

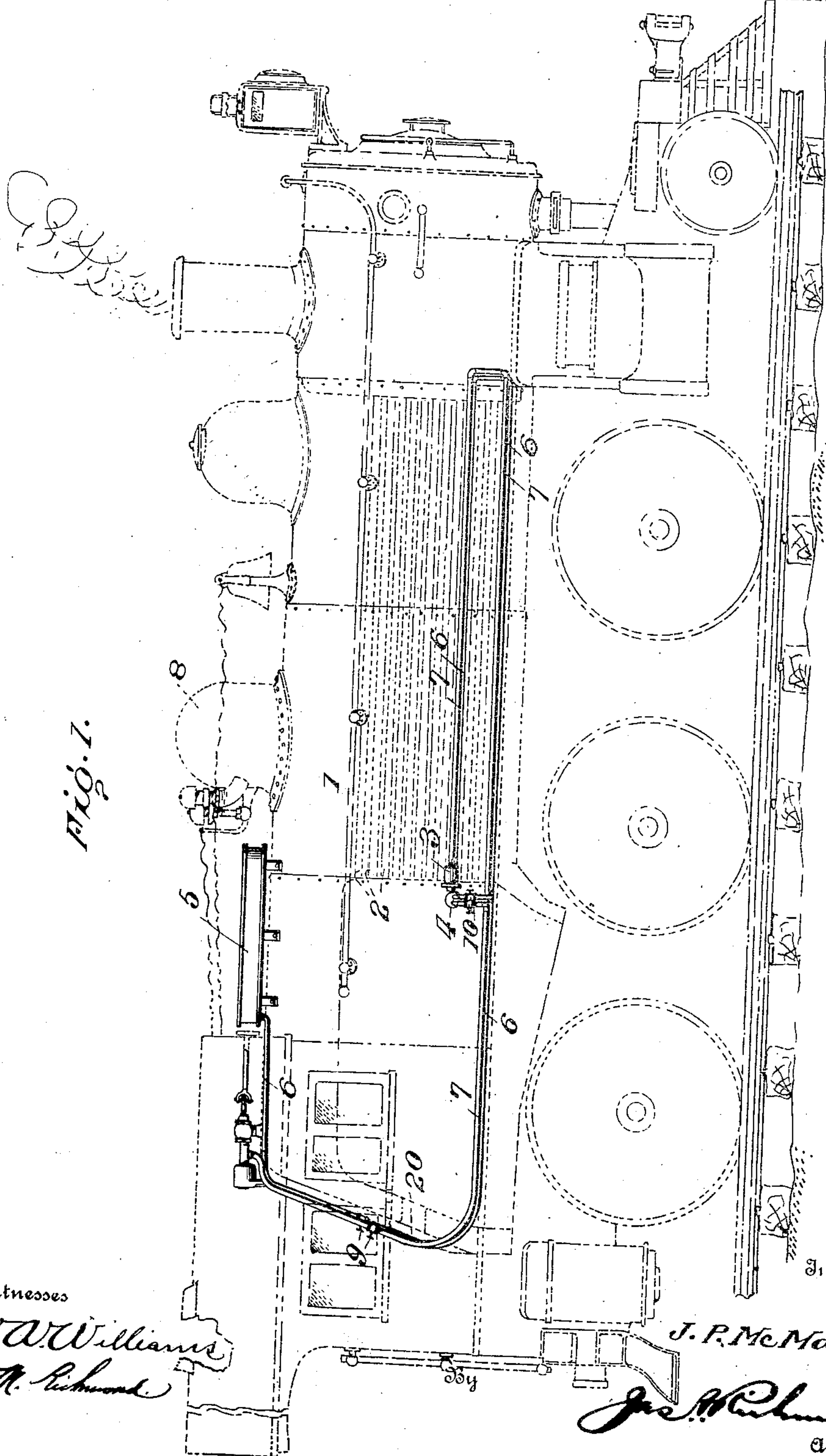
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PATENTED MAR. 6, 1906.

