

No. 675,782.

Patented June 4, 1901.

L. MARKEY.

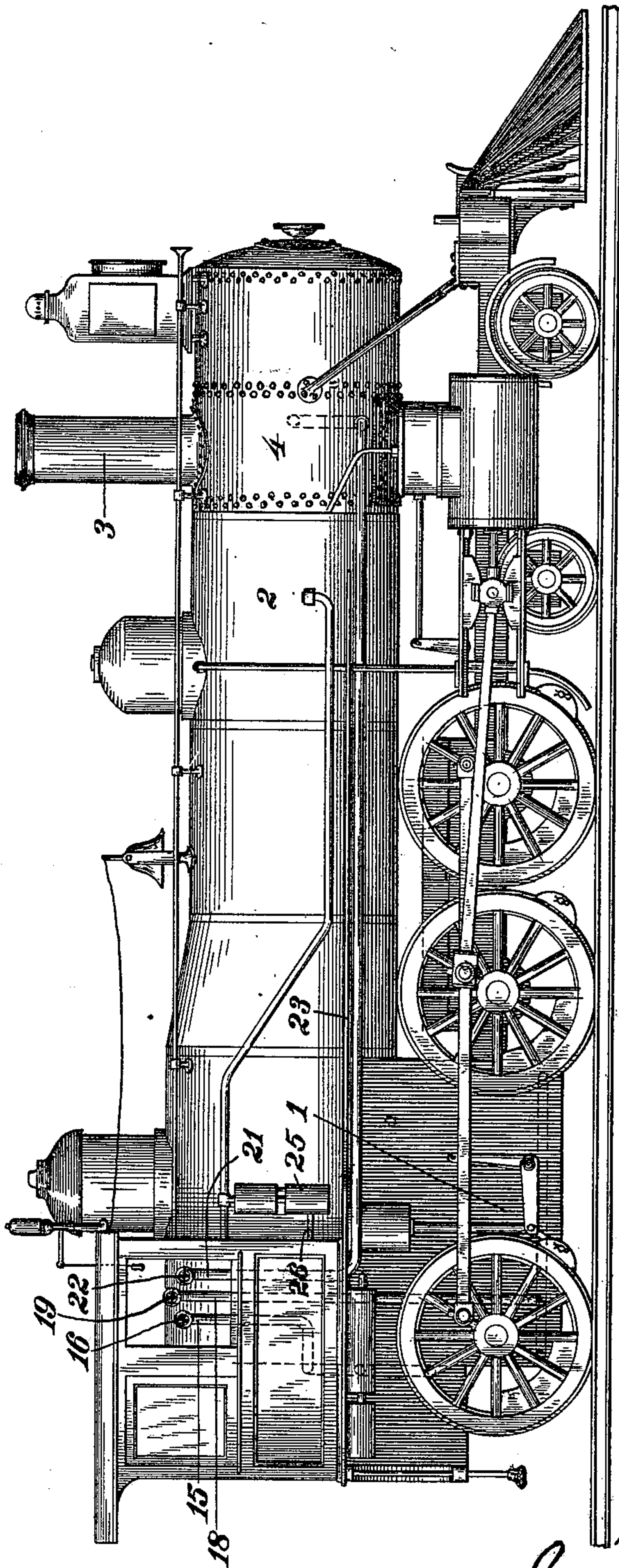
MEANS FOR PROMOTING COMBUSTION IN BOILER FURNACES.

(No Model.)

(Application filed Apr. 3, 1900.)

2 Sheets—Sheet 1.

Fig. 1.



