

G. BELL.  
Boiler and Furnace.

No. 227,475.

Patented May 11, 1880.

Fig. 1.

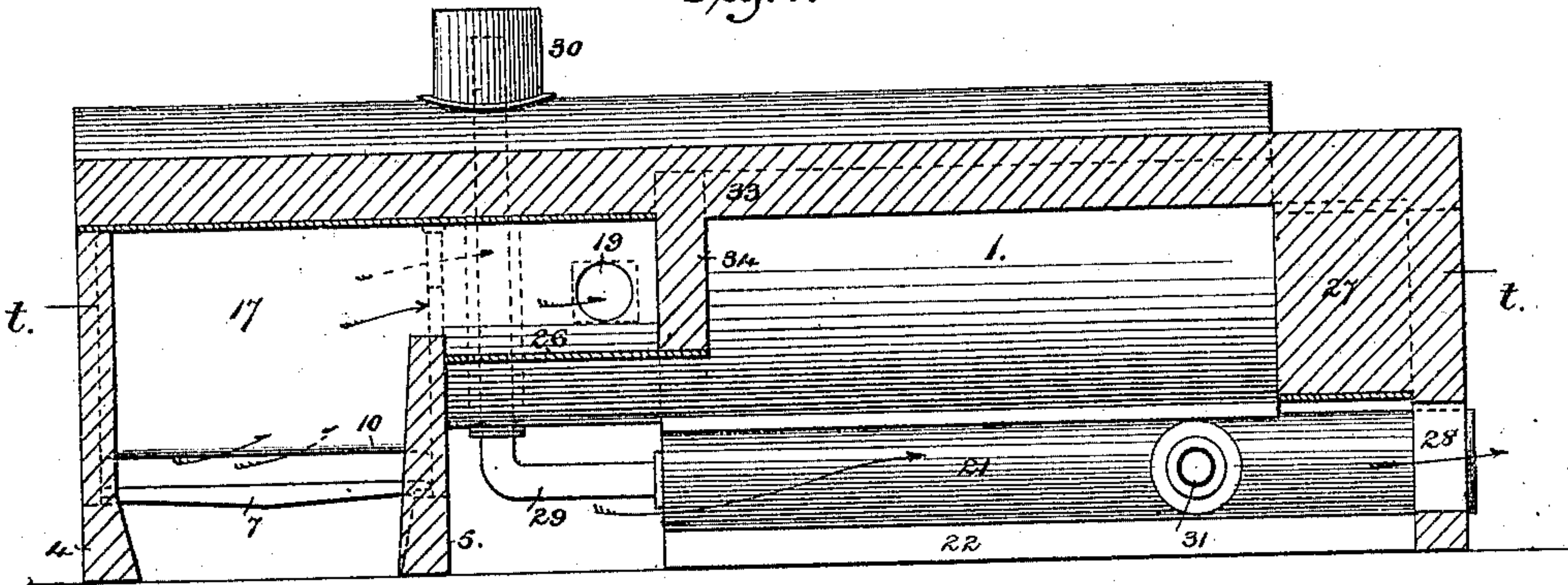


Fig. 2.