J. P. McMAHON.
SMOKE CONSUMING APPARATUS FOR FURNACES.

APPLICATION FILED APR 10, 1905.

4 SHEETS—SHEET 1.



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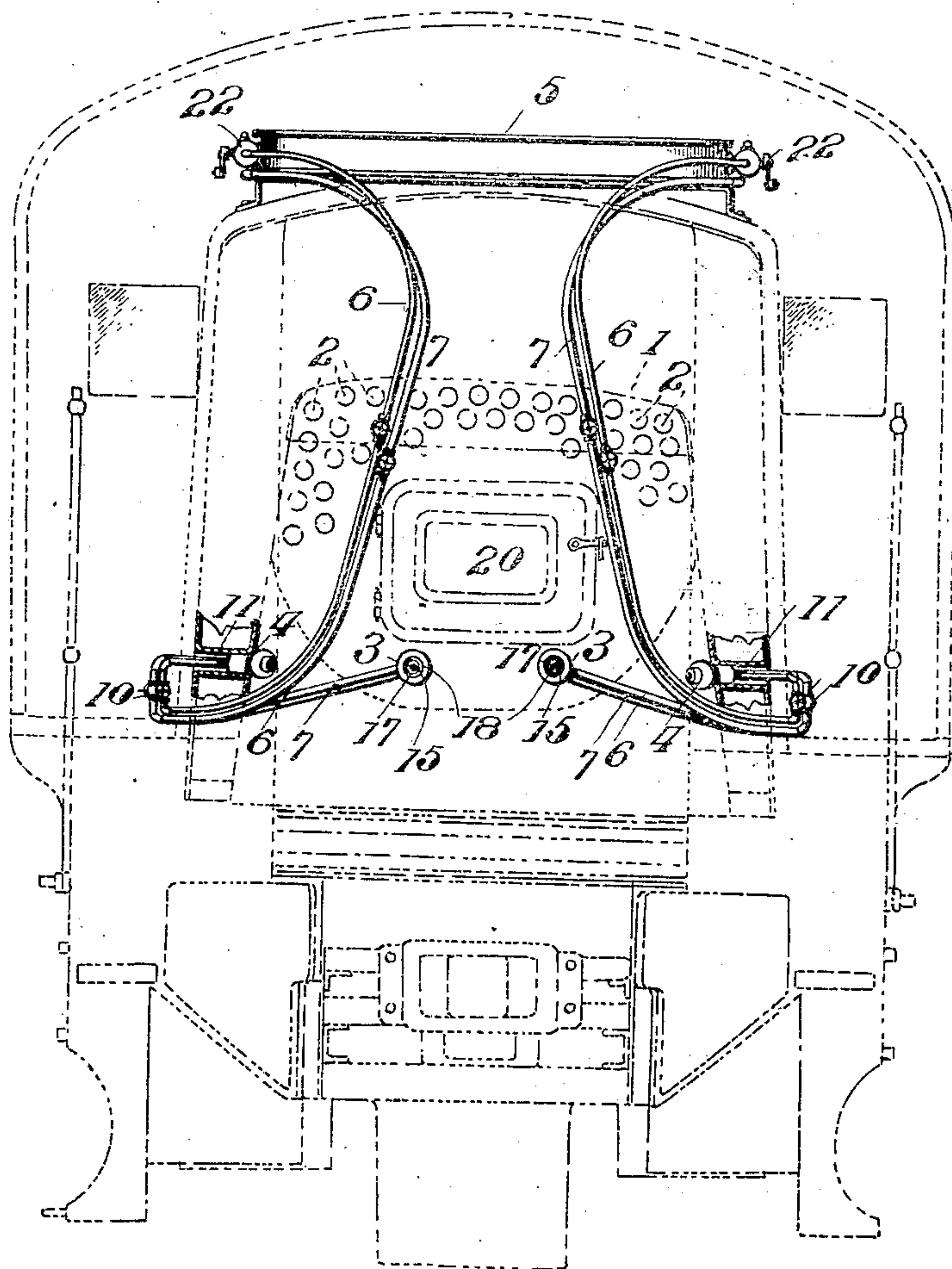
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4 SHEETS—SHEET 2.

