No. 885,779. PATENTED APR. 28, 1908.

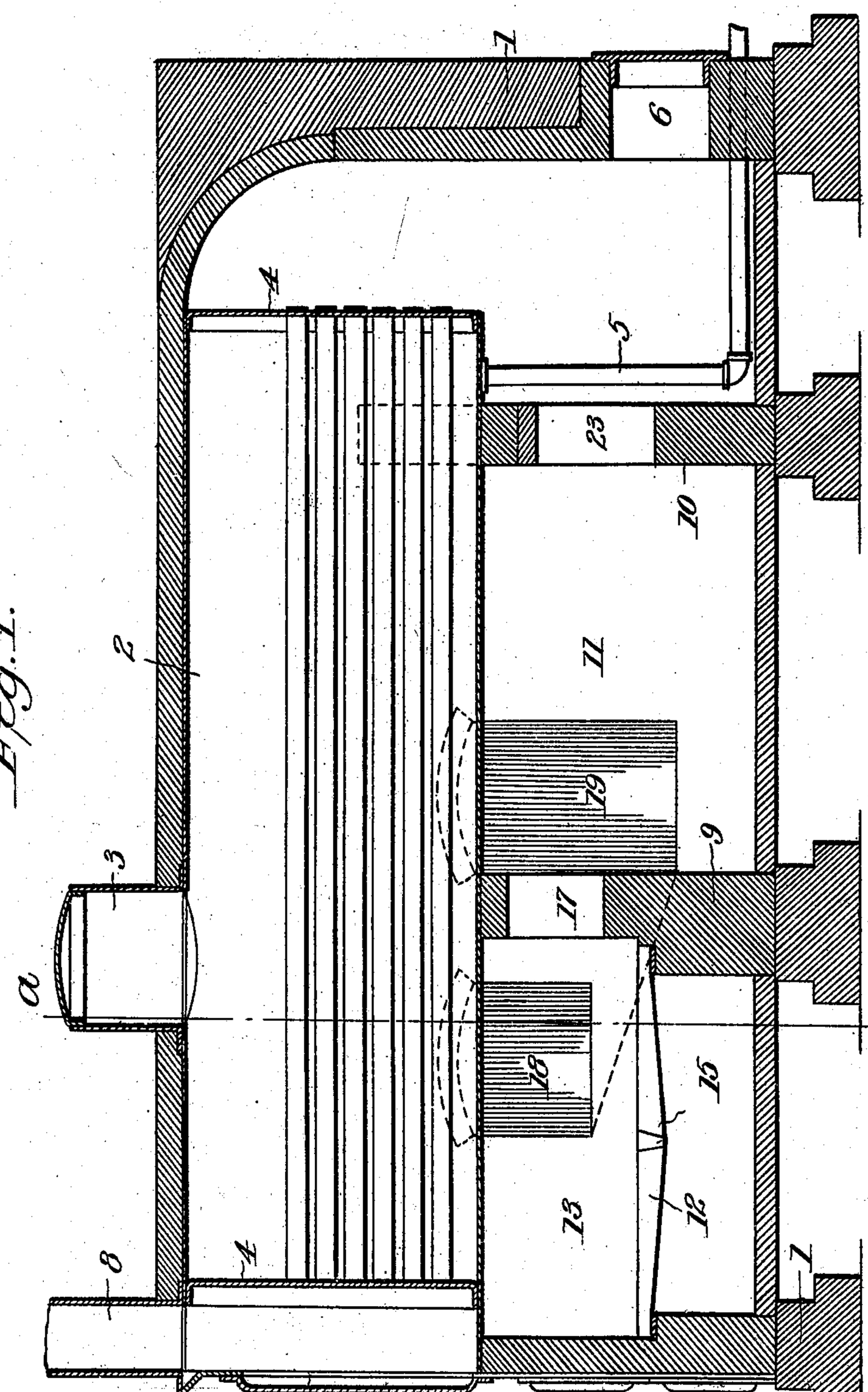
C. J. OBERG.

SMOKELESS FURNACE.