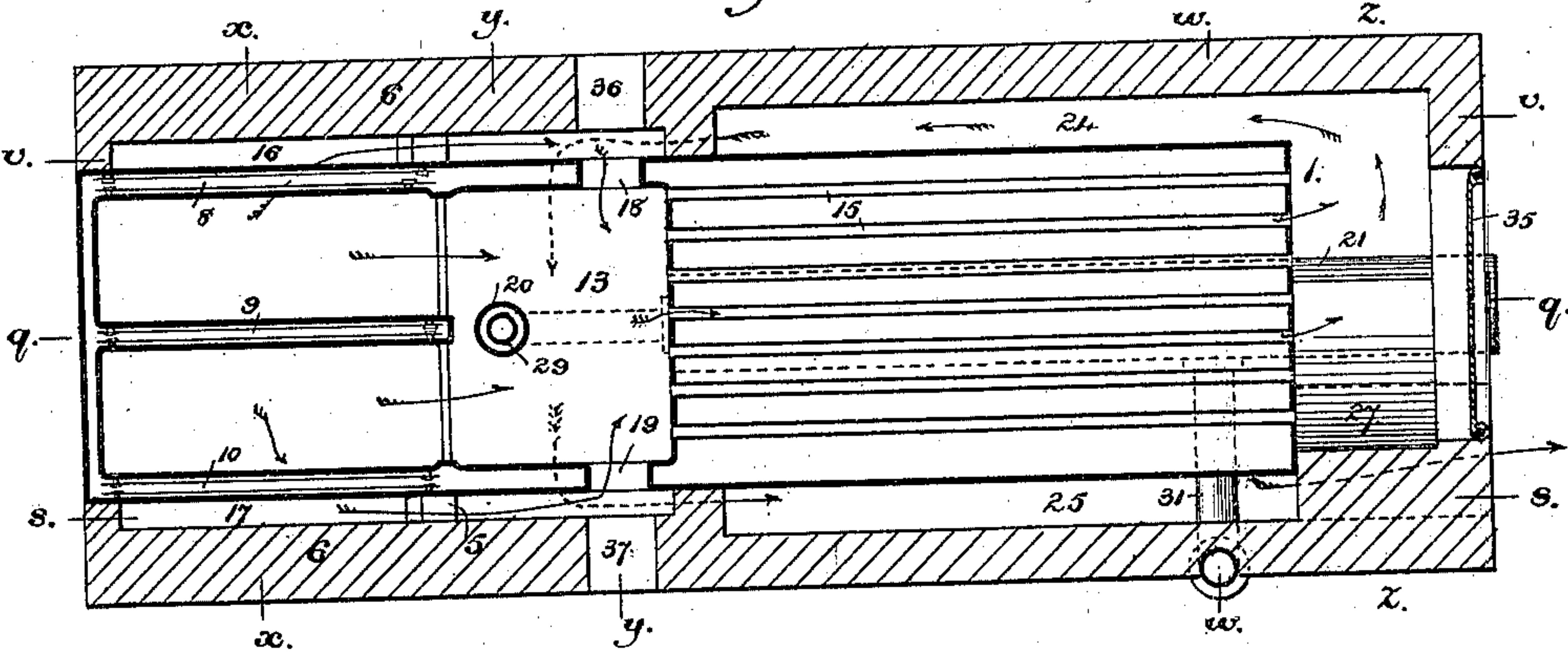
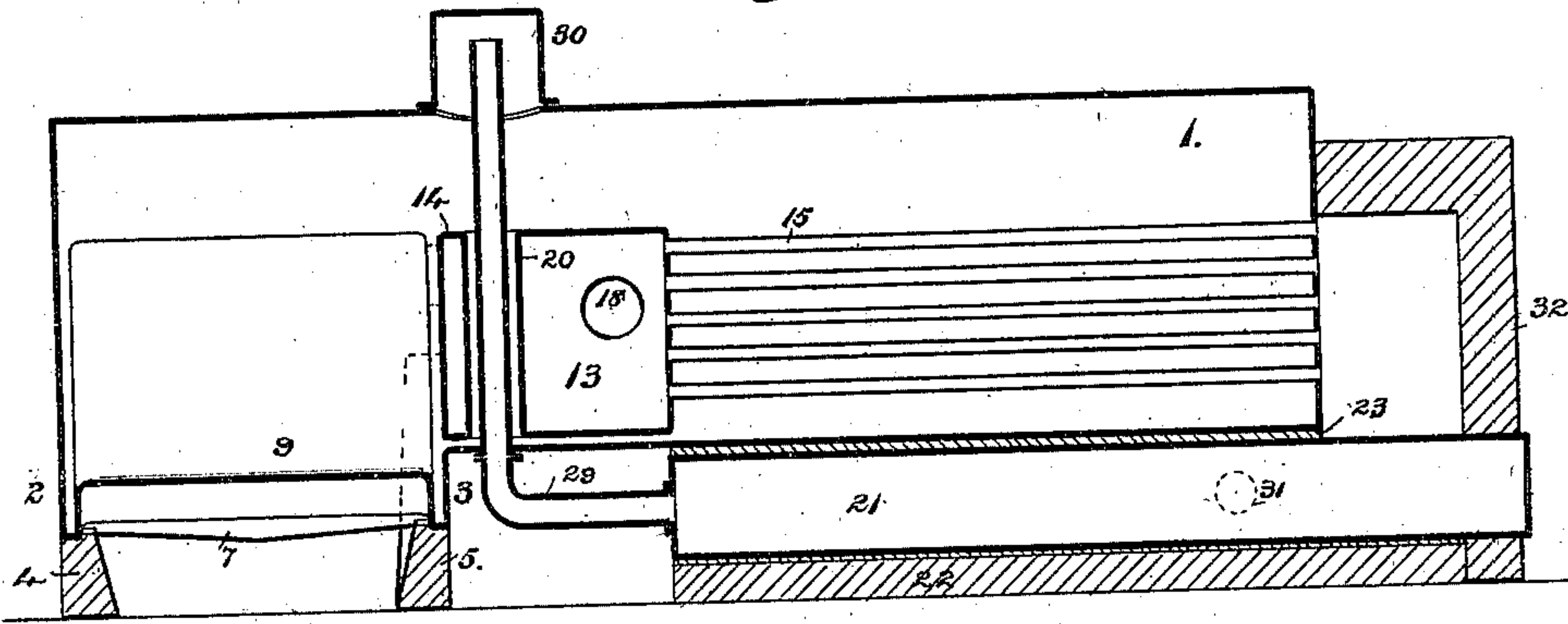


