

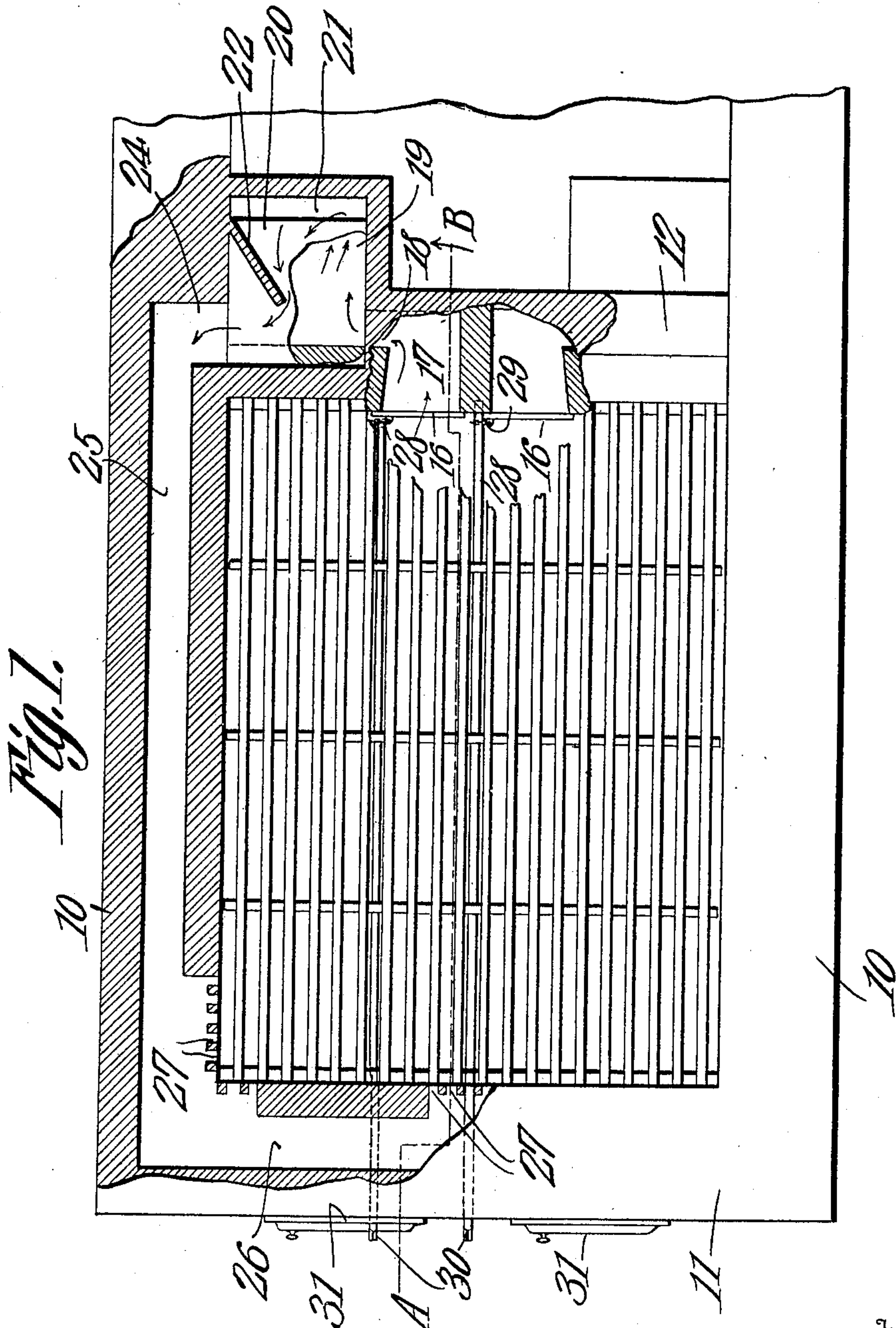
J. M. ERICSON.  
BOILER FURNACE.

APPLICATION FILED JULY 11, 1908.

916,542.

Patented Mar. 30, 1909.

2 SHEETS—SHEET 1.



Inventor

John M. Ericson.

