

(No Model.)

4 Sheets—Sheet 1.

F. COOK.  
BAGASSE FURNACE.

No. 497,770.

Patented May 23, 1893.

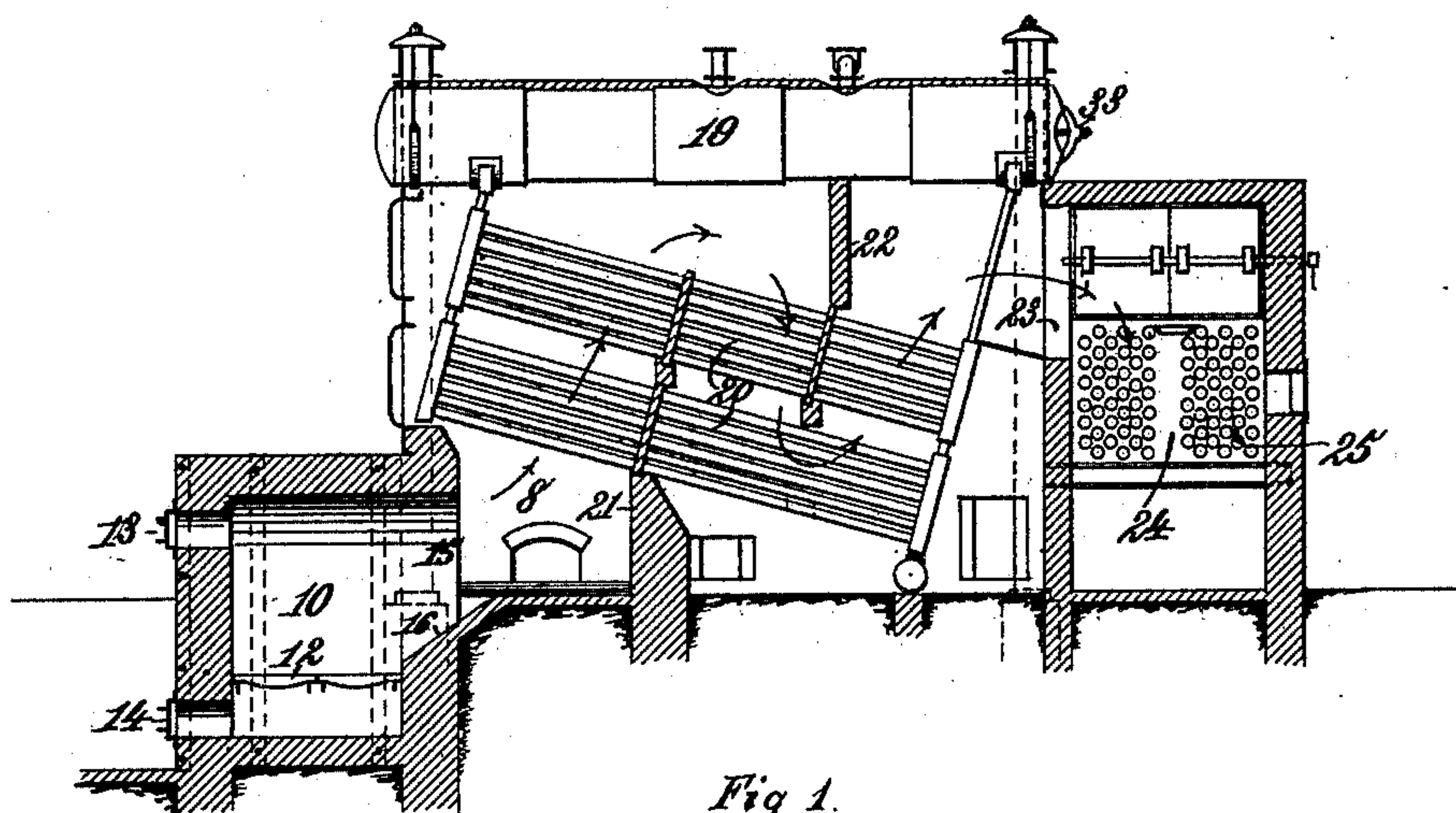


Fig 1.