Fig. 3.



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Fig. 4.

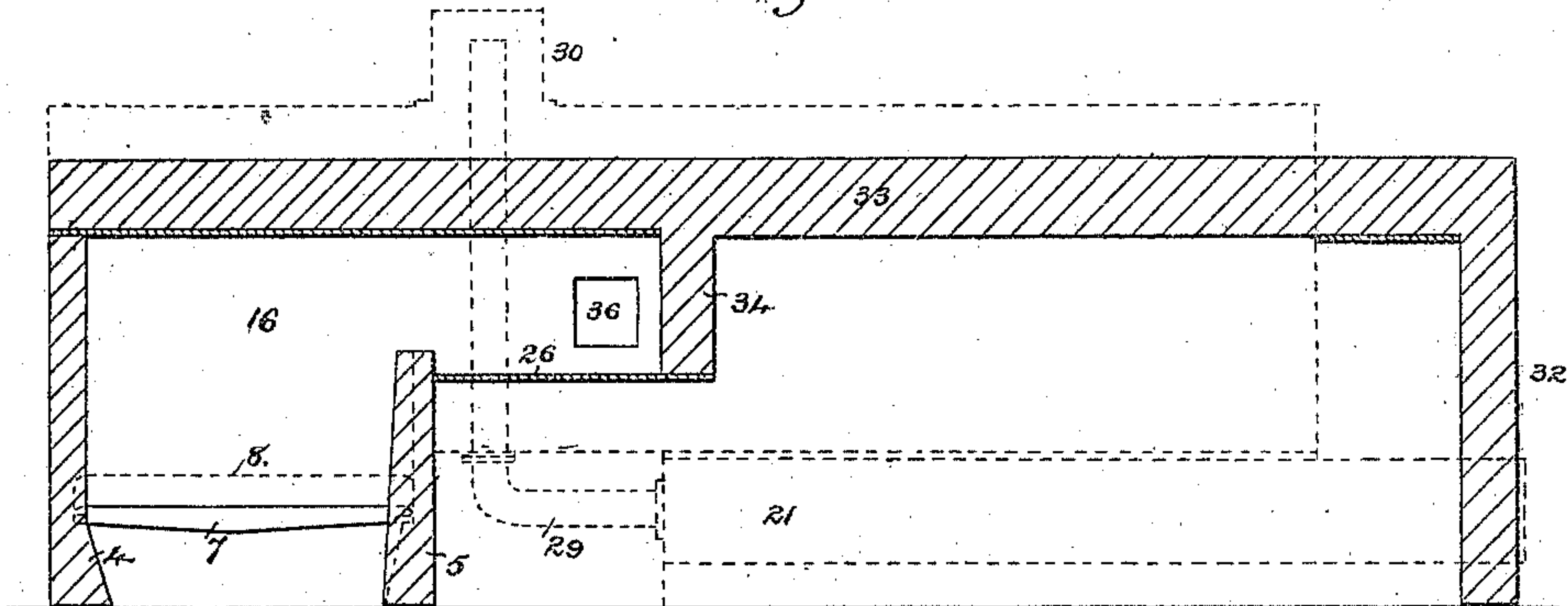


Fig. 5.