Witnesses

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*W. Miller*

By

*C. A. Snow & Co.*  
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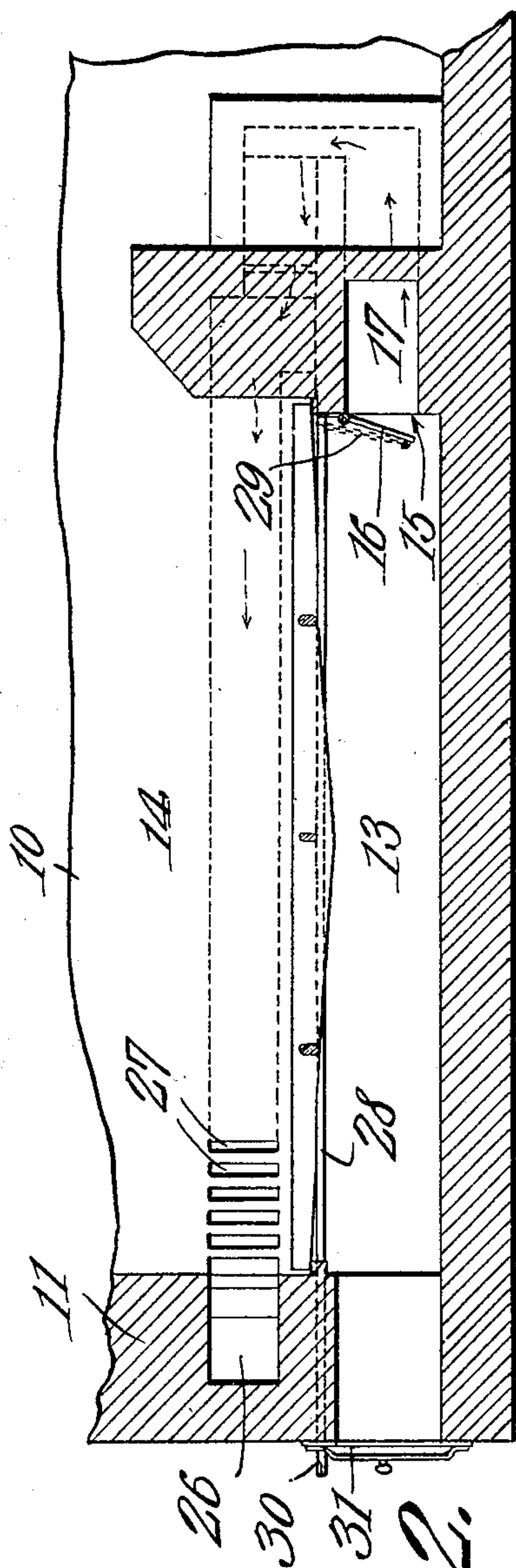


Fig. 2.

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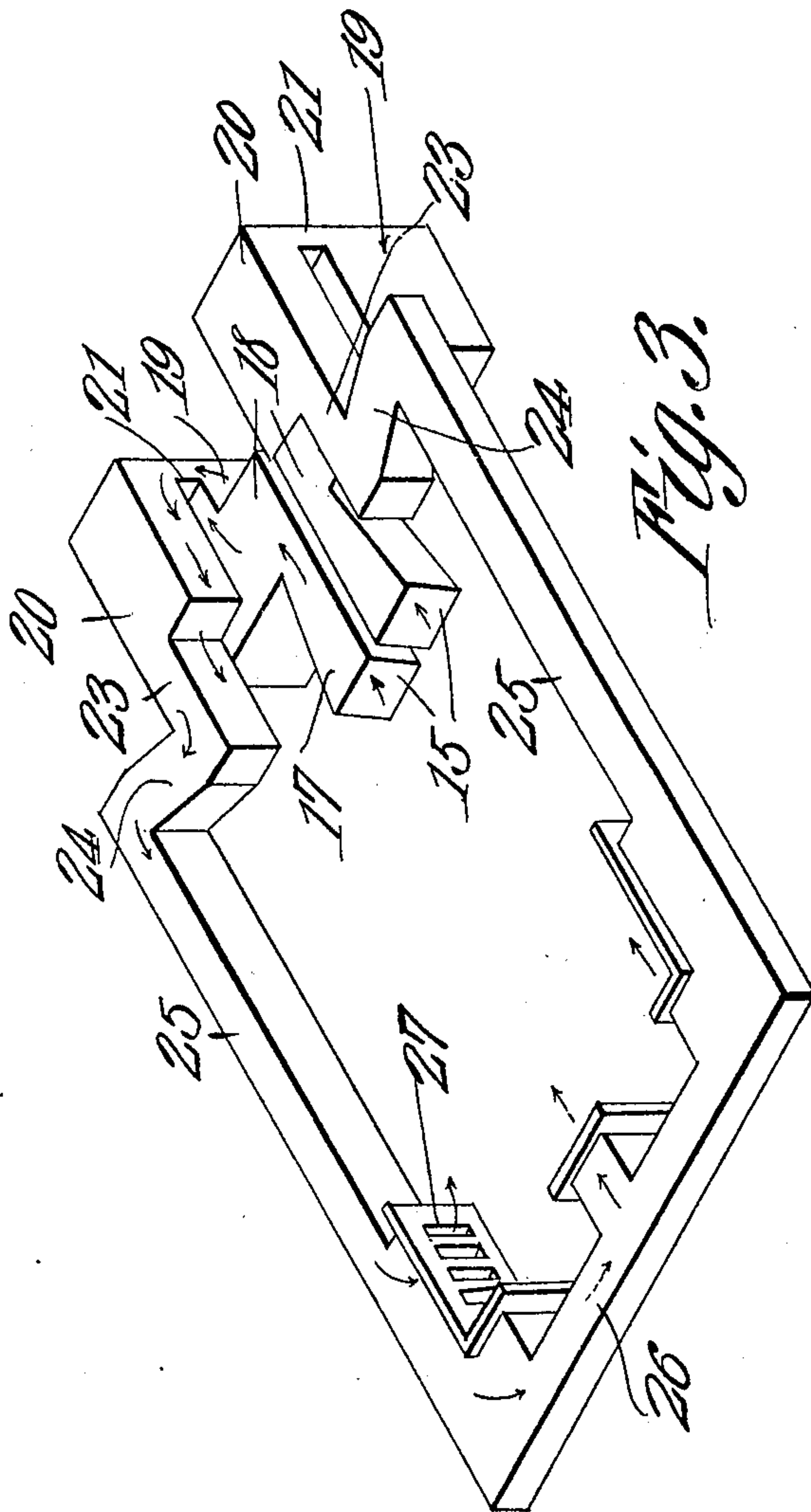