APPLICATION FILED JULY 8, 1907.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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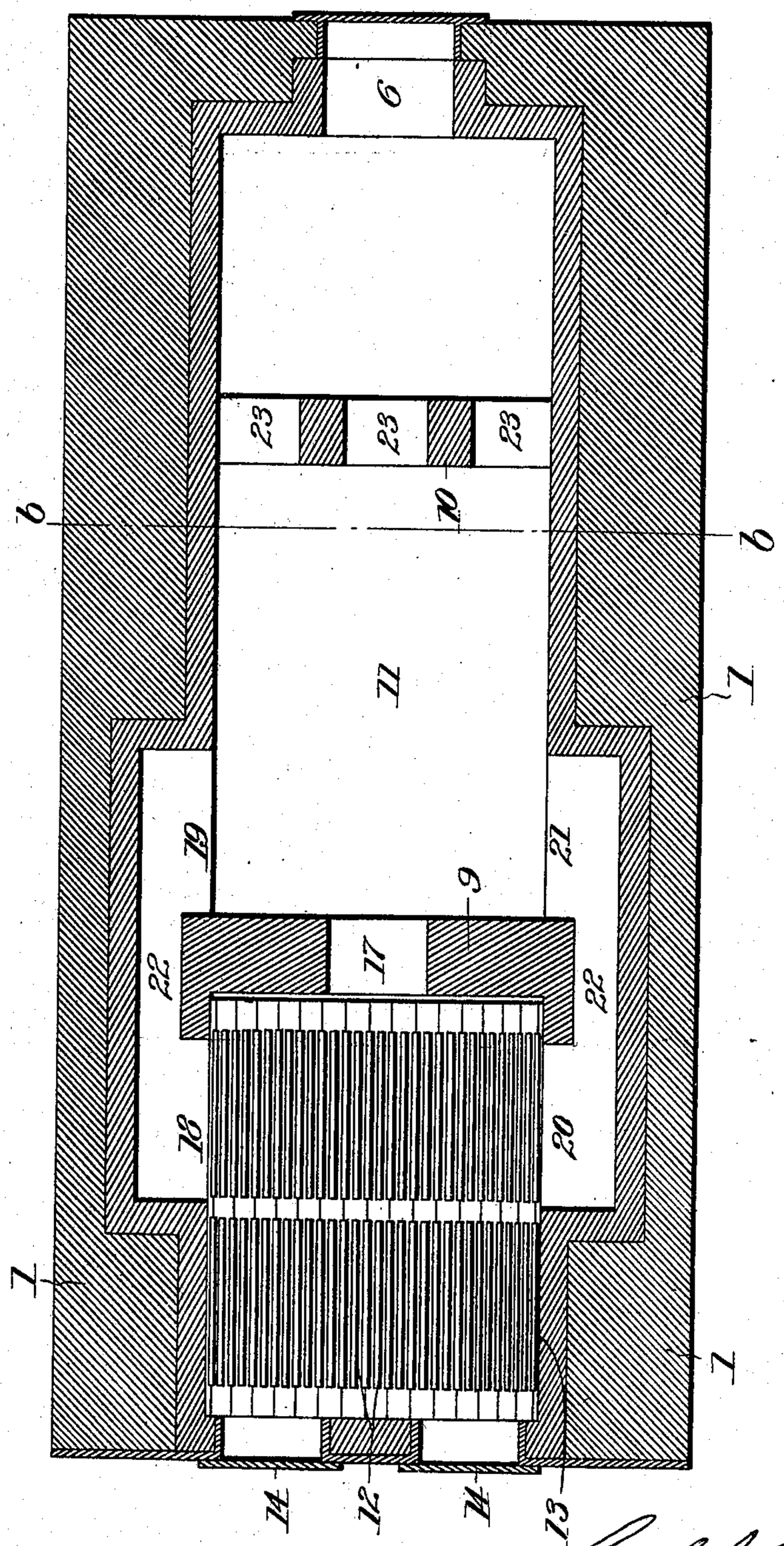
3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 4.