Fig. 2.



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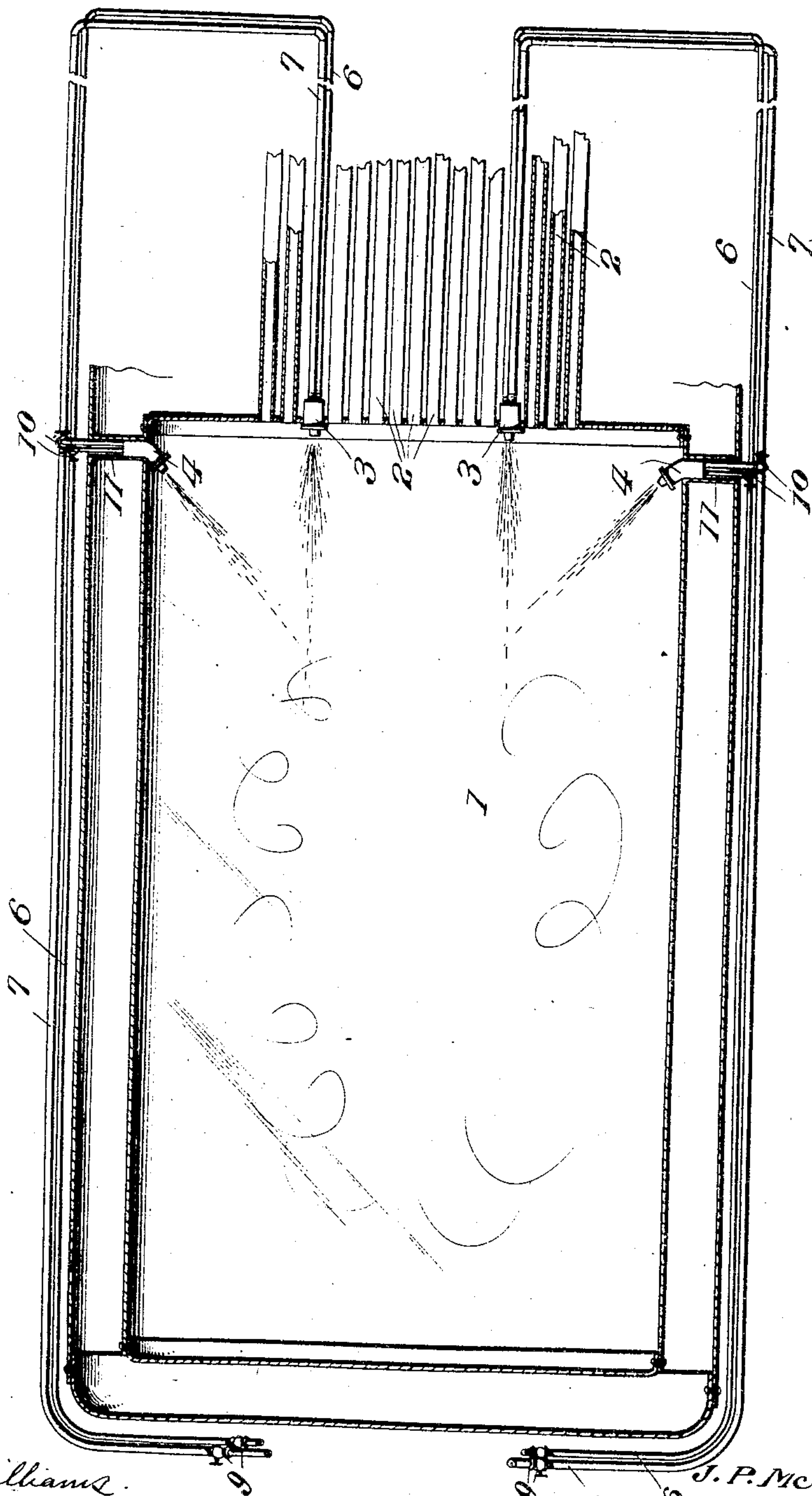
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Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 4.