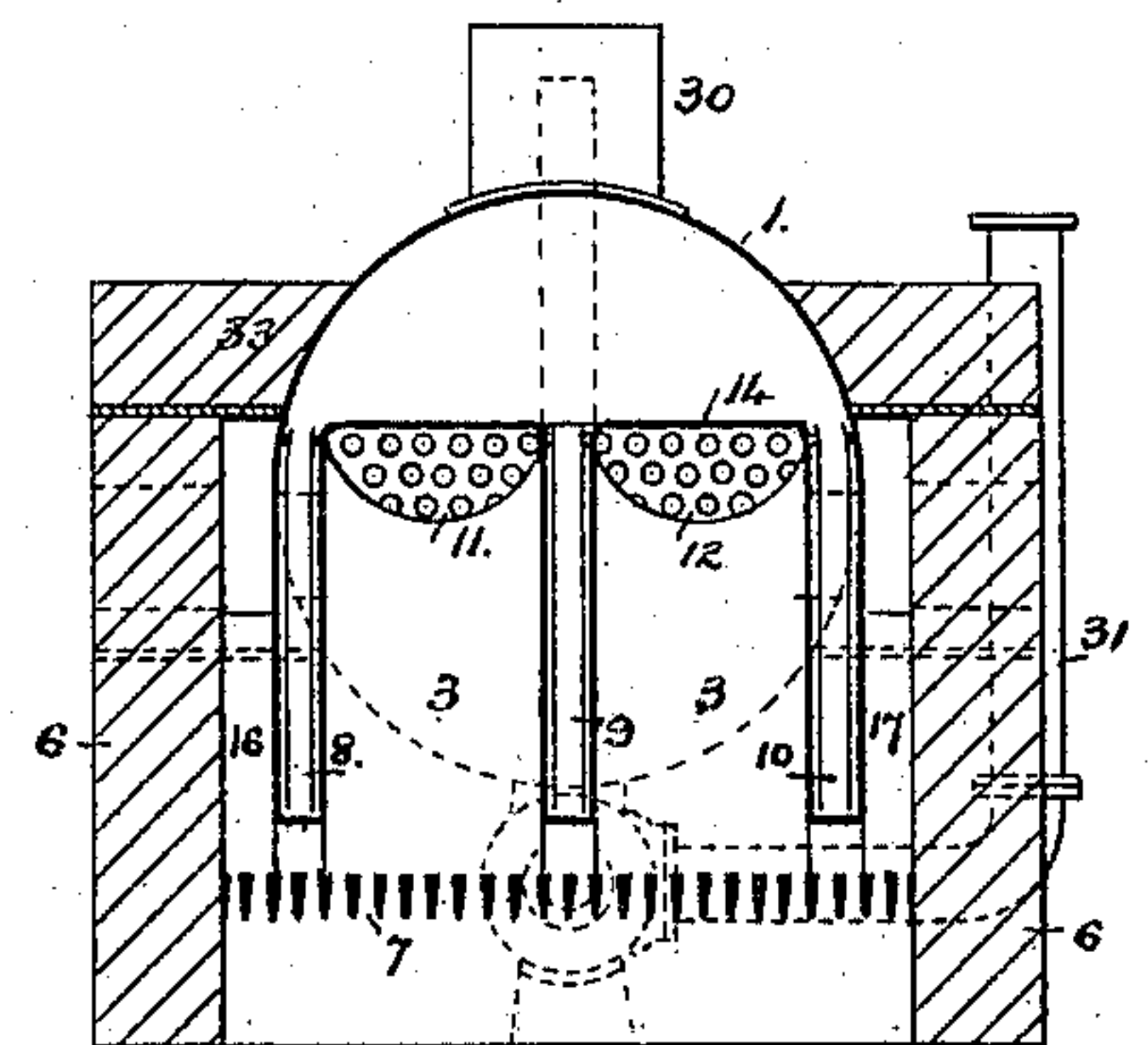


Fig. 6.