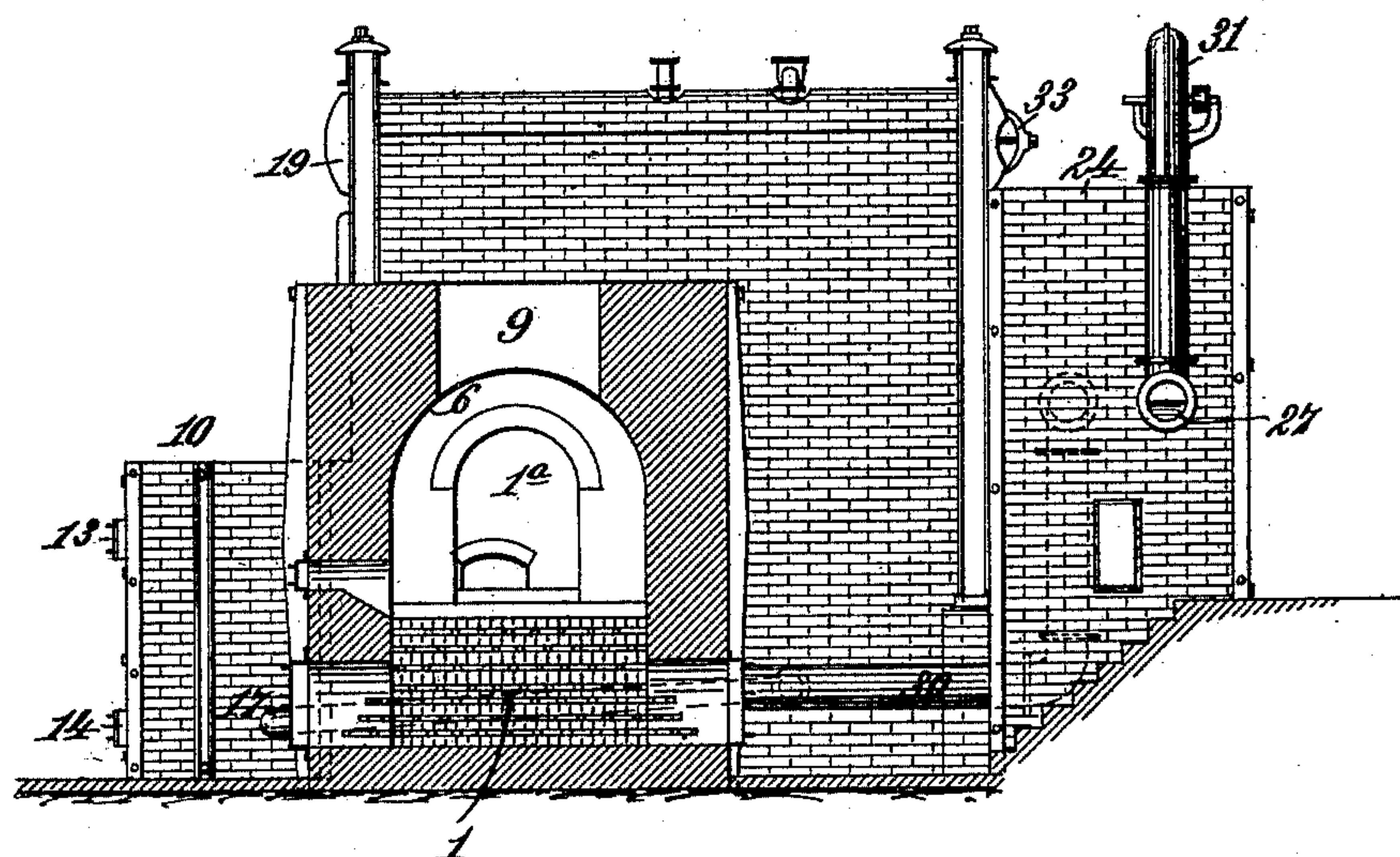


Fig 2.