Fig. 3.

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# UNITED STATES PATENT OFFICE.

JOHN MARSHALL ERICSON, OF SALT LAKE CITY, UTAH.

## BOILER-FURNACE.

No. 916,542.

Specification of Letters Patent.

Patented March 30, 1909.

Application filed July 11, 1908. Serial No. 443,056.

*To all whom it may concern:*

Be it known that I, JOHN MARSHALL ERICSON, a citizen of the United States, residing at No. 538 South Tenth East street, Salt Lake City, in the county of Salt Lake and State of Utah, have invented a new and useful Boiler-Furnace, of which the following is a specification.

This invention relates to boiler furnaces, and has special reference to an improved draft arrangement for such furnaces.

It is a well known fact that the combustion of the fuel depends upon the air admitted to the ash-pit passing up between the grate-bars, and through the fuel. It is also well known that, where fuel is burned in this manner, a large amount of soot is produced, which is deposited in the flues and other passages, thus cutting down the boiler efficiency, and that portion of the soot which is not so deposited, passes off in volumes of dense, black smoke.

The object of the present invention is to overcome the difficulties above set forth, and to provide a furnace in which the combustion of the fuel shall be substantially complete.

The invention, in general, consists of a furnace provided with a bridge wall and the usual grate, and one or more flues leading from the ash-pit of the furnace, at the rear end, to the fire-box of the furnace, immediately above the bed of fuel.

The invention further consists of certain novel arrangements of details, and the combination of parts, hereinafter fully described, illustrated in the accompanying drawing, and specifically set forth in the claims.

In the accompanying drawings, like characters of reference indicate like parts in the several views, and Figure 1 is a top plan view of a furnace constructed in accordance with this invention, certain of the parts being broken away, the better to show the interior of the flues. Fig. 2 is a sectional view on the lines "A—B," of Fig. 1. Fig. 3 is a diagrammatic view, in isometric perspective of the flues, used in connection with this invention, it being supposed, for the purpose of illustration, that the walls of the flues are of infinitesimal thickness.

The furnace consists of a pair of side-walls 10, a front wall 11, and a back wall, not being necessary here to be shown, as the same forms no part of the invention. Between the front wall 11, and the back wall, is a

