall for said chamber, means for feeding the products of combustion from the smoke box to the chamber, and means for burning the products of combustion in said chamber throughout the entire length thereof whereby to provide an auxiliary and supplemental heater for the boiler.

2. In a furnace having an ash pit, the usual combustion chamber, boiler and smoke box, of a chamber beneath the boiler outside of the combustion chamber and communicating at one end with the smoke box, and at its opposite end with the ash pit, means for forcing the products of combustion from the smoke box to the ash pit through said chamber, and means for consuming the products of combustion during their passage through said chamber.

3. In a smoke consumer and spark arrester, the combination with a boiler, a fire-box at one end of said boiler, and a smoke box at the other end of said boiler, of a supplemental and auxiliary fire chamber beneath said boiler communicating with said smoke box and in which the smoke is adapted to be burned, a water-jacket about said auxiliary fire-chamber in communication with the boiler, and a passage from said chamber to the fire box for returning the products of combustion to the latter.

4. In a furnace having the usual boiler and combustion chamber, a second chamber arranged beneath said boiler, a water-jacket about said second chamber having communication with the boiler, means for delivering the products of combustion from said first chamber to the second chamber, and means for consuming the products of combustion in said second chamber.

5. In a furnace having the usual combustion chamber and boiler, of a smoke box having a diaphragm extending downwardly and forwardly and substantially separating said smoke box into two vertical chambers, one of said chambers being immediately in front of said boiler, and the other of said

chambers being in communication with a smoke stack a damper on said diaphragm adapted to control communication between said chambers, a second combustion chamber arranged beneath the boiler, a passage leading from said first chamber of the smoke box to said second combustion chamber, means in said passage for forcing the products of combustion through said passage into said second chamber, and means in said second chamber for burning the products of combustion therein.

6. In a furnace having the usual boiler and combustion chamber, a second combustion chamber adjacent the boiler outside of said first combustion chamber and extending substantially throughout the entire length of said boiler, the wall of the boiler serving as a wall for said second chamber whereby the evaporative surface of the boiler is increased, a water-jacket about the remaining walls of said second chamber and in communication with the boiler whereby the evaporative surface is further increased, means for delivering the products of combustion from said first chamber to said sec-

ond chamber, and means in said second chamber for consuming the products of combustion therein.

7. In a smoke consumer and spark arrester, the combination with a furnace having the usual combustion chamber, a fire-grate, boiler and smoke-box, of a divided ash pit beneath said fire-grate, a second combustion chamber arranged beneath the boiler and communicating at one end with the smoke box and at its other end with one portion of said ash pit, a water-jacket about said second chamber communicating with said boiler, means for forcing the products of combustion to said portion of the ash pit through said second combustion chamber, and means for consuming the products of combustion during their passage through said second chamber.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CHAUNCEY H. MOORE.

Witnesses:

D. E. NORTH,
HENRIETTA KABIS.