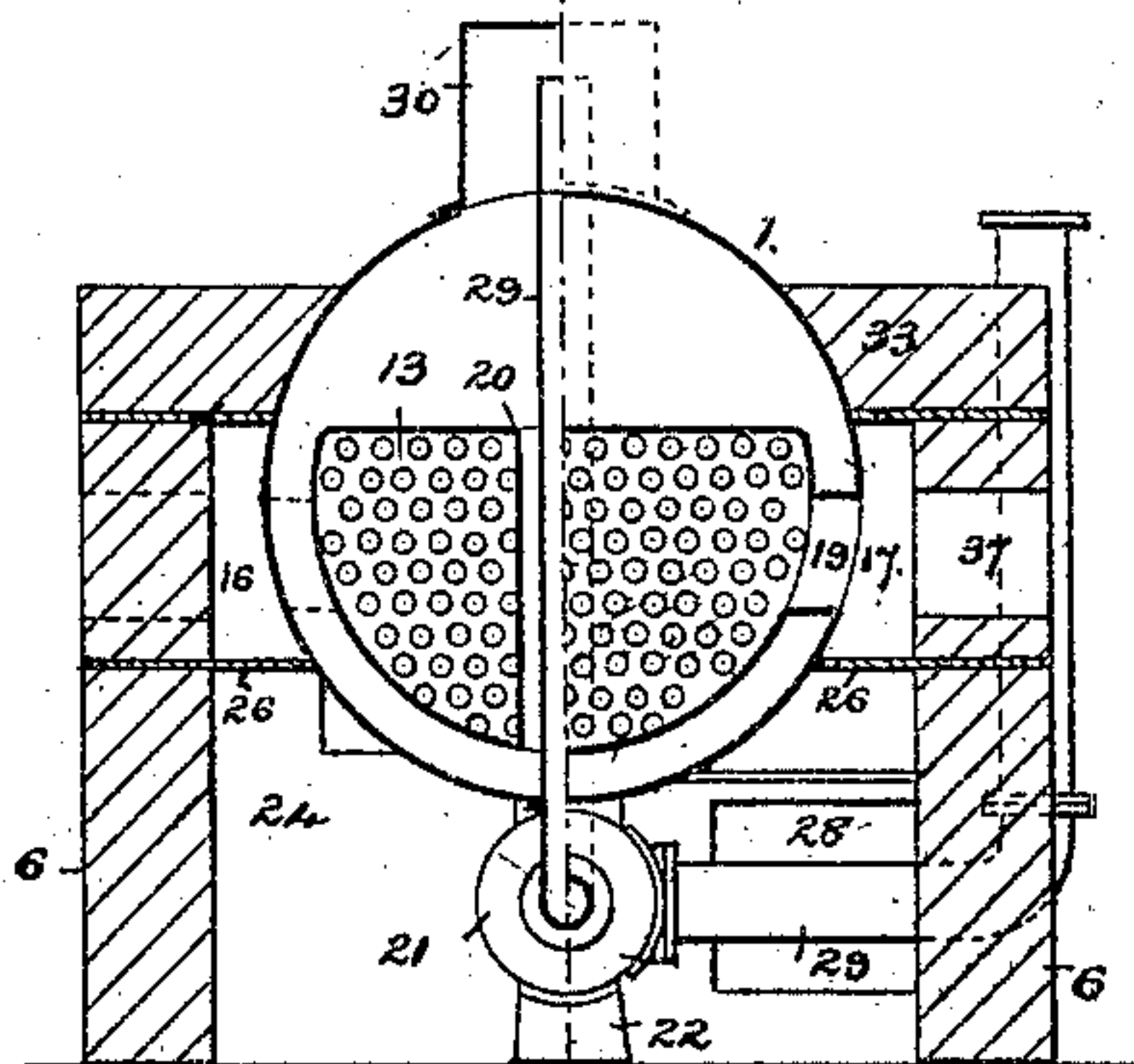


Fig. 7.