Witnesses

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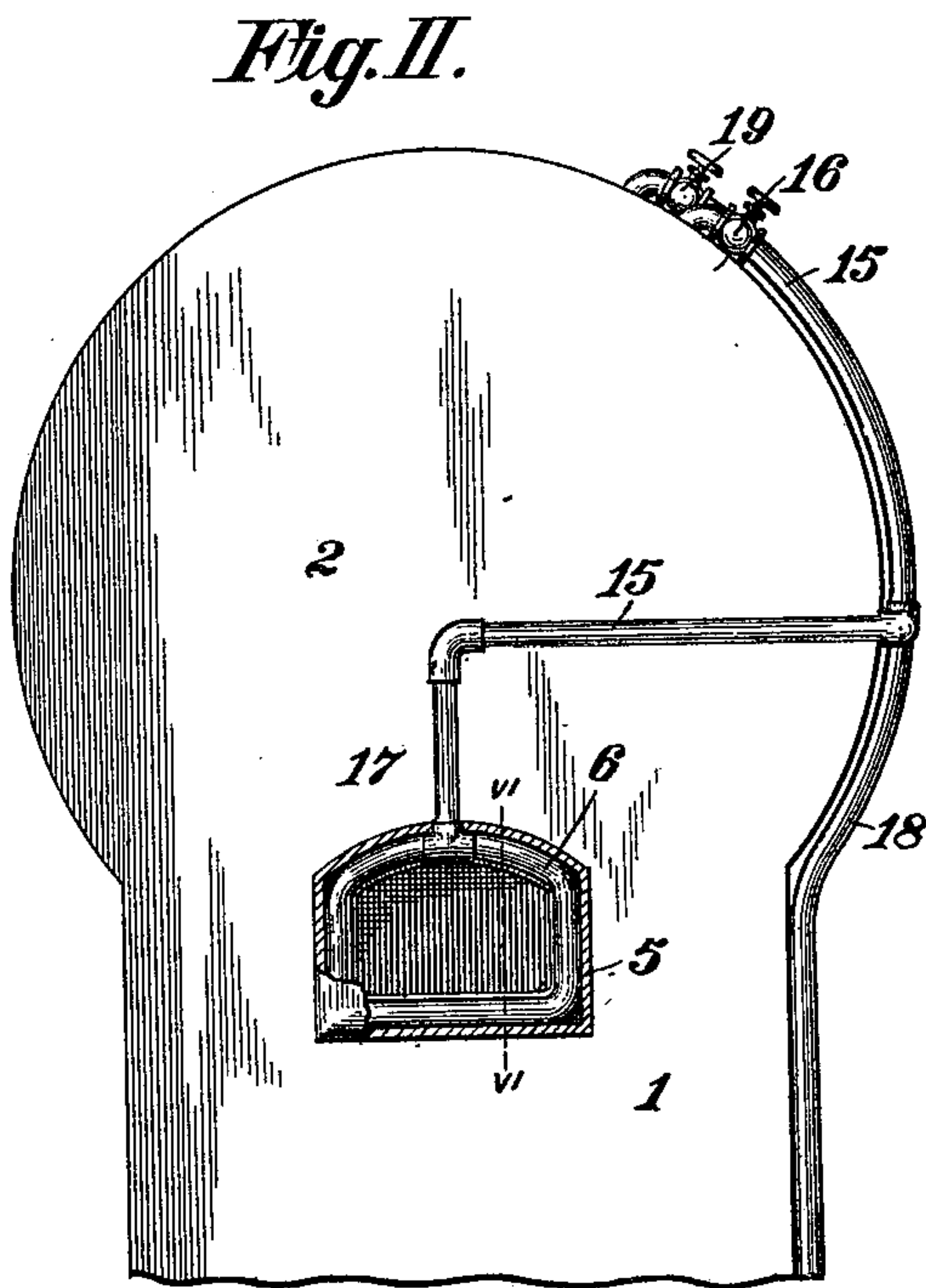
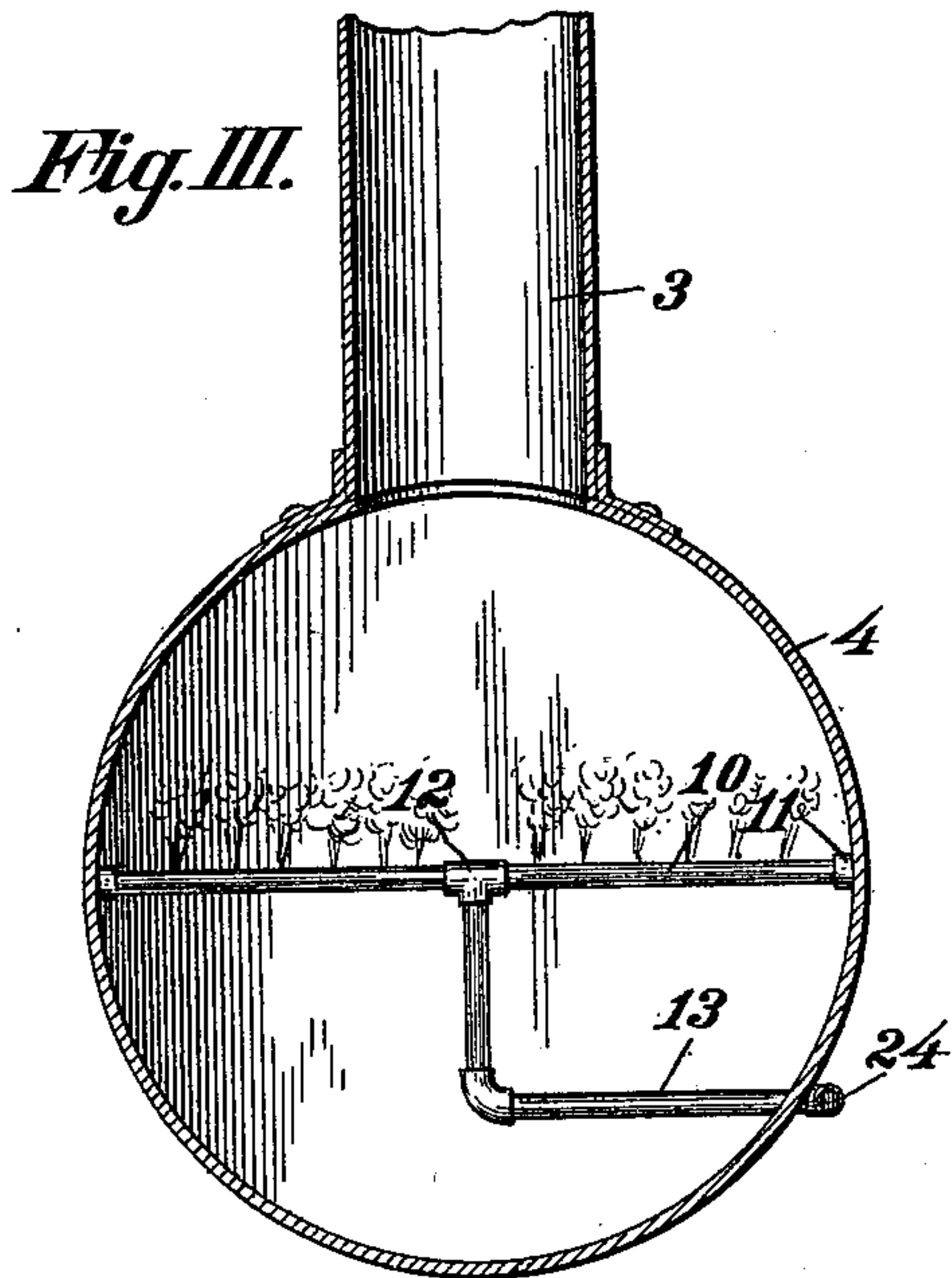