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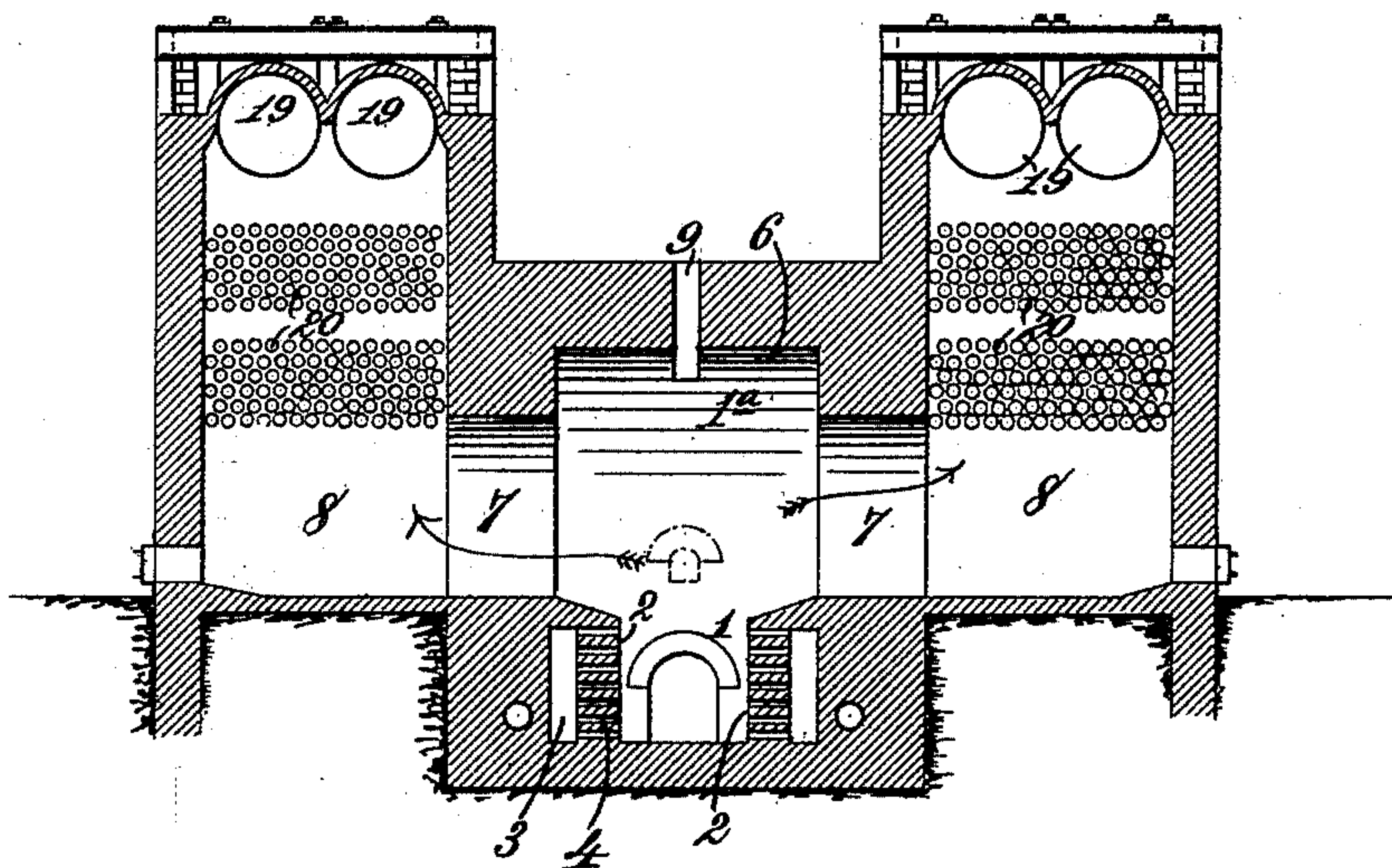


Fig. 3.

