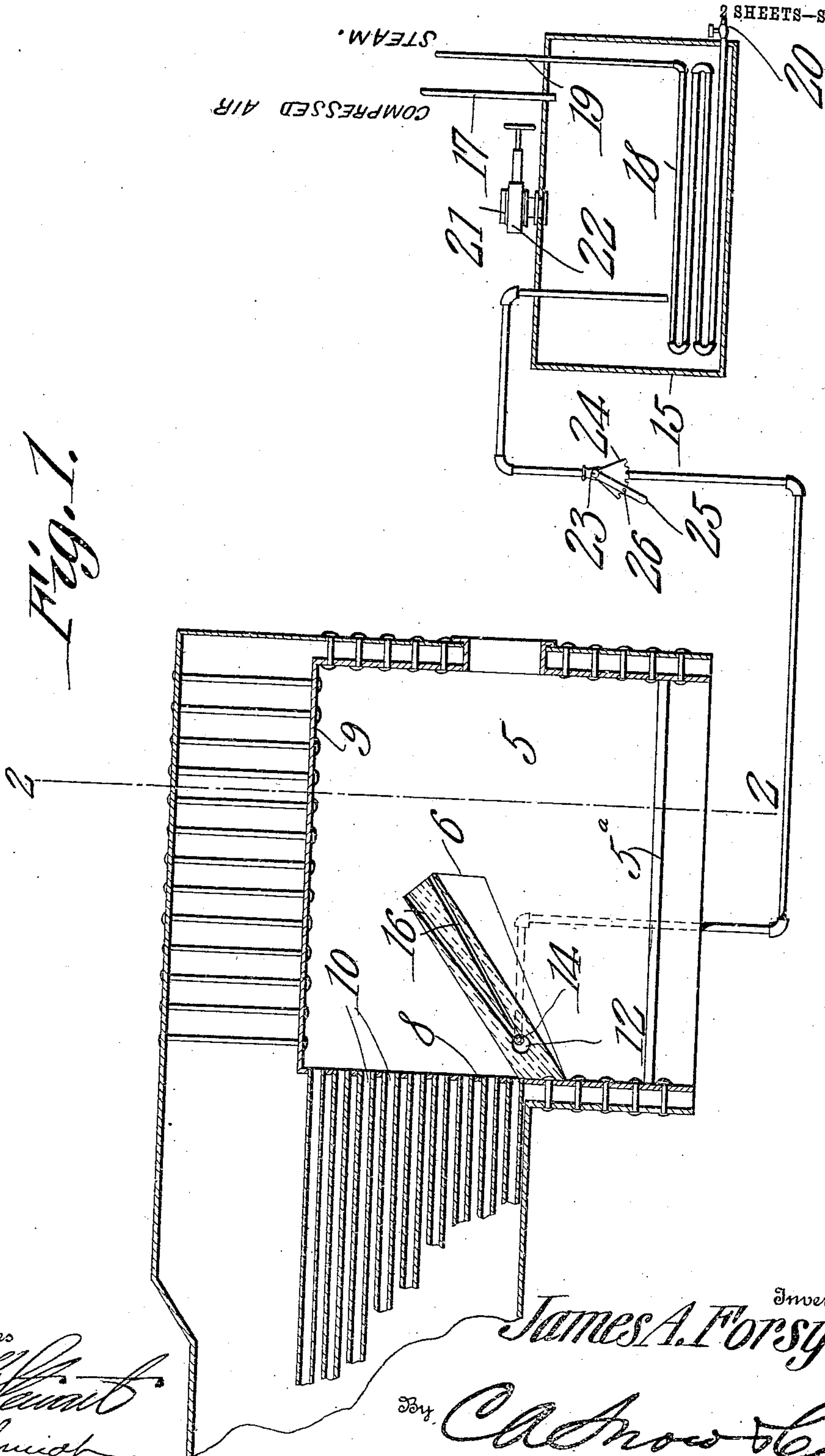


951,069.

J. A. FORSYTH.
STEAM BOILER FURNACE.
APPLICATION FILED SEPT. 22, 1909.

Patented Mar. 1, 1910.