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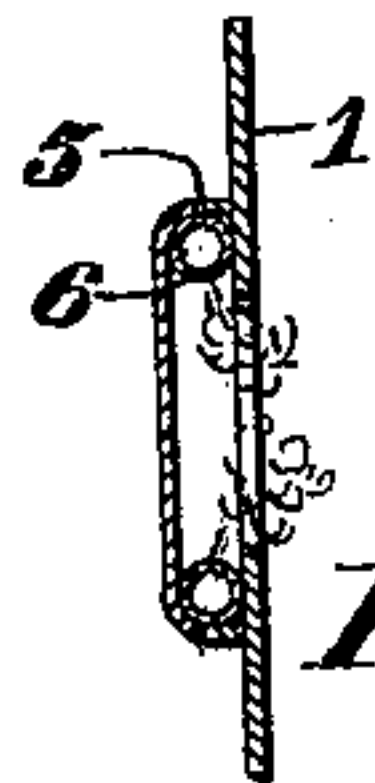
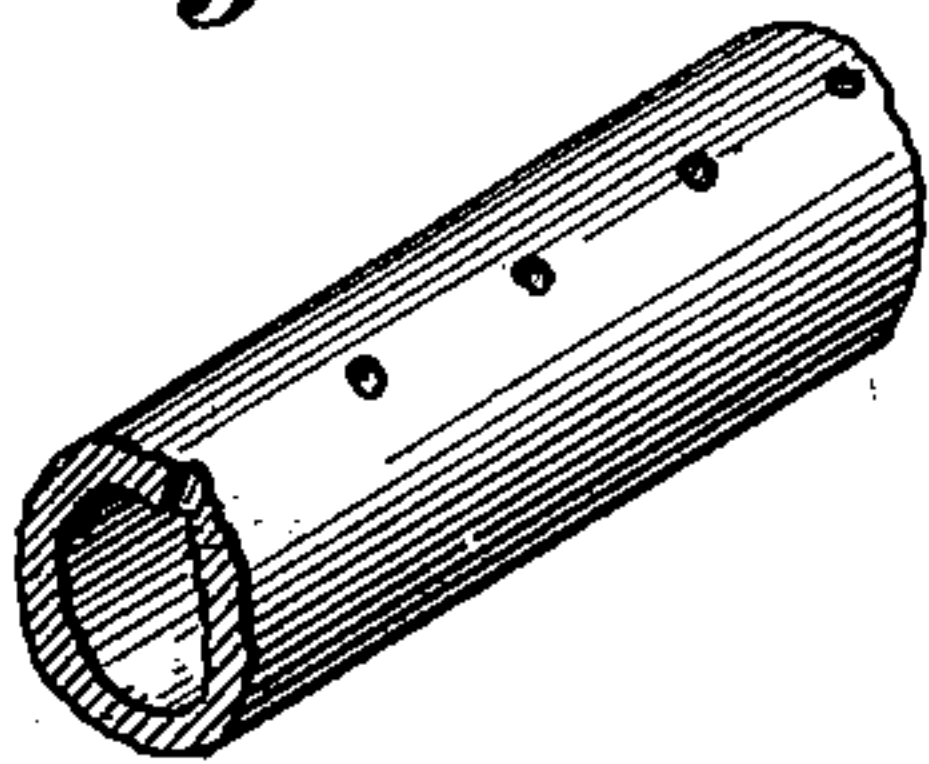