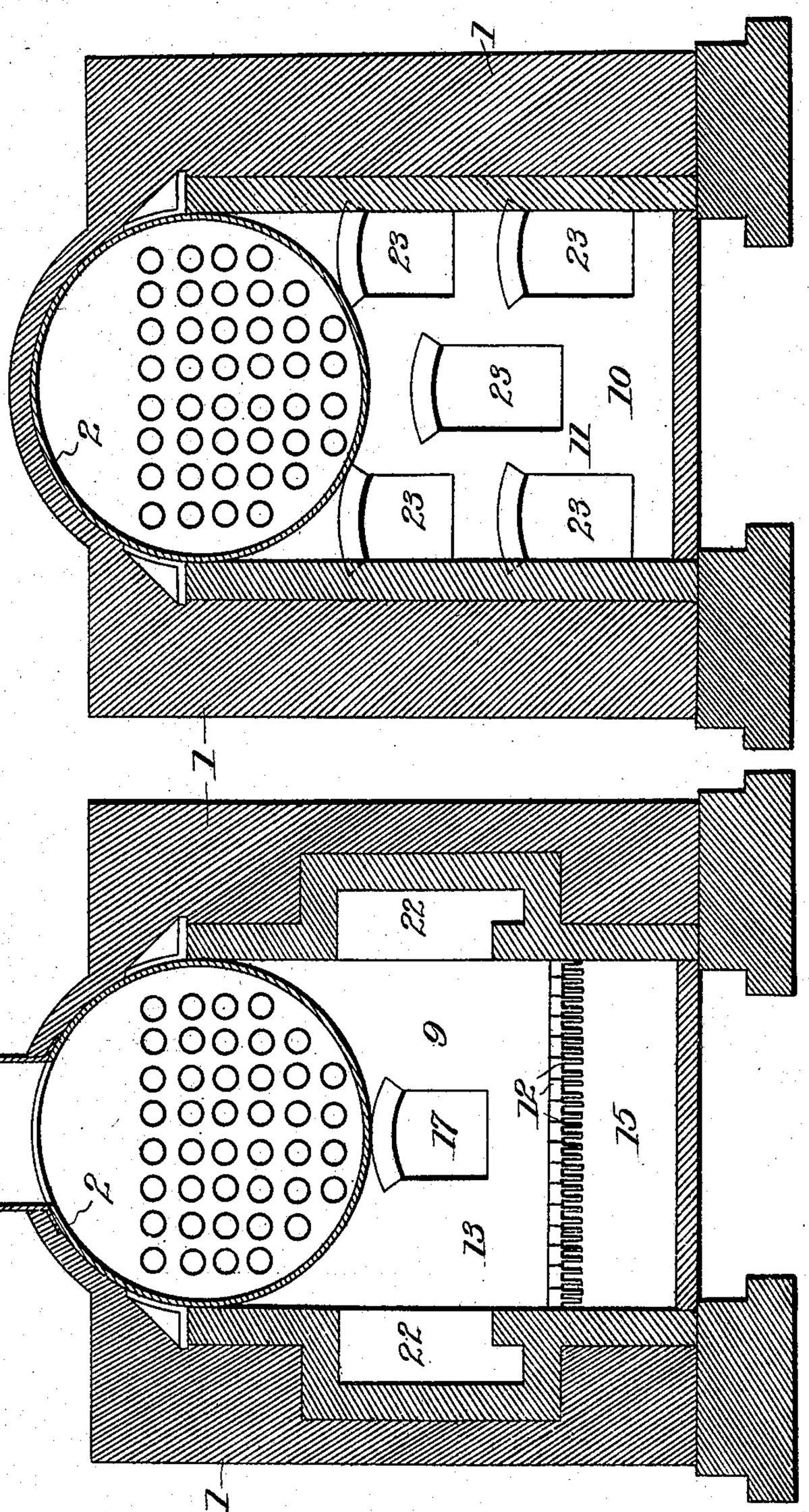

Fig. 3.

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UNITED STATES PATENT OFFICE.

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SMOKELESS FURNACE.

No. 885,779. Specification of Letters Patent. Patented April 28, 1908.

Application filed July 8, 1907. Serial No. 382,805.

To all whom it may concern:

Be it known that I, CARL JOHAN OBERG, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake and State of Utah, have invented certain new and useful Improvements in Smokeless Furnaces, of which the following is a specification.

This invention relates to steam boiler furnaces.

One object of the invention is to provide a furnace embodying such characteristics that perfect combustion may be obtained to prevent dense volumes of smoke from issuing from the chimney stack.