2 SHEETS—SHEET 1.



Witnesses
E. P. McIntosh
W. A. Smith

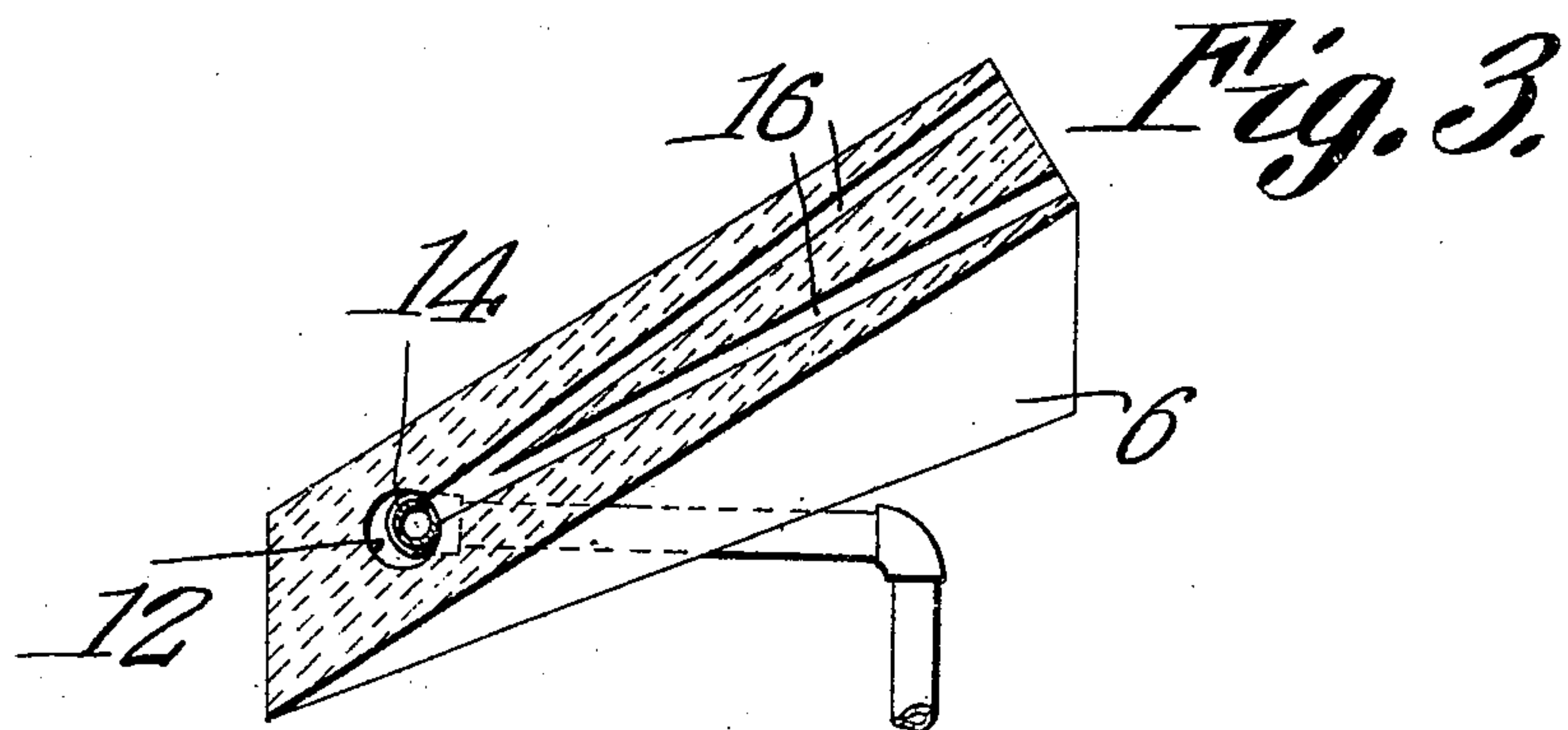
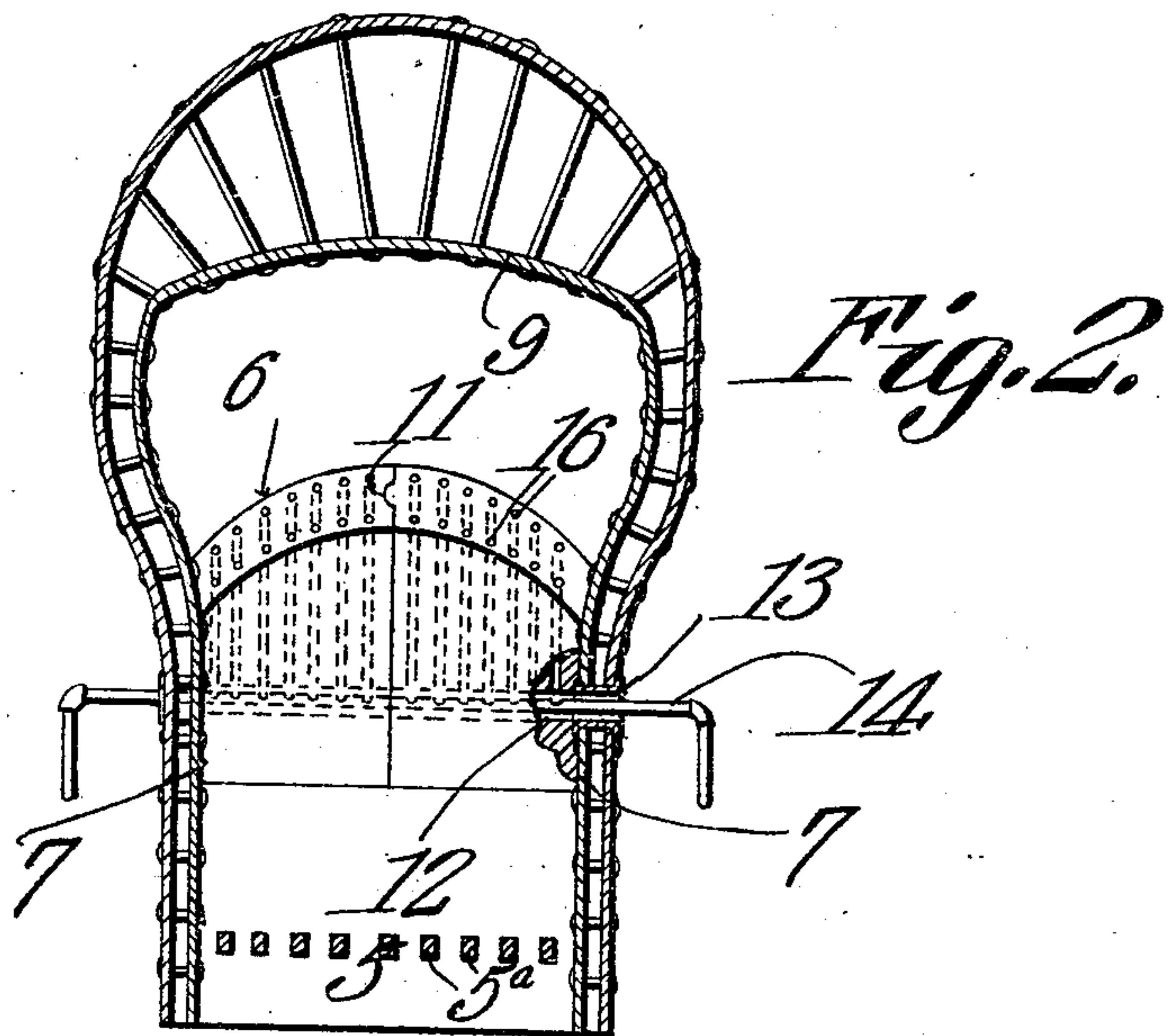
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2 SHEETS—SHEET 2.