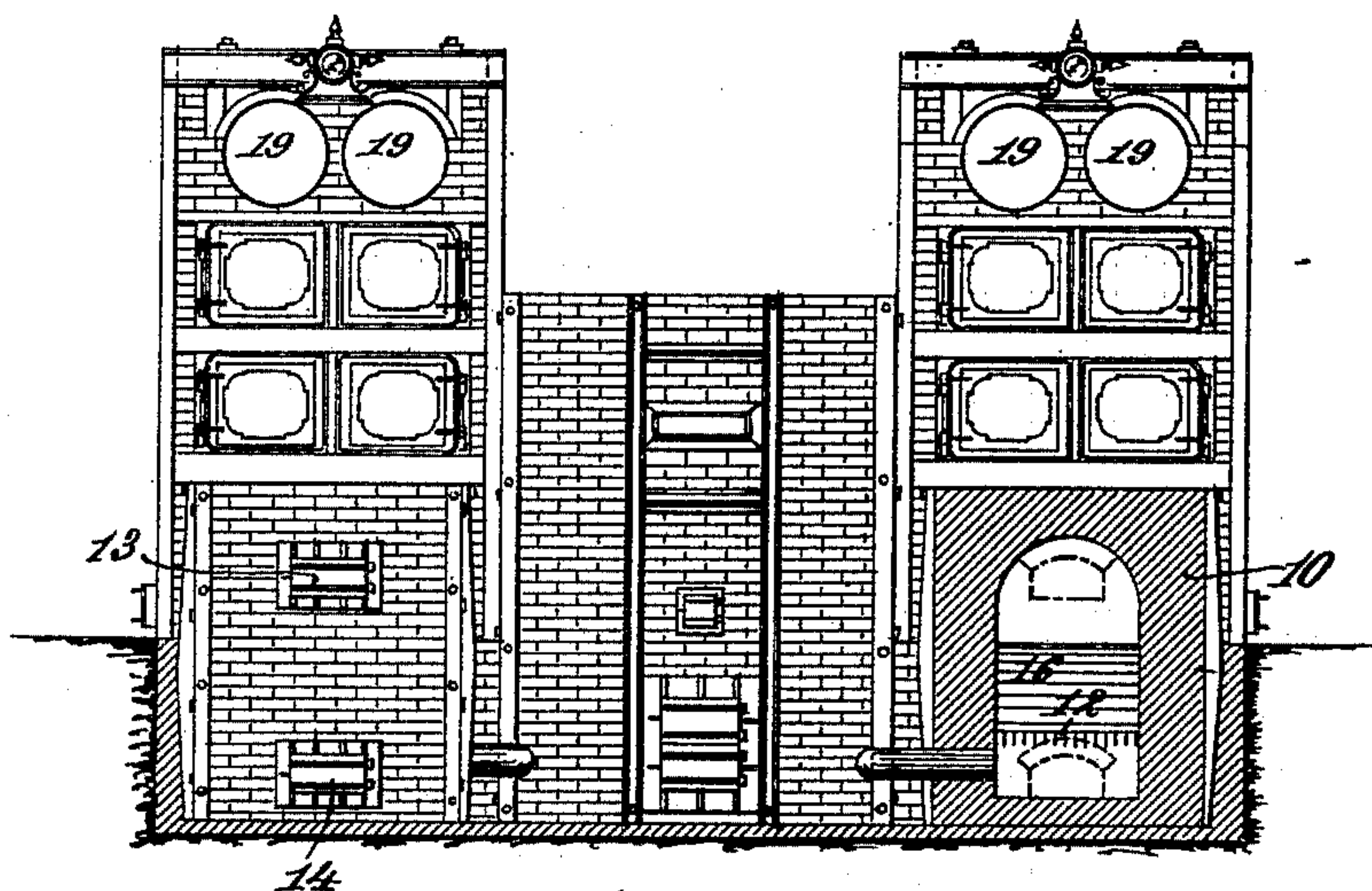


Fig. 4.