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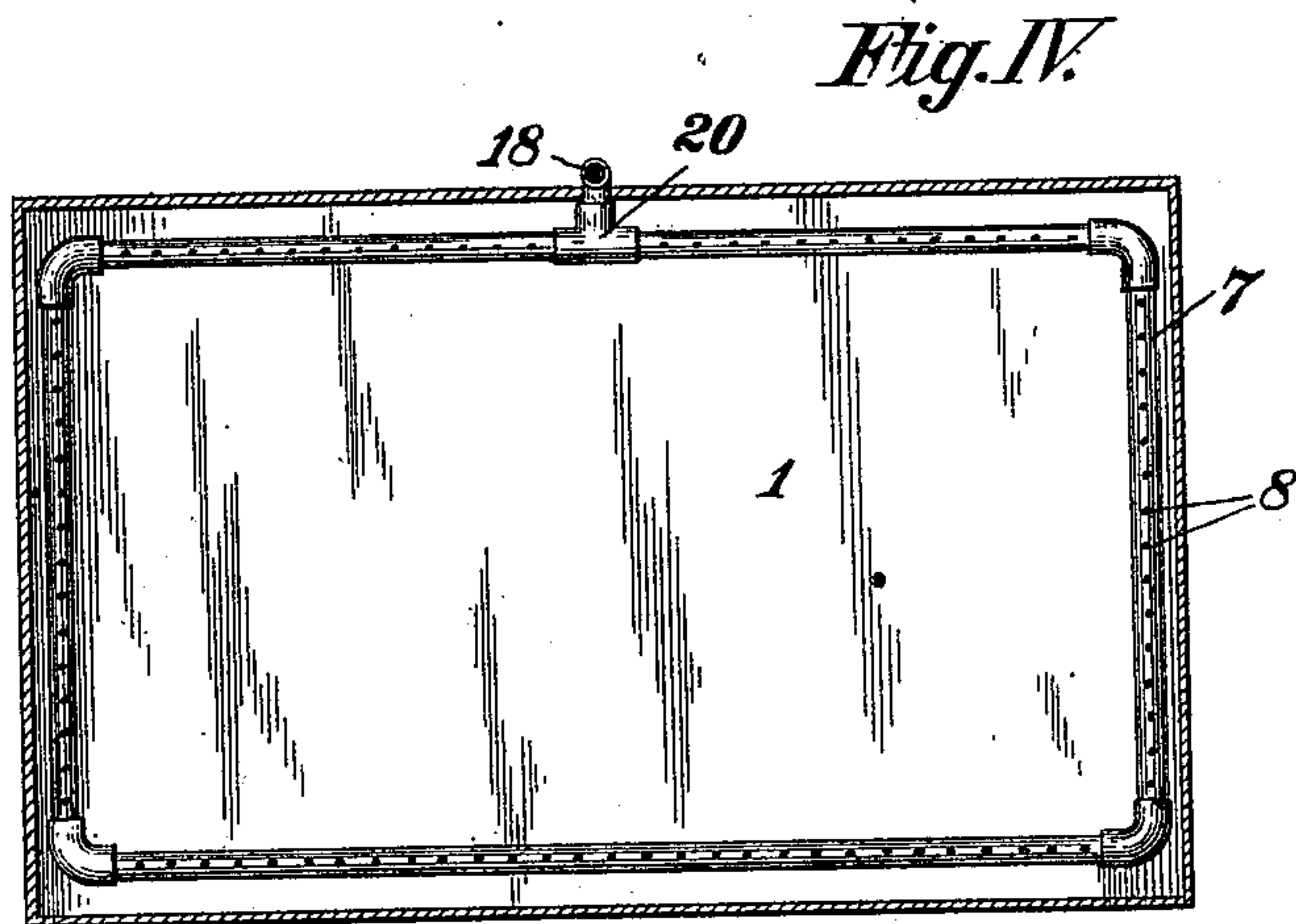
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*Fig. V.*