Witnesses

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UNITED STATES PATENT OFFICE.

JAMES ARCHIBALD FORSYTH, OF ATLANTA, GEORGIA.

STEAM-BOILER FURNACE.

951,069.

Specification of Letters Patent.

Patented Mar. 1, 1910.

Application filed September 22, 1909. Serial No. 518,968.

To all whom it may concern:

Be it known that I, JAMES A. FORSYTH, a citizen of the United States, residing at Atlanta, in the county of Fulton and State of Georgia, have invented a new and useful Steam-Boiler Furnace, of which the following is a specification.

This invention has for its object to provide in the fire-box of a steam boiler furnace, means for consuming the smoke, gases and other products of combustion, whereby waste of heat and fuel will be reduced to a minimum.

The invention consists in a novel form of liquid fuel burner through the flame of which the products of combustion are compelled to pass on their way out of the fire-box, whereby said products are consumed.

The invention also has for its object to provide a smoke consuming apparatus of the kind stated which requires no specially constructed fire-box, but which can be readily applied to any ordinary fire-box of a horizontal flue boiler.

With the hereinstated objects in view, the invention consists in a novel construction and arrangement of parts to be hereinafter described and claimed, reference being had to the drawings hereto annexed, in which,

Figure 1 is a longitudinal section of a boiler fire-box, showing the application of the invention. Fig. 2 is a cross section on the line 2—2 of Fig. 1. Fig. 3 is an enlarged sectional view of the arch and the burner therein.