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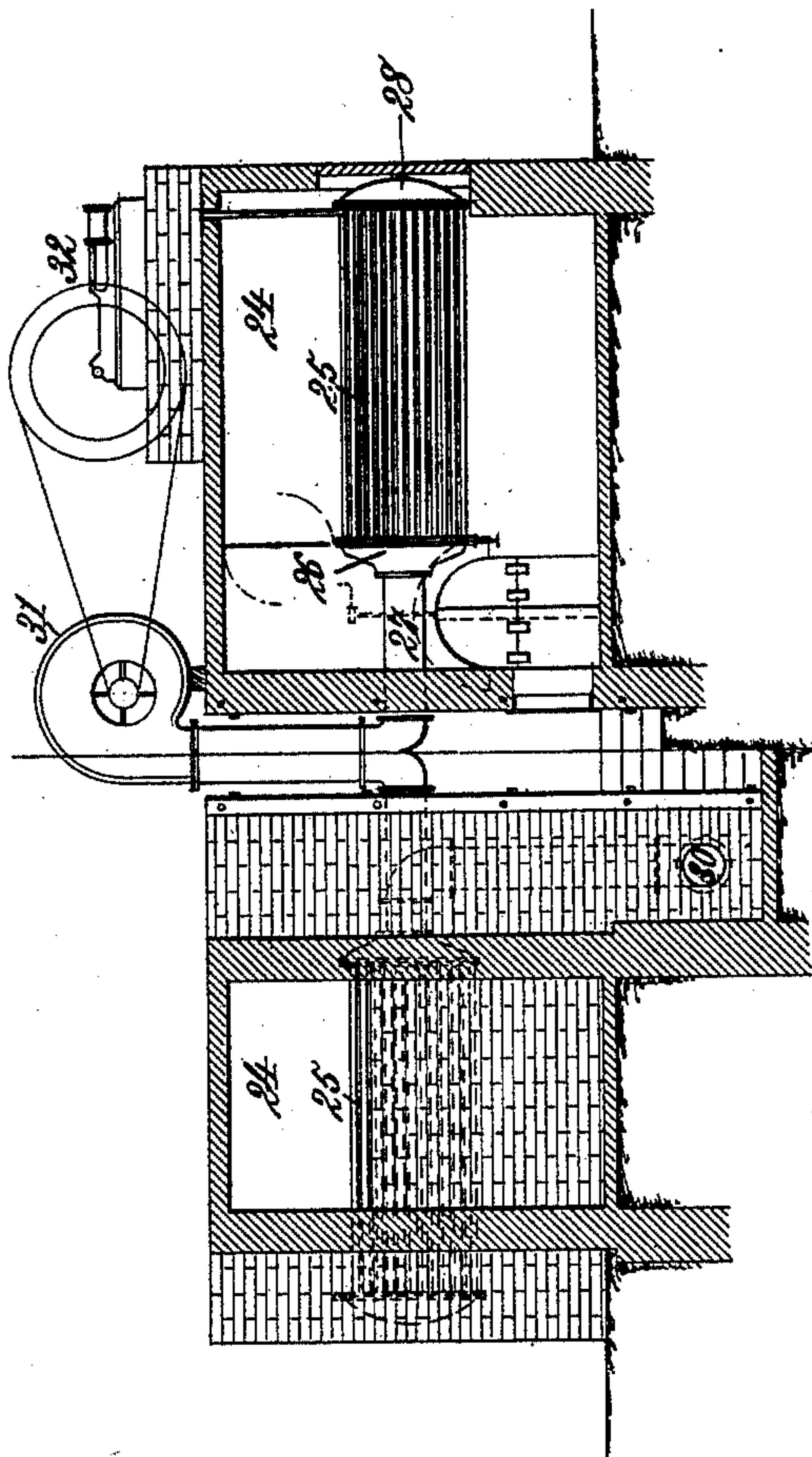


Fig. 5.

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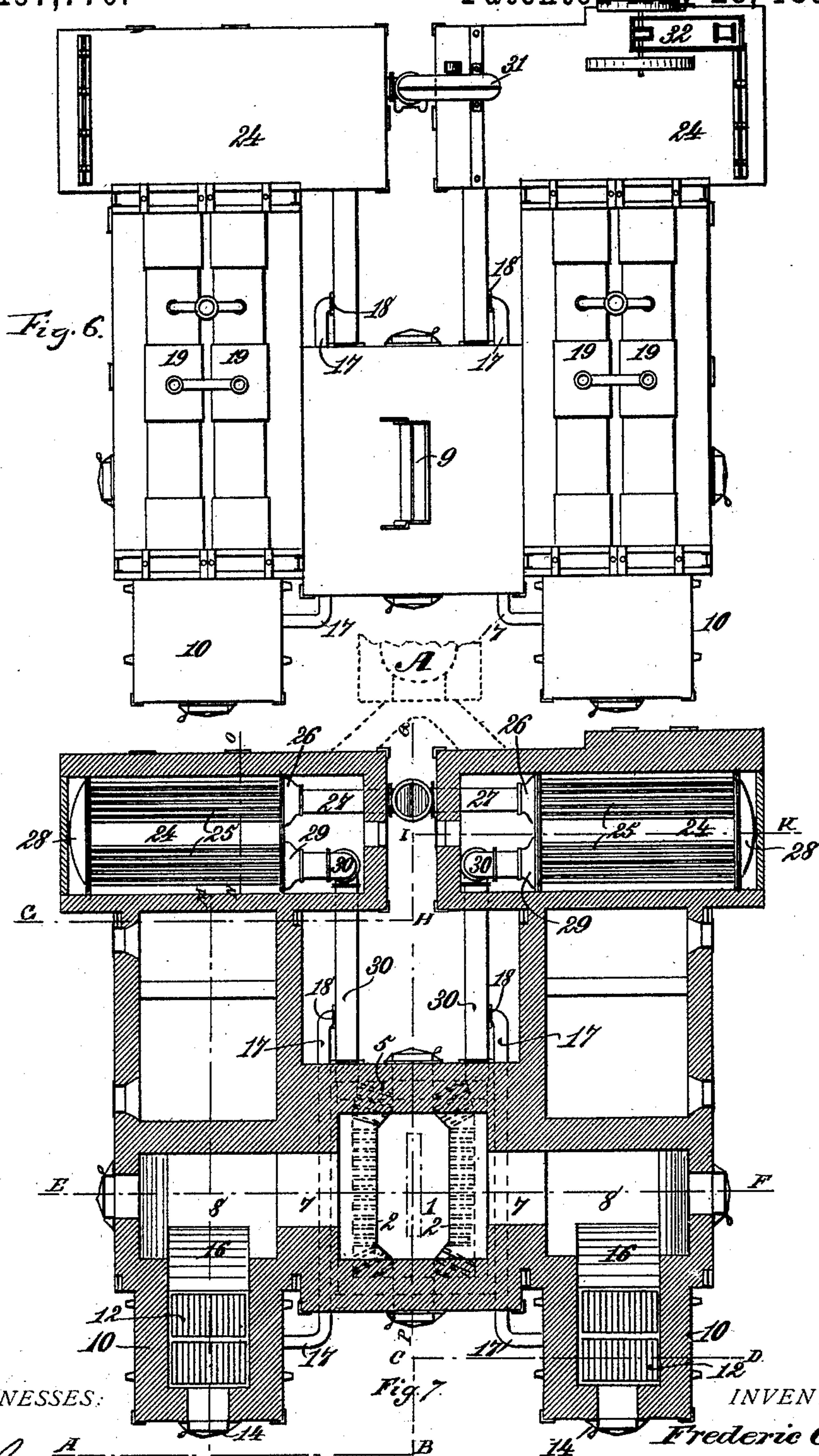
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# UNITED STATES PATENT OFFICE.