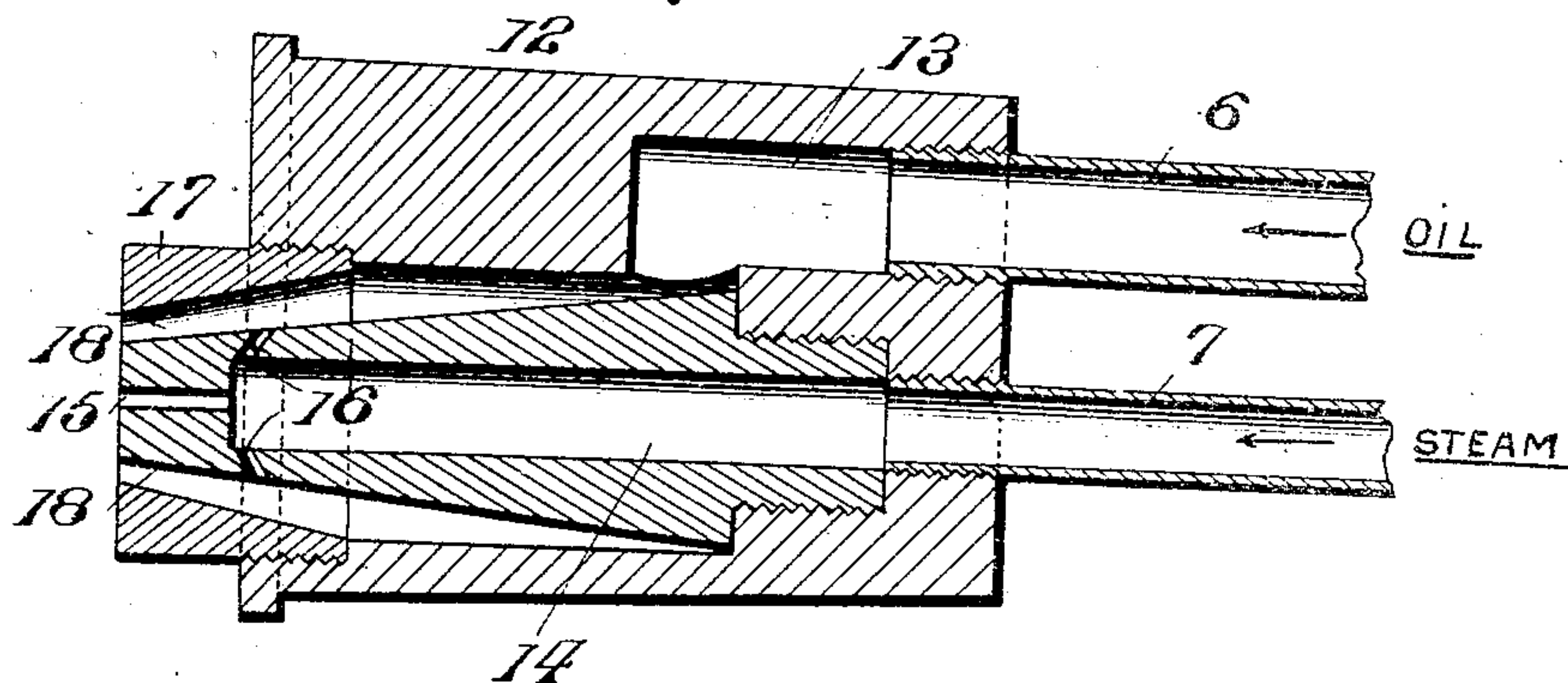