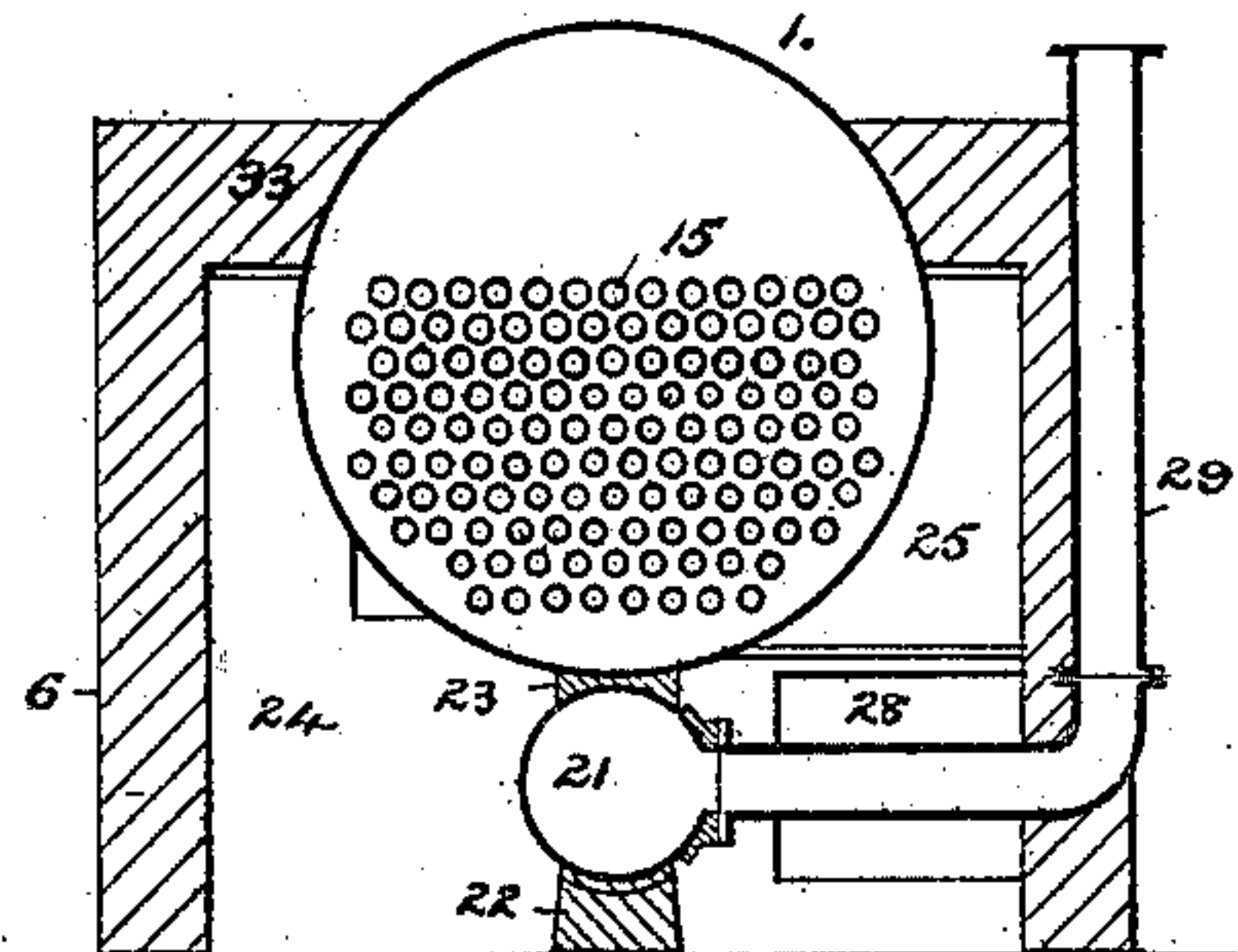
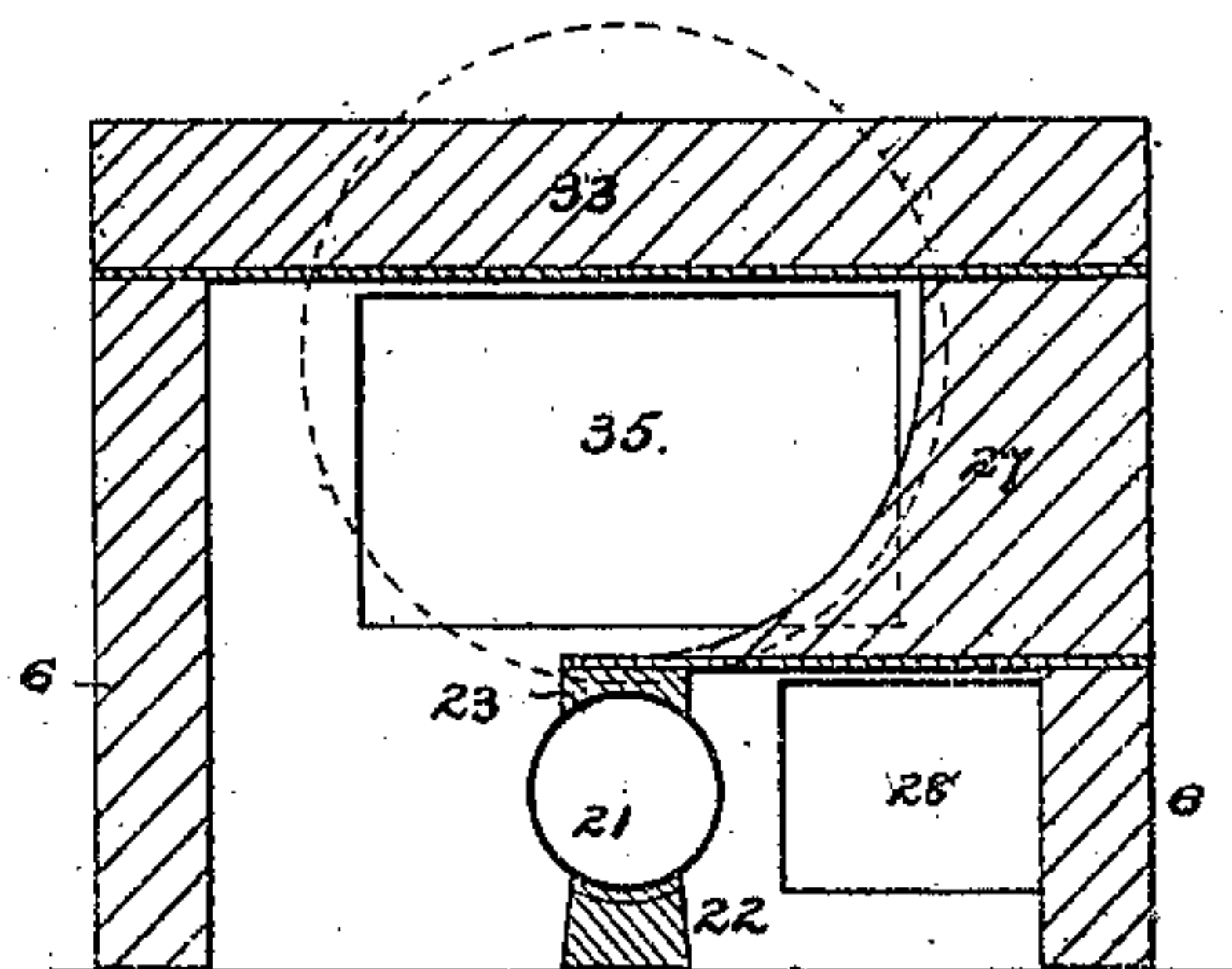