FREDERIC COOK, OF BAY ST. LOUIS, MISSISSIPPI.

## BAGASSE-FURNACE.

SPECIFICATION forming part of Letters Patent No. 497,770, dated May 23, 1893.

Application filed March 10, 1892. Serial No. 424,432. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERIC COOK, a citizen of the United States, residing at Bay St. Louis, in the county of Hancock and State of Mississippi, have invented certain new and useful Improvements in Bagasse-Furnaces; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, and to the figures of reference marked thereon.

My invention relates to that type of furnace specially constructed for the use of green bagasse as fuel.

It is my purpose to improve furnaces of this kind by the provision of novel features of construction and new combinations, or arrangements of parts, whereby the water-tubes of the steam-boiler are brought, as a whole, near to the bagasse-furnace and exposed to a more uniform heat throughout, without loss of boiler-space, and without sacrificing any portion of the power.

It is my purpose, also, to provide a bagasse-furnace having such construction that the products of combustion shall undergo a further combustion in the boiler-chambers, and shall produce a more intense and uniform heat, whereby the full heating power of the fuel and the maximum power of the boilers are rendered available.

It is one purpose of my invention, also, to provide a bagasse-furnace having a central combustion-chamber and lateral boiler-chambers, arranged on both sides, in which the heating-tubes are so arranged as to be heated with substantial uniformity, and exposed to the hottest portions of the blast, said tubes being arranged in closer proximity to the bagasse-burner than in the furnaces now in use.

My invention also has for its purpose the improved arrangement of auxiliary furnaces, adapted for ordinary fuel, and capable of use either alone, or in conjunction with the bagasse-furnace; and the combination with the said furnaces of an air-heater of improved construction, capable of supplying the bagasse-furnace only, or the auxiliary furnaces, or all three conjointly, as circumstances may require.

My invention consists in the parts and combinations of parts hereinafter fully set forth, and then more particularly pointed out and defined in the claims concluding this specification.

To enable others skilled in the art to make, construct and use my said invention, I will now describe the same in detail, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical section, taken in the line L, M, N, O, Fig. 7. Fig. 2 is a central, longitudinal section, taken vertically in the line P, Q, Fig. 7, one of the boiler-chambers being shown in elevation beyond. Fig. 3 is a transverse, vertical section, taken in the line E—F, Fig. 7. Fig. 4 is a transverse, vertical section, taken in the line A, B, D, Fig. 7. Fig. 5 is a longitudinal section, taken in the vertical plane G, H, I, K, Fig. 7. Fig. 6 is a plan view of the furnace. Fig. 7 is a horizontal section, passing through the auxiliary and bagasse-furnaces, boiler-chambers, and air-heaters.