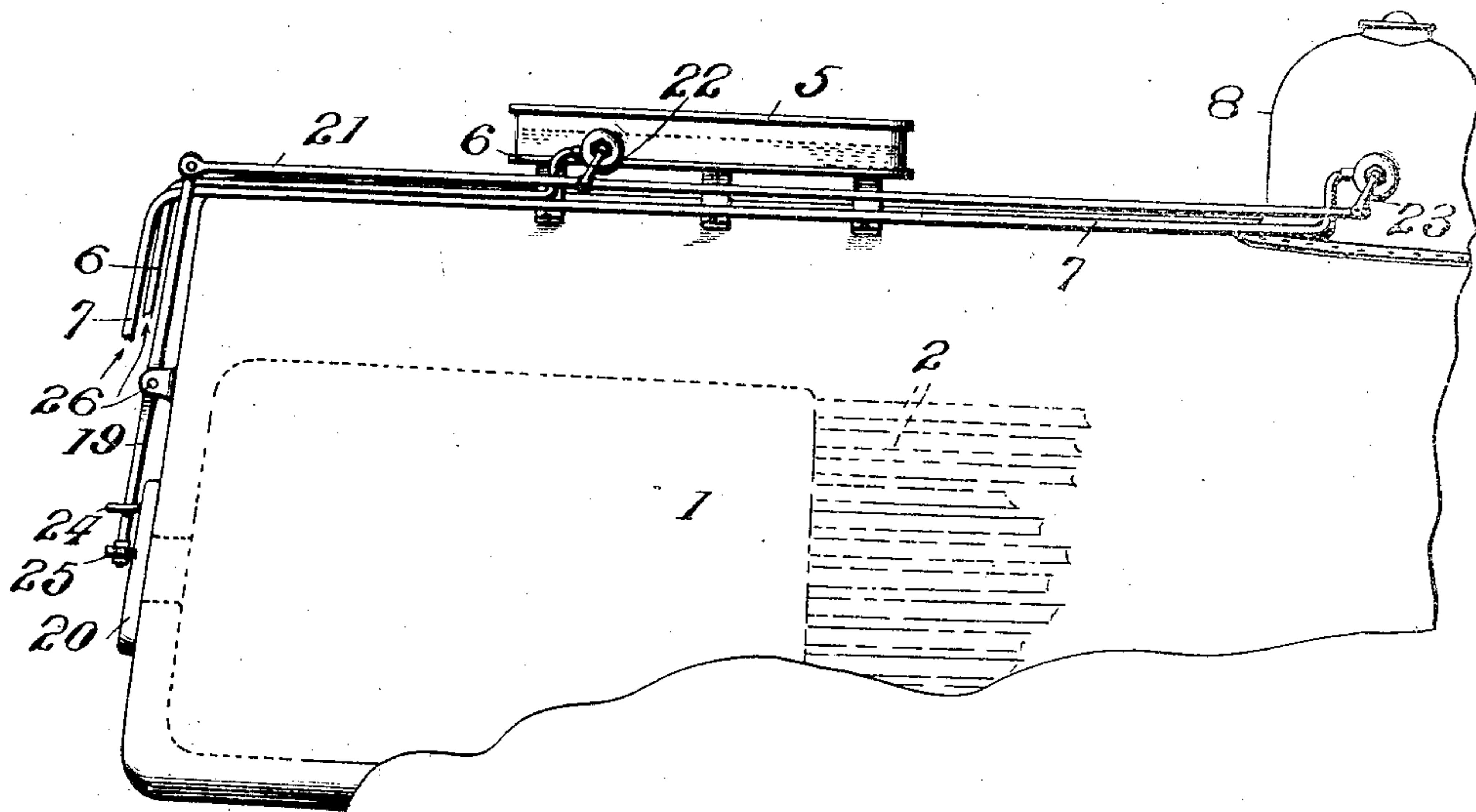