Fig. 8.



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# UNITED STATES PATENT OFFICE.

GEORGE BELL, OF NEW YORK, N. Y.

## BOILER AND FURNACE.

SPECIFICATION forming part of Letters Patent No. 227,475, dated May 11, 1880.

Application filed July 29, 1879.

*To all whom it may concern:*

Be it known that I, GEORGE BELL, of the city, county, and State of New York, have invented certain new and useful Improvements in Boilers and Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the drawings accompanying and forming a part of this specification.

10 In the drawings, Figure 1 is a vertical longitudinal section of a boiler and furnace, taken upon the line *s s*, Fig. 2, containing my invention. Fig. 2 is a horizontal section of the same, taken on a line, *t t*, Fig. 1. Fig. 3 is a vertical longitudinal section of the same, taken on the line *q q*, Fig. 2. Fig. 4 is a vertical longitudinal section of the same, taken on the line *v v*, Fig. 2. Fig. 5 is a transverse vertical section of the same, taken on the line *x x*, Fig. 2. Fig. 6 is a transverse vertical section of the same, taken on the line *y y*, Fig. 2. Fig. 7 is a transverse vertical section of the same, taken on the line *w w*, Fig. 2. Fig. 8 is a transverse section of the same, taken on the line *z z*, Fig. 2.

25 The object of my invention is to increase the heating-surface and circulation of boilers without materially increasing the size of the same, thus saving fuel and their cost; and it consists in the construction, arrangement, and combination of parts, as will be hereinafter fully described and claimed.