In the said drawings the reference-numeral 1 indicates the bagasse-burner, or furnace, which consists of a substantially rectangular structure, provided upon each side with a false wall 2, (Fig. 5,) by which a tuyere-chamber 3 is formed. Blast-openings 4 are provided, the air being supplied in the manner described hereinafter to a chamber 5, formed in the rear wall of the bagasse-furnace. The walls 2 contract the interior of the furnace 1, in one direction, making it narrower than the combustion-chamber 1<sup>a</sup>, which rises to a suitable height above it, the form and size of said combustion-chamber being the same as the furnace 1, below, would be, were the walls 2 removed. The top 6 of the chamber 1<sup>a</sup> is preferably arched. Upon each side of said chamber is formed an opening 7, which gives communication with the boiler-chamber 8 on that side. The bagasse is supplied by means of an opening 9, in the arched top of the combustion-chamber 1<sup>a</sup>.

The boiler-chambers and auxiliary furnaces are alike in structure and a description of one will answer for both. They consist of structures of masonry, of rectangular form, projecting, as to the furnace, entirely in front



of the bagasse-furnace and out of line therewith. The auxiliary furnace 10 not only projects forward, out of line with the bagasse-furnace, but each is sunk down below the level  
 5 of the lateral discharge-openings, in order to prevent the grates 12 of said auxiliary furnaces from being injured by the heat of the bagasse-furnace. Each auxiliary furnace is provided with a door 13, to enable wood, or  
 10 other solid fuel to be fed to the grate. A clean-out door 14 is also provided. The products of combustion pass through an opening 15 at the rear of each furnace, over an inclined surface 16, by which they are directed upward  
 15 to the forward ends of the water-tubes of the boiler. These furnaces are supplied with hot air by pipes 17, which branch from blast-pipes, described hereinafter, and are carried in the side-walls of the bagasse-furnace, from the  
 20 front of which they emerge and are bent laterally to enter the side walls of the auxiliary furnaces and discharge beneath the grates 12. These pipes 17 are provided with dampers 18, by which their blast may be cut off at pleasure.  
 25 In each boiler-chamber I use, preferably, boilers 19, of the Babcock & Wilcox type, with two drums. Beneath each boiler I arrange the water-tubes 20, having the arrangement, inclination, and connection to the boiler, well  
 30 known to those skilled in the art. These water-tubes, however, I arrange in two gangs, decks, or groups, about fourteen, or perhaps sixteen pipes in width, and built up in height sufficiently to afford the necessary water-  
 35 space. This arrangement enables me to place the outer tubes, which are at the greatest distance from the bagasse-furnace, some five to seven tubes nearer to the bagasse-furnace than has been possible when using boilers  
 40 with three drums and twenty-one tubes wide; while by extending the group of tubes to a higher point, I am able to obtain as great a power as before, with an economy in the consumption of fuel. The blast in the boiler-  
 45 chambers is directed by the bridge-walls 21 and flame-bridges 22, which are so well known as to require no description.

Referring to Fig. 1 of the drawings, the products of combustion, after traversing the  
 50 boiler-chambers, pass out at the rear end of each chamber by way of openings 23, in the end walls. Said walls form part of the inclosure of an air-heating-chamber 24, arranged transversely to the boiler-chamber.  
 55 These heaters are usually of rectangular form, and each contains one, two, or more gangs of pipe 25. I preferably use two gangs of pipe, and insert the ends of one gang into a closed head, or box, 26, which communicates with a  
 60 supply-pipe 27. The other ends of the pipes 25 enter a head, or closed box, 28, which has communication in common with both gangs. The groups of pipes enter a head 29, which delivers the air to a pipe 30, by which it is  
 65 carried to the tuyere-chamber 3. The arrangement is precisely the same for the other side. The air-heating pipes 25 are supplied

with air by a blower 31, the casing of which communicates with the pipe 27. The blower is driven by an engine 32. The pipes 27, 70 leading from the blower to the heaters, are usually provided with dampers, to enable either, or both heaters, to be cut out. The heated gases, after traversing the compartments 24, pass off to the stack, which is shown 75 in the drawings, at A, in Fig. 6. The drums of the boiler are provided with man-holes 33, to admit of cleansing, and similar entrances are also provided for the air heaters 24, and boiler-chambers. 80

By placing the auxiliary furnaces in front of the line of direction of the blast from the bagasse-furnace, with their grates below the level of the lateral openings by which the hot blast passes from the combustion-chamber 1 85 to the boiler-chambers, the grates are wholly withdrawn from the heat and cannot be injured when the auxiliary furnaces are not in use. The auxiliary furnaces are, as a rule, used separately, being intended to supply 90 heat to the boilers when bagasse is not to be had, or when for any reason it is desirable to use other fuel. These auxiliary furnaces can be cooled either by natural draft through the doors opening beneath the grate, or by a 95 forced draft through the blast-pipes. When these furnaces are used, the dampers in the pipes leading from the blower to the air-heating tubes must be opened and the blower should be turned slowly, to drive air through 100 the tubes in the air-heaters 24, to prevent them from burning.