Fig. 5.



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UNITED STATES PATENT OFFICE.

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SMOKE-CONSUMING APPARATUS FOR FURNACES.

No. 814,230.

Specification of Letters Patent.

Patented March 6, 1906.

Application filed April 10, 1905. Serial No. 254,848.

To all whom it may concern:

Be it known that I, JAMES P. McMAHON, a citizen of the United States, residing at Renovo, in the county of Clinton and State of Pennsylvania, have invented a new and useful Improvement in Smoke-Consuming Apparatus for Furnaces, of which the following is a specification.

This invention relates to an apparatus for consuming the smoke and gases in furnaces using bituminous or anthracite coal, and is particularly applicable to locomotive-furnaces.

The primary object of the invention is to provide a smoke-consuming apparatus which will not only consume the smoke and other objectionable products of combustion, but will also appreciably multiply the heat units and operate to minimize the consumption of fuel.

A still further object of the invention is to provide an apparatus of the class specified which may be easily applied and having a thoroughly reliable and efficient operation.

The invention consists in the construction and arrangement of parts hereinafter set forth in preferred form.

In the drawings, Figure 1 is a view, principally in diagram, of the invention shown applied to a locomotive fire-box. Fig. 2 is a sectional elevation of the apparatus. Fig. 3 is a transverse sectional view of a locomotive fire-box, showing the general arrangement of the invention. Fig. 4 is a sectional view of one of the burners or nozzles. Fig. 5 is an elevation of an apparatus for automatically controlling the valves.

One of the prime factors to which the success of this invention is in a general measure due is the interposition between the products of combustion and the smoke-box of a wall or diaphragm constituted of a highly-combustible hydrocarbon mixture which entirely cuts off, turns back, and wholly consumes said products in its own combustion. This is accomplished by supplying a portion at least of the combustible mixture through the flues and projecting or throwing the hydrocarbon mixture into the fire-box over the fire-bed.

The numeral 1 designates the fire-box; 2, the flues; 3, the flue nozzles or burners, and 4 supplemental nozzles entering through the side sheets. An oil tank or reservoir 5 is connected by pipes or conduits 6 with the nozzles 3 and 4, and similar pipes 7 are mounted

with relation to the conduits or pipes 6 and serve to supply steam to the nozzles from some convenient source—say the bridge-casting 8 of the locomotive. Of course, suitable valves may be provided for controlling the supply of steam and oil, and for the purpose of illustration 9 represents such valves for use in the engine-cab, and 10 represents valves for operation outside or when the locomotive is standing. The pipes 6 and 7 pass through the flues 2 and connect with the nozzles 3. These pipes 6 and 7 may also be equipped with nozzles 4, which pass through sleeves 11 in the side sheets.

Fig. 4 illustrates an enlarged view of one of the nozzles, and particularly referring thereto 12 designates a casting having a chamber 13 tapped for the reception of the pipes 6 and 7. An external cone-shaped hollow member or part 14 is removably mounted in the casting 12, as by screw-threads, and constitutes a continuation of the steam pipe or conduit 7. The member 14 is provided with an orificed head 15, and subjacent this head are lateral ducts or passages 16, whereby oil from the chamber 13 may be drawn into the member 14. A member 17 coöperates with the cone-shaped hollow member 14 and has a threaded cap internally cone-shaped to form a discharge passage or outlet 18 for the oil. Thus the oil and steam in a gaseous state are discharged or projected in the form of a hollow column or cone.

Figs. 2 and 5 illustrate an example of means for automatically controlling the supply of combustible mixture to the fire-box and comprises a tripping arm or lever 19, pivoted, as at 26, and bearing at one end against the fire-door 20. The other end of the arm or lever 19 is pivotally connected to a rod or pitman 21, having an arm 22 to control the oil-valve and a similar arm 23 to control the steam-valve. It will be apparent that in response to the opening of the fire-door the tripping arm or lever 19 will be shifted and will in turn shift the pitman 21, and through the instrumentality of the latter simultaneously open the oil and steam valves. Means may be provided for automatically closing the valves, and for the sake of illustration of such mechanism I have shown a member or keeper 24, which returns the tripping-lever in response to the closing of the fire-door. A frictional roller 25 is preferably

interposed between the tripping-arm 19 and the fire-door.