30 In the drawings, 1 is a boiler provided with water-legs 2 3, of which the one 2 extends downward and rests upon a brick ledge, 4, and the other one, 3, extends downward and rests upon another ledge, 5. Two passages, 11 12, are made in the water-leg 3, for a purpose to be described. The two ledges 4 5 extend from the side wall, 6, of the furnace. Extending from these side walls to the shell of the boiler 1, and from the ledge 4 to a ledge, 34, extending downward from the top walls, 33, of the furnace, are plates 26, for a purpose to be explained.

45 7 are grate-bars supported by the ledges 4 5, and extending laterally to the wall 6. From the water-leg 3 extend three water-legs, 8, 9, and 10, joining the water-leg 2 at the front and connecting with the crown-sheet 14 of the boiler. These water-legs terminate a sufficient distance above the grate-bars 7 to allow fuel

to be properly placed and burned on the latter under and beyond each water-leg 8, 9, and 10. Within the boiler 1 is provided a combustion-chamber, 13. From this chamber extend tubes 15 through the boiler 1 to its rear. Communication is had between the combustion-chamber 13 and the passages 16 and 17, formed by the water-legs 8 and 10, with the wall 6 of the furnace by apertures 18 19 in the shell of the boiler. Extending from the bottom to the top of the combustion-chamber is the tube 20, forming a communication between the upper and lower water-spaces of the boiler 1. Beneath the boiler is a steam-drum, 21, resting on a brick ledge, 22, and aiding, through another ledge, 23, to support the boiler 1. Two passages, 24 25, for the passage of the products of combustion, are formed by the steam-drum 21 and ledges 22 23, with the side wall, 6, top wall, 33, end wall, 32, water-leg 3, ledges 5 and 34, and plates 26, a brick partition, 27, cutting off communication between the two passages 24 25, while an aperture, 28, in said partition allows the escape of the products of combustion into a chimney or the air.

29 is a pipe extending from the steam-drum 21, and passing through the water-space of the boiler 1, inside of the tube 20, and to nearly the top of the dome 30, with which the boiler is provided, another pipe, 31, extending from the steam-drum 21 through the passage 25 and wall 6, from which the steam generated in the boiler is taken. The pipe 29, inside of the tube 20, acts to induce a circulation of the water around and through the combustion-chamber. The rear wall, 32, is provided with a door, 35, to obtain access to the boiler, and the side wall, 6, with apertures 36 37, to obtain access to the combustion-chamber 21 and the passages 16 and 17, which apertures can be closed in any desired manner. The water-legs 8, 9, and 10 are each provided with two circulating-plates, held by the ordinary screw-bolts that pass through the water-leg.

When fire is made on the grate-bars 7 some of the products of combustion pass through the passages 16 and 17 and apertures 18 and 19 into the combustion-chamber 13, while the rest of such products pass through the openings 11 and 12 into said combustion-chamber 13. From the latter they all pass, through the tubes



15, to the rear of the boiler, then around the same through the passage 24, heating one side of the boiler and steam-drum 21, and then back under the boiler and through the passage 25, heating the other side of the boiler, the pipe 29, and the steam-drum 21, and then escape through the aperture 28, heating the pipe 31, all as indicated by the arrows.

By this construction of steam-boiler and furnace a very large area of heating-surface is provided and the circulation increased, the water being heated by the internal and external application of the products of combustion, and the steam taken from the dome 30 is dried in its passage through the pipe 29, drum 21, and pipe 31 to where it is to be used. A very large saving of fuel is thus effected.

This boiler and furnace I have actually had in use for a period of time long enough to demonstrate its efficacy and saving of fuel over boilers and furnaces known and used prior to my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of two or more water-

legs terminating above the grate-bars, with the latter extending beneath and beyond the same laterally, and passages on both sides of each water-leg for the escape of the products of combustion, substantially as described. 30

2. The combination of two or more water-legs terminating above the grate-bars, with the latter extending beneath and beyond the same laterally, passages on both sides of each water-leg for the escape of the products of combustion, and a combustion-chamber with which said passages connect, substantially as described. 35

3. In combination with the boiler and steam-drum 21, passages 24 and 25, substantially as described. 40

4. The arrangement of the pipes 20 29 with relation to the combustion-chamber 13, substantially as described. 45

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

GEO. BELL.

Witnesses:

M. B. PHILIPP,

CHAS. W. CARPENTER.