bridge-wall 12, which forms the back of the fire box and ash-pit, as indicated respectively by the numerals "13" and "14." In the back end of the ash-pit is provided a pair of openings 15, each of which has a door or damper 16, mounted to close the same, when desired. From the opening 15, flues 17, lead rearwardly through the bridge-wall, and open into laterally disposed flues 18. Extending rearwardly from each of the flues 18, is a short flue 19, which communicates with a return flue 20, by means of a vertical flue 21. In the interior of the flue 20, is positioned a baffle brick 22, so arranged as to direct the current of air away from the side-wall, and toward the center, or hottest portion of the furnace. Each of the flues 20, have a forwardly extending portion 23, which is, in turn, connected to a laterally and upwardly extending flue 24. This flue communicates with a long flue 25, held within the side-walls 10. The flue 25 extends clear to the front of the furnace, and then is angled inwardly to form the common flue 26. At the central portion of the flue 26, and at its junction corners with the flue 25, is provided a plurality of openings 27, so that the air passing through the flues may be evenly distributed over the fire. It is to be observed that these openings are so arranged that the air will be admitted immediately above the bed of fuel. The dampers 16 are operated by means of a pair of rods 28, to which are attached chains 29, so arranged that, when the rods are rotated, the chains will be wound thereon. The lower ends of these chains are each attached to one of the doors 16. The rods 28 extend out through the front of the furnace, and are provided with angled portions 30, whereon may be placed a suitable crank-handle, for the purpose of winding the rods, and opening the doors to the desired degree. There is also provided the usual ash-pit door 31, which may be of any desired type.

In order to understand the operation of the device, let it be supposed that a fire has been built in the furnace. If now, the fire-pit doors 31, be opened, and, at the same time, the doors, 16, be opened, air will pass in through the fire-pit doors, beneath the grate. A certain portion of this air will pass up through the grate, and the fuel held thereon. A percentage of this portion will be converted to carbon-monoxid, and the remainder will be converted to carbon-dioxid. The air which does not pass up through the



grate, will pass through the flues 17, and circulate through the entire flue system, on either side of the furnace. While this part of the air is passing through the flues, it will  
5 become intensely heated by reason of the flues lying in close proximity to the flame of the furnace throughout their length. This air will finally issue through the opening 27, at the forward corners and middle portion of  
10 the fire-box, immediately over the bed of fuel. The issuing air, being intensely heated, will readily combine with the carbon-monoxid, and convert the same to carbon-dioxid; thus increasing the efficiency of the furnace.  
15 At the same time, any suspended particles of uncombined carbon, which may be held in the gases of combustion, in the form of soot or smoke, will be combined with the oxygen of the air, and further increase the  
20 efficiency of the furnace.

I am aware that numerous attempts have been made to accomplish this result by introducing air at the back of the fire-box; but this merely has the effect of chilling the  
25 flame, and preventing any further combination between the uncombined oxygen and the carbon in suspension. Further, by introducing the air in this manner, it is comparatively cold, and, therefore, inefficient for  
30 the purpose desired. By means of the present flue arrangement, however, the air is heated to the proper temperature, and readily combines, both with the suspended carbon, and the carbon-monoxid.

35 It is obvious that minor changes may be made in the form and proportions of the device, without departing from the principles thereof. It is not therefore desired to confine the invention to the exact form herein  
40 shown and described, but it is wished to include all such as properly come within the scope thereof.

Having thus described the invention, what is claimed as new, is:—

45 1. A furnace provided with an ash-pit, a fire-box, and a flue extending through each side wall from the back end of the ash-pit and in communication therewith, to the front of the fire-box, and across, through the  
50 front wall thereof, the said wall of the fire-box and the side walls being provided with openings at the front corner, and at the

middle of the front thereof, the said openings establishing communication between the fire-box and the flue.

55

2. A furnace provided with an ash-pit, a fire-box and a valved flue, extending through each side wall from the back end of the ash-pit and in communication therewith, to the front end of the fire-box, the  
60 said flue extending across through the front wall of the fire-box, the wall of the fire-box being provided with openings at the corners and middle front thereof, the said openings establishing communication between the fire-  
65 box and the flue.

3. In a furnace, an ash-pit, a fire-box, a bridge-wall, a pair of tortuous flues, extending through the bridge-wall, vertically and angularly disposed baffle-bricks arranged  
70 one within each of the flues in that portion which extends through the bridge-wall, the said baffle-bricks being so arranged as to direct the heated currents of air, passing  
75 through the flues, toward the center of the fire-box, said flues leading to the forward end of the fire-box and across the front of the same, the walls of the fire-box, at the corners and front thereof, being formed with  
80 openings which establish communication between the flues and the said fire-box.

4. In a furnace, side walls, a front wall, a bridge wall, an ash-pit extending from the front wall to the bridge wall, a grate held above said ash-pit, a fire-box formed above  
85 said grate, and a flue opening from the rear of the ash-pit into the said bridge-wall and extending therethrough at the lower part thereof, and thence extending laterally therethrough and across the rear thereof,  
90 the said flue thence extending forwardly along through each of the side walls and entirely across the front wall, the said flue opening through the front wall at a point midway of its ends, and opening also through  
95 the said wall at its end, and through the forward ends of the side walls.

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

JOHN MARSHALL ERICSON.

Witnesses:

WM. CROME,  
JACOB H. WOLCOTT.