From the foregoing description it will be apparent that upon supplying steam and oil to the nozzles 3 and 4 or to either set the same will be projected into the fire-box at the front end thereof and in the path of the products of combustion. The mixture is projected in the form of hollow cones or columns which tend to merge and burning with an intense heat in the path of the products of combustion form an efficient barrier to the escape of such products. It has been found in practice that a brief period of operation of the apparatus is sufficient to practically instantaneously run the Fahrenheit up to a considerable extent and positively insure the consumption of smoke and other products. The nozzles are all located at the front extremity of the fire-box or furnace close to the points of communication of the flues with said box. There is no intercepting structure between the points of injection of the combined steam and oil by the nozzles and the flue-openings, and hence the full consumption of the unconsumed products of combustion reaching the front of the fire-box must ensue, with the beneficial result that no smoke passes into the flues no matter what kind of fuel is fed to the fire-box.

Having thus described the invention, what I claim as new is—

1. In combination with a locomotive fire-box adapted to burn solid fuel and flues, of means located close to the communicating openings of the flues with the fire-box for establishing a combustible barrier at the front of the fire-box which wholly consumes the products of combustion in its own combustion, the said means being located in such close proximity to the flue-openings as to obstruct the escape of any of the products of combustion between the said means and the communicating flue-openings.

2. In combination with a locomotive fire-box adapted to burn solid fuel and flues, of means located close to the communicating openings of the flues with the fire-box for directing a hydrocarbon mixture across the path of the products of combustion, the said means being located in such close proximity to the flue-openings as to obstruct the escape of any of the products of combustion between the said means and the communicating flue-openings.

3. In combination with a locomotive fire-box and flues, of means located directly at the point of communication of the flues with the fire-box for directing a hydrocarbon mixture across the path of the products of combustion, the hydrocarbon mixture being gradually heated before entering the fire-box.

4. In combination with a locomotive fire-box adapted to burn solid fuel, of flues, steam and oil supply pipes extending through the

flues, and nozzles common to said pipes and disposed close to the points of communication of the flues with the fire-box to discharge a mixture of oil and steam in the path of the products of combustion, a portion of the nozzles being projected from the flues.

5. In combination with a locomotive fire-box adapted to burn solid fuel, of flues, steam and oil supply pipes extending through the flues, the flues having unobstructed communication with the fire-box, nozzles common to said pipes and arranged to discharge a mixture of oil and steam in the path of the products of combustion, and auxiliary means penetrating the side sheets for supplying a like mixture at an angle to the mixture discharged by the nozzles, the said nozzles and auxiliary means being located at the front of the fire-box.

6. In combination with a locomotive fire-box adapted to burn solid fuel and flues, of steam and oil supply pipes located in front of the fire-box and provided with injecting means operating to force the steam and oil into the fire-box in the form of hollow cones or columns, close to the communicating openings of the flues with the front of the fire-box.

7. In combination with a locomotive fire-box adapted to burn solid fuel and flues, of steam and oil supply pipes having communication with the fire-box and provided with injecting-terminals which project the mixture of steam and oil into the fire-box in the form of hollow cones or columns, close to the communicating openings of the flues with the front of the fire-box.

8. In combination with a locomotive fire-box adapted to burn solid fuel and flues, steam and oil supply pipes extending through the flues, nozzles common to said pipes arranged to discharge a mixture of oil and steam in the path of products of combustion at the front of the fire-box close to the flue-openings, said nozzles being located at the front of the fire-box, and controlling means for the said pipes.

9. In combination with a locomotive fire-box adapted to burn solid fuel and flues, steam and oil supply pipes extending through the flues, nozzles common to said pipes and arranged to discharge a heated mixture of oil and steam in the path of the products of combustion, said nozzles being located adjacent to the point of communication of the flues with the fire-box, and means responding to the opening and closing of the door of the fire-box for controlling the steam and oil supply.

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

JAMES P. McMAHON.

Witnesses:

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