In using green bagasse as fuel, I have heretofore attempted to provide a furnace having water-tube boilers, in which the maximum 105 heating surface should be as near the bagasse furnace as possible. To obtain large horse-powers I have used water-tube boilers with three drums arranging one boiler on each side of the bagasse-furnace, with water-tubes 110 arranged in a number of series of tubes, each series having twenty one tubes. When thus arranged the group of tubes was of such width that those most remote from the bagasse-furnace received much less heat than the others, 115 which were nearer to it.

I have now adopted the construction and arrangement shown, consisting essentially of boilers of two drums only, with fourteen or sixteen water-tubes in each series. I use two 120 groups, or gangs, of these water-tubes, one above the other, the whole connected at their ends. Thus the water-tubes most remote from the bagasse-furnace are from seven to five tubes nearer to the furnace than was possible in arrangements heretofore used, in 125 which twenty-one tubes were used in each series. By building up the water-tubes in the manner described I obtain a boiler of as great power, which is much nearer the bagasse furnace, and in which the generation of steam is 130 more economically accomplished, as the water-tubes have a better exposure to the heat and receive the hottest portions of the blast,



which acts with more uniformity on all parts of gangs or groups of water-tubes.

What I claim is—

1. In a bagasse-furnace a combustion-chamber, having lateral openings communicating with boiler chambers, arranged on both sides of said combustion-chamber, and boilers having water-tubes arranged in said chambers in double decks, or groups of greater total height than width, substantially as described.

2. In a bagasse-furnace, the combination with a combustion-chamber and with boiler-chambers on both sides of said chamber and water-tubes arranged in two groups, or double decks, of greater height than width, their ends being connected together, substantially as described.

3. In a bagasse-furnace, the combination of a combustion chamber, a boiler, a double deck, or group of water-tubes of greater total height than width, arranged in boiler-chambers on both sides the bagasse-furnace, an air-heater and an air-forcing mechanism driving air through the heater and into the furnace, substantially as described.

4. In a bagasse-furnace, a central combustion-chamber having lateral blast-communication with boiler-chambers containing water-tubes, and auxiliary furnaces for solid fuel, arranged in front of the boilers and below the level of the blast-openings leading to said boiler-chambers, substantially as described.

5. In a bagasse-furnace, a combustion-chamber, a boiler-chamber upon one side thereof, a blast-opening leading to the boiler-chamber and beneath water-tubes arranged therein, and an auxiliary furnace having its grate beneath the level of the floor of the boiler-chamber, and in front thereof, an upwardly inclined surface being provided be-

tween said grate and floor, substantially as described.

6. In a bagasse-furnace, a central combustion-chamber, a boiler-chamber upon each side of the same, a blast-opening in the side of each boiler-chamber, to admit the blast from the combustion-chamber, an air-heater consisting of two gangs or groups of pipes, both opening at one end into a common head, or closed box, and communicating at the other end with a blower-casing, air-pipes leading to the tuyeres of the central combustion-chamber and dampered branch-pipes communicating with said air-pipes and leading to the auxiliary furnaces, said gang, or group of pipes, being inclosed in the heater, which is traversed by the waste heat going to the stack, substantially as described.

7. A bagasse-furnace having a central and two auxiliary furnaces, one on each side of the central furnace and below the level of and in front of the blast-openings of the central furnace, boiler-chambers behind and above the auxiliary furnaces, water-tubes suspended in said chambers and arranged in double decks, of groups, of greater total height than width, an air-heater traversed by the waste heat going to the stack, a blower supplying air to the air-heater pipes leading to the tuyeres of the central furnace and branch-pipes leading from said pipes to the auxiliary furnaces, said branch-pipes being provided with dampers, substantially as described.

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

FREDERIC COOK.

Witnesses:

A. H. GIFFNEY,  
S. G. COOK.