In the drawing, the invention is shown applied to a locomotive boiler, but it is to be understood that the invention is not limited to such a type of boiler, but that it may be applied to stationary horizontal flue boilers.

In the fire-box 5 of the boiler is mounted a grate 5^a, and above the latter an arch 6 of fire brick or other refractory material. This arch extends throughout the entire width of the fire-box, between the inner side sheets 7, and is inclined upwardly from the bottom of the back tube sheet 8, in the direction of the front of the fire-box, and terminates at or about midway between the front and rear of the fire-box. The outer end of the arch is spaced a sufficient distance from the crown sheet 9 so that the products of combustion can pass over to the flues 10.

The arch is made in two sections, the contiguous edges of which are vertical, and are

joined by a tongue and groove joint 11, as shown in Fig. 2. In each section, near the base of the arch, is an opening 12, the opening of the respective sections being in alignment. In the side sheets of the fire-box, on both sides thereof, in line with the opening 12, are mounted flues 13 which are rolled and beaded in each sheet to make a water-tight joint.

In the opening 12 of the two sections of the arch, are mounted burners, comprising perforated pipes 14, which enter said openings through the flues 13, and are connected to a tank 15 containing oil or other liquid fuel. The ends of the burner pipes within the arch, are closed, so that there is no communication between the same.

In line with the perforations of the pipes 14, the arch is formed with passages 16 which open through the outer end thereof. Two passages are provided for each perforation, and said passages merge in front of the perforations, and extend divergently therefrom to the outer end of the arch. The passages are presented in such a direction that the flames issuing therefrom are projected across the fire-box from the outer end of the arch, toward the crown and front sheets, so that the products of combustion are compelled to pass through the same on their way over the arch, and out of the fire-box to the flues 10.

The oil is forced from the tank 15 to the burners 14 by compressed air, an air pipe 17 connecting the tank with a pump, or the air service of the locomotive. The tank also contains a steam coil 18 for heating the oil, steam being taken from the boiler by a pipe 19. The coil is located in the bottom of the tank, and one end thereof extends outside of the tank, and is fitted with a waste cock 20. The tank is filled through a pipe 21 provided with a suitable valve 22. The pipes leading to the burners 14 enter the tank separately, and each is provided with a valve 23 for controlling the flow of oil. A notched sector 24 is provided for locking the valve handle 25 in adjusted position, said handle carrying a spring latch 26 which is engageable with the notches. The tank may be placed in the coal bunker, or in any other convenient place on the tender.

The mode of operation is as follows: The boiler is fired up as usual, and when the arch 6 is hot, the burners 14 are ready for

operation. Upon turning on the oil, the same is forced to the burners by the pressure in the tank 15. The heat of the arch vaporizes the oil, and the vapor is blown through the passages 16 and ignited, the flames being projected across the fire-box, throughout the entire width thereof, as already described. The smoke, gases, and other products of combustion upon passing through the flames from the burners, are entirely consumed, thus preventing smoke and increasing the steaming qualities of the engine by utilizing the heat which otherwise would escape in the smoke. The burners need be employed only when firing the boiler, and after the fire is burning brightly, the burners may be shut off until more coal is to be thrown on the fire.

The arch and burners herein described require no specially constructed fire-box, but can be readily applied to any ordinary flue boiler, locomotive or stationary, and the manner in which the arch is mounted will give free access to the flue.

What is claimed is:

1. The combination with a boiler fire-box having a grate, of an arch therein above the grate having passages opening through its outer end, said passages being arranged in pairs, the members of which extend diverg-
ingly to the outer end of the arch, and a

liquid fuel burner mounted in the arch, and discharging into the passages.

2. The combination with a boiler fire-box having a grate, of an arch therein above the grate having a transverse opening, and passages extending from said opening to the outer end of the arch, and opening there-through, said passages being arranged in pairs, the members of which merge at the transverse opening, and extend divergently therefrom, and a liquid fuel burner mounted in the arch, and discharging into the passages.

3. The combination with a boiler fire-box having a grate, of an arch therein above the grate between the side sheets, said arch being inclined upwardly from the bottom of the back tube sheet in the direction of the front of the fire-box, and the outer end of the arch being spaced from the crown sheet, said arch having passages opening through its outer end, and a liquid fuel burner mounted in the arch, and discharging into the passages.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JAMES ARCHIBALD FORSYTH

Witnesses:

H. K. STANFORD,
S. J. CONNOLLY.