Another object of the invention is to produce a furnace so arranged that the fuel is inserted into the fire box near its side walls, and with means for conveying the products of combustion, such as the gases, carbon and smoke, from the fire box by separate courses and in a substantially horizontal direction into a supplemental combustion chamber of suitable size and from opposite sides to insure the complete combustion of any particles which may not be fully consumed in the main combustion chamber of the fire box, whereby when one side of the fire box is charged with fresh fuel, the products from such side will pass into the supplemental combustion chamber through one of the aforesaid courses slowly as compared with the products from the main combustion chamber through the other horizontal course, incident to the difference in temperature occasioned by the fresh supply of fuel, the products from the different courses uniting in the supplemental combustion chamber where they are consumed to such an extent as to insure against the issuance of heavy volumes of smoke from the chimney or stack.

With the above and other objects in view, the present invention consists in the combination and arrangement of parts hereinafter more fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that changes may be made in the form, size, proportion, and minor details within the scope of the appended claims, without departing from the spirit or sacrificing any of the advantages thereof.

In the drawings:—Figure 1 is a longitudinal sectional view of a steam boiler furnace embodying my invention. Fig. 2 is a horizontal sectional view. Fig. 3 is a transverse vertical sectional view on the line *a*—*a* of Fig. 1. Fig. 4 is a transverse vertical sectional view on the line *b*—*b* of Fig. 2.

Referring now more particularly to the accompanying drawings, the reference character 1 indicates the supporting structure of brick, masonry, or other suitable material in which the tubular boiler 2 is located, the boiler having the usual steam dome 3 and heads 4 with a feed pipe 5 leading from the rear end of the structure immediately beneath the cleaning opening 6 and thence upward into the boiler. The boiler has the usual front smoke arch 7 and a communicating smoke flue 8, and is preferably supported in position by the front wall of the outer structure 1, the bridge wall 9, and the rear wall 10 of the combustion chamber 11, or in any other suitable manner.

The character 12 indicates a grate of any suitable character supported between the front of the structure and the bridge wall 9 in any suitable manner, the drawings indicating that the front wall and the bridge wall are cut away to provide shoulders for the support of the grate. Access is had to the fire box 13 above the grate through the spaced doors 14, while access is had to the ash-pit 15 through one or more doors 16.

The supplemental combustion chamber 11, which is of a comparatively large area to insure a proper combustion of the carbon and gases, has communication with the fire box through three separate and distinct passages. One passage is indicated at 17 and extends through the bridge wall 9 near its upper edge and intermediate the sides thereof and is designed to carry off the hotter gases of the furnace as the latter is being fired, these hotter gases being utilized to accelerate the combustion in the chamber 11, as hereafter explained. Each side wall of the fire box is provided with a recess indicated respectively at 18 and 19, while each side of the supplemental combustion chamber 11 is provided with a recess indicated respectively at 20 and 21, the recesses of the fire box and of the supplemental combustion chamber are within the sides of the outer wall of the structure 1 and communicates through passage ways 22 around the ends of the bridge wall 9. Thus hot gases and smoke may pass into the supplemental combustion chamber at both the right and left hand sides of the furnace, or around the ends of the bridge wall.

The rear wall 10 of the supplemental com-

bustion chamber 11 is provided with a series of openings 23 through which the final products of the combustion pass toward the rear of the structure and thence upwardly and forwardly through the boiler flues, and thence out through the chimney or stack 8 as indicated by arrows in Fig. 1.

In operating my invention one side of the fire box is preferably fired at a time. When the firing is done on the left side of the furnace or through the left hand door 14 the products of combustion pass through the passage ways 19—21 and the connecting passages 22 at the left side to the supplemental combustion chamber where they will mix with the products issuing through the intermediate passage 17.