*Fig. VI.*



Witnesses

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# UNITED STATES PATENT OFFICE.

LAWRANCE MARKEY, OF CLIFTONFORGE, VIRGINIA, ASSIGNOR OF ONE-HALF TO JOHN A. QUINN, OF SAME PLACE.

MEANS FOR PROMOTING COMBUSTION IN BOILER-FURNACES.

SPECIFICATION forming part of Letters Patent No. 675,782, dated June 4, 1901.

Application filed April 3, 1900. Serial No. 11,366. (No model.)

*To all whom it may concern:*

Be it known that I, LAWRANCE MARKEY, of Cliftonforge, in the county of Alleghany, State of Virginia, have invented an Improved  
5 Means for Promoting Combustion in Boiler-Furnaces, of which the following is a complete specification, reference being had to the accompanying drawings.

The object of my invention is to produce  
10 means for promoting combustion in furnaces, particularly of locomotives, whereby a material gain is made in point of expense and comparative efficiency.

My invention being, as above stated, especially designed for use upon locomotives  
15 has for a principal object to prevent the emission of smoke, cinders, and gases from the smoke-stack.

I accomplish the object of my invention in  
20 two ways, first, in supplying beneath the fire-box and at the stoke-hole (the two sources of draft and air supply to the furnaces) a well-distributed and sufficient quantity of fluid, as steam or air, to promote and maintain  
25 under all conditions maximum combustion within the furnace proper; second, in supplying within the boiler-head or smoke-box a supply of fluid which in proportion to the volume supplied may either there suffice to  
30 complete the consumption of such products of combustion that escape from the furnace through the boiler-flues or to precipitate them in the bottom of the smoke-box out of reach of the draft to the stack.

It is well understood in the art to which my invention relates that a supply of steam or air to a furnace in certain quantities serves to promote combustion. The several objects of my invention may be therefore  
40 summed up in the statement that they are to supply a suitable fluid at such points and by such means as will best tend to accomplish the desired result.

In the accompanying drawings, Figure I is  
45 a side elevation of a conventional design of a locomotive equipped with my apparatus. Fig. II is a rear end elevation of the boiler and upper portion of the furnace, a portion of the stoke-hole being cut away. Fig. III is  
50 a transverse section through the fire-box and

smoke-stack shown in Fig. I. Fig. IV is a horizontal section through the bottom of the fire-box shown in Fig. I, illustrating in plan the main steam or air supply apparatus. Fig. V is a perspective view of a fragmentary section of a pipe provided with apertures by which a supply of fluid may be distributed at the various points for the accomplishment of the objects of my invention. Fig. VI is a section on the line VI VI of Fig. II, showing  
55 the location of the feed-pipe with respect to the combustion-chamber.

Referring to the numerals on the drawings, 1 indicates the fire-box, 2 the boiler, and 3 and 4 the stack and smoke-box, respectively,  
60 thereof. The elements enumerated are illustrated by way of example of the parts of any preferred type of a locomotive furnace and boiler to which my invention is applicable, the remaining portions whereof require in  
70 this connection no description.

