

No. 819,183.

J. C. TELLER.

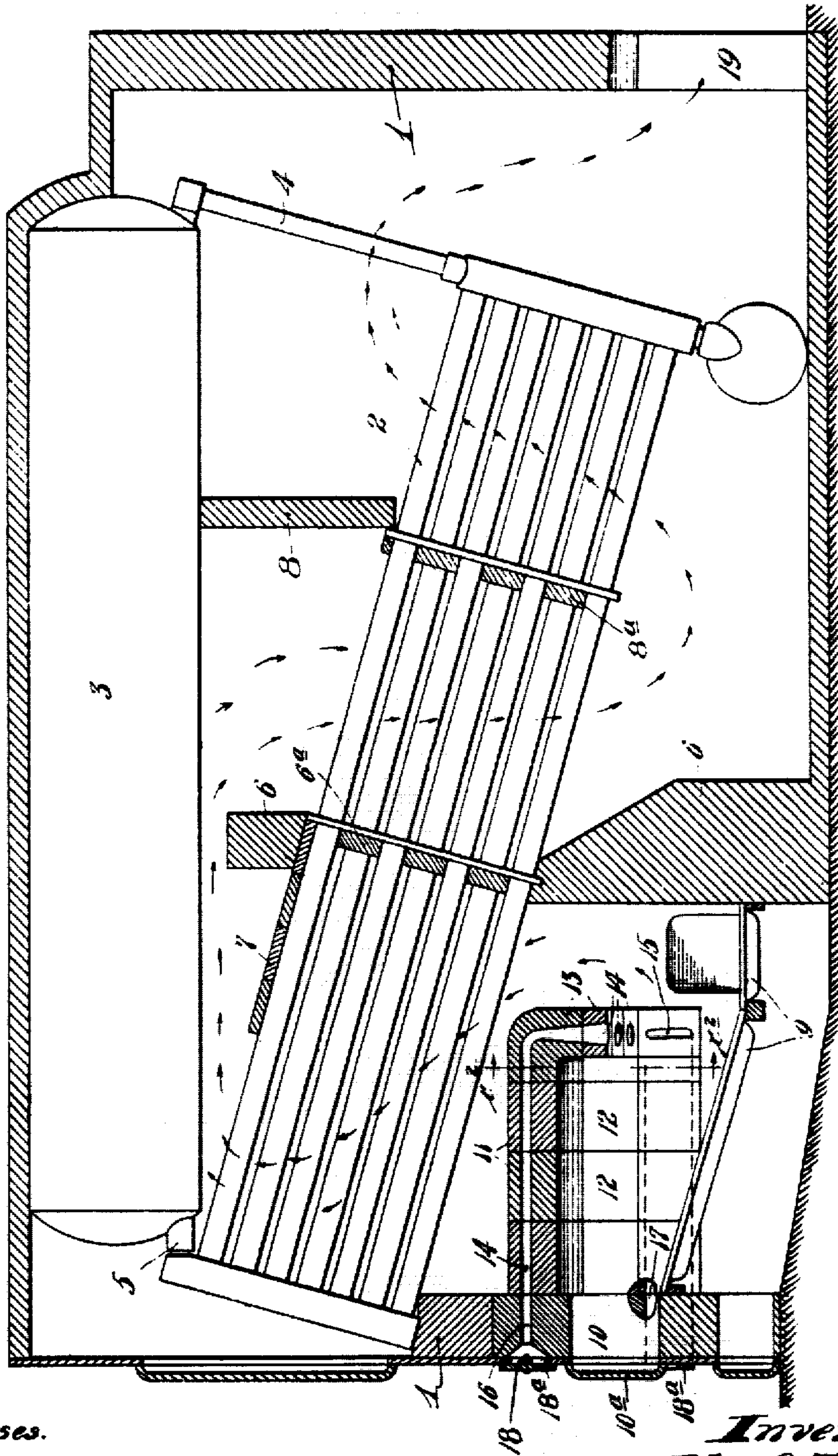
PATENTED MAY 1, 1906.

FURNACE.

APPLICATION FILED MAY 23, 1905.

2 SHEETS—SHEET 1

Fig. 1.



Witnesses.  
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Robert Mabry.

Inventor:  
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