When the firing is done on the right side of the furnace, or through the right hand fire door 14, the products of the combustion pass through the passage 18—19 and the connecting passages 22 at the left and thus insure a thorough intermingling and complete combustion prior to the passage of the fumes to the stack 8 through the openings 23 in the rear wall 10 of the supplemental combustion chamber. By this arrangement it will be obvious that when the firing is being done through the left hand door, the opening of the door will necessarily retard or check the combustion, and the combustion upon the opposite side of the furnace will proceed more rapidly, and then when the left hand door is closed and the firing done through the right hand door, the action will be reversed, or the combustion be greatest upon the left hand side of the furnace and checked at the right hand side, consequently the combustion will proceed alternately through the side passages 18—20 and 19—21. By this arrangement of feeding the fuel at alternate sides of the fire chamber, the combustion is more uniform and is continuous, and is not therefore interfered with by the opening and closing of the fire doors, as will be obvious.

From the foregoing it will be seen that I do not depend upon a supply of heated air to insure a thorough mixing of the gases to make the proper combustion, but that on the other hand I eliminate the necessity of supplying air to the combustion chamber through a separate air supplying means. It will be seen that the bottoms of the passage ways 22 are inclined and that the recesses 20 and 21 in the sides of the supplemental combustion chamber are larger than the recesses 18 and 19 of the fire box, to prevent clogging of the products of combustion in their passage from the fire box to the supplemental combustion chamber, and to insure a proper precipitation of the products into the same. It will also be seen that I provide a large supplemental combustion chamber to insure a thorough mixing and dissipation of the gases and carbon before the passage of the gases and carbon through the openings in the rear wall of the supplemental combustion chamber. It will also be seen that the alternate firing of the furnace or grate insured a perfect operation of the furnace in that when the left side of the furnace is receiving a new charge of fuel, the smoke or carbon of that side will meet the hot gases coming through the flues or passages on the right side of the furnace. The large area of highly heated fire brick, furnace flues and supplemental combustion chamber with which the products come into contact makes the combustion complete without any extra admission of air. It will also be noted that the products of combustion proceed directly from the grate 11 into the passages 16—18—15 and in a substantially horizontal direction and enter the supplemental combustion chamber at the sides thereof and are directed against and commingled with the products of the combustion passing through the intermediate aperture 17 of the bridge wall, the passages thus offering the minimum of resistance to the flame, smoke, gases, etc. passing therethrough.

What is claimed is:—

1. In a furnace, a main combustion chamber, a bridge wall provided with an intermediate transverse opening, a supplemental combustion chamber having spaced side walls and a rear wall, the rear wall provided with transverse openings, passage ways in the side walls providing substantially horizontal independent and direct means of communication between the main combustion chamber and supplemental combustion chamber.

2. In a furnace, a main combustion chamber, a supplemental combustion chamber, a bridge wall between the chambers, said bridge wall having an intermediate transverse aperture providing communication between the chambers and a supplemental chamber having transverse apertures in its rear wall, and passage ways providing substantially horizontal communication between the chambers around the ends of the bridge wall.

3. In a furnace, an inclosing structure including side walls and with a smoke arch at one end and a main combustion chamber at the other end, a supplemental combustion chamber between the smoke arch and the main combustion chamber, a bridge wall between the main combustion chamber and supplemental combustion chamber and having an intermediate communicating aperture, passages within said side walls providing independent substantially horizontal means of communication between said main chamber and supplemental chamber around the end of the bridge wall, and a wall between the supplemental chamber and smoke arch and provided with a plurality of transverse apertures providing communication

between the supplemental chamber and the smoke arch.

4. In a furnace, an inclosing structure including side walls and with a smoke arch at one end and a main combustion chamber at the other end with spaced feed openings provided with movable doors next the side walls of the main combustion chamber, a supplemental combustion chamber between the smoke arch and the main combustion chamber, a bridge wall between the main combustion chamber and supplemental combustion chamber and having an intermediate communicating aperture, passages within said side walls providing independent substantially horizontal means of communication between said main chamber and supplemental chamber around the end of the bridge wall, and a wall between the supplemental chamber and smoke arch and provided with a plurality of transverse apertures providing communication between the supplemental chamber and the smoke arch, whereby the fuel may be fed alternately through said doors to the main combustion chamber at the opposite sides thereof and the products of combustion conducted into the supplemental combustion chamber alternately at opposite sides.

In testimony whereof I affix my signature, in presence of two witnesses.

CARL JOHAN OBERG.

Witnesses:
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NICHOLAS GULBRANSEN.