5 indicates the stoke-hole frame of a furnace, which in practice is provided, as usual, with a suitable door. (Not illustrated.) Within the frame 5 and fitting snugly around the  
75 same and preferably well removed from the intense heat of the furnace I provide a collar of pipe 6, that is provided with inwardly-discharging apertures, such as are illustrated in Fig. V. Beneath the mass of fuel within the  
80 fire-box I provide a similar frame 7, which may be made of pipe united by suitable fittings and elbows. The frame 7, like the collar 6, is preferably protected from the intense heat of the furnace and is for that reason  
85 located near the bottom of the fire-box, as illustrated in Fig. I, and provided with upwardly and inwardly discharging apertures 8, which also correspond to the apertures illustrated in Fig. V.  
90

Within the smoke-box I provide a cross-head 10 of pipe closed at its opposite ends, as indicated at 11, and connected, as by a T-fitting 12, with an angular pipe 13.

The collar 6, frame 7, and cross-head 10, with its fitting and interior pipe connections, may be made of metal if protected, as preferred, from the intense heat; but, if preferred, they may be made of highly refractory material, in which case the necessity of pro-  
100



tection from the heat is obviated, and consequently their several stations may be, if preferred, somewhat varied.

The elements last referred to constitute respective means for distributing a fluid draft-supply, such as steam or air, to the several parts of the furnace and boiler where they are applied and are preferably supplied therewith by external pipes, which respectively communicate with the interior of the boiler or other source of air-supply. For that purpose if steam is to be employed I provide a pipe 15, which, leading from a valve-controlled connection 16 with the boiler, communicates with the collar 6, as indicated at 17. Another pipe 18, leading from a valve-controlled connection 19, communicates with the frame 7, as indicated at 20. Another pipe 21, leading from a valve-controlled connection 22 along the outside of the boiler, preferably underneath the foot-rail 23, communicates, as indicated at 24, with the pipe 13. The several valve-controlled boiler connections 16, 19, and 22 are located within easy reach of the engineer and place the steam-supply within his control, thereby enabling him to direct or shut off steam to or from the several points of distribution in such quantities and at such times as may be required.

In operation the valve-controlled connection 19 is kept constantly open while the locomotive is working and contributes, with the main draft-supply, a continuous supply of steam, the force of which may be increased into a strong blast when required. By this means the ordinary combustion within the furnace is perfected and maintained. The frequent opening of the stoke-hole cuts off at intervals the main draft-supply, which ordinarily reduces the degree of combustion and causes dense volumes of smoke and other unconsumed matter to pass out through the flues and stack of the boiler. Through the employment of this invention a supplemental draft or blast of fluid may be supplied above the mass of fuel and compel in the upper part of the furnace and the flues of the boiler such degree of combustion as will consume the smoke and other matter which on account of the checked combustion ordinarily occasioned by the opening of the stoke-hole causes the emission from the stack of unconsumed prod-

ucts of partial combustion. The collar 6 need be employed as a fluid-distributing apparatus only at intervals when the stoke-hole is open, or it may be used more constantly, if preferred.

The operation last mentioned will suffice in the main to consume most of the products of combustion before they reach the smoke-box; but if any remain they may be there consumed or precipitated, as preferred or required, by regulating the volume of fluid supplied through the cross-head 10. The proportion of unconsumed products of combustion that escape into the smoke-box will differ with different grades of fuel and with the degree of success with which the furnace is operating. Such conditions will therefore determine the constancy and extent of draft fluid which will be required to be delivered through the cross-head 10.

The management of the fluid-supply to the several distributing portions of the apparatus being under complete control of the engineer or other attendant can be conducted to suit the requirements of varying conditions.

If air is used as the combustion-supporting fluid, the pipes 15, 18, and 21 are connected with an air-supply tank, (not illustrated,) which may be carried on the tender and which derives its air-supply from an ordinary pump, (indicated at 25 in Fig. I of the drawings.) A pipe 26 is shown as leading from the pump 25 toward the tank on the tender. By the employment of such means air may be substituted for steam as the combustion-supporting fluid, or commingled air and steam may be employed.

What I claim is—

The combination with a boiler and furnace, of a perforated fluid-supply pipe, so arranged within the stoke-hole of the furnace that any air which may pass through the stoke-hole, either when the door is open or closed, will pass over the supply-pipe, and tend to cool the same.

In testimony of all which I have hereunto subscribed my name.

LAWRANCE MARKEY.

Witnesses:

G. W. KINCAID,  
W. S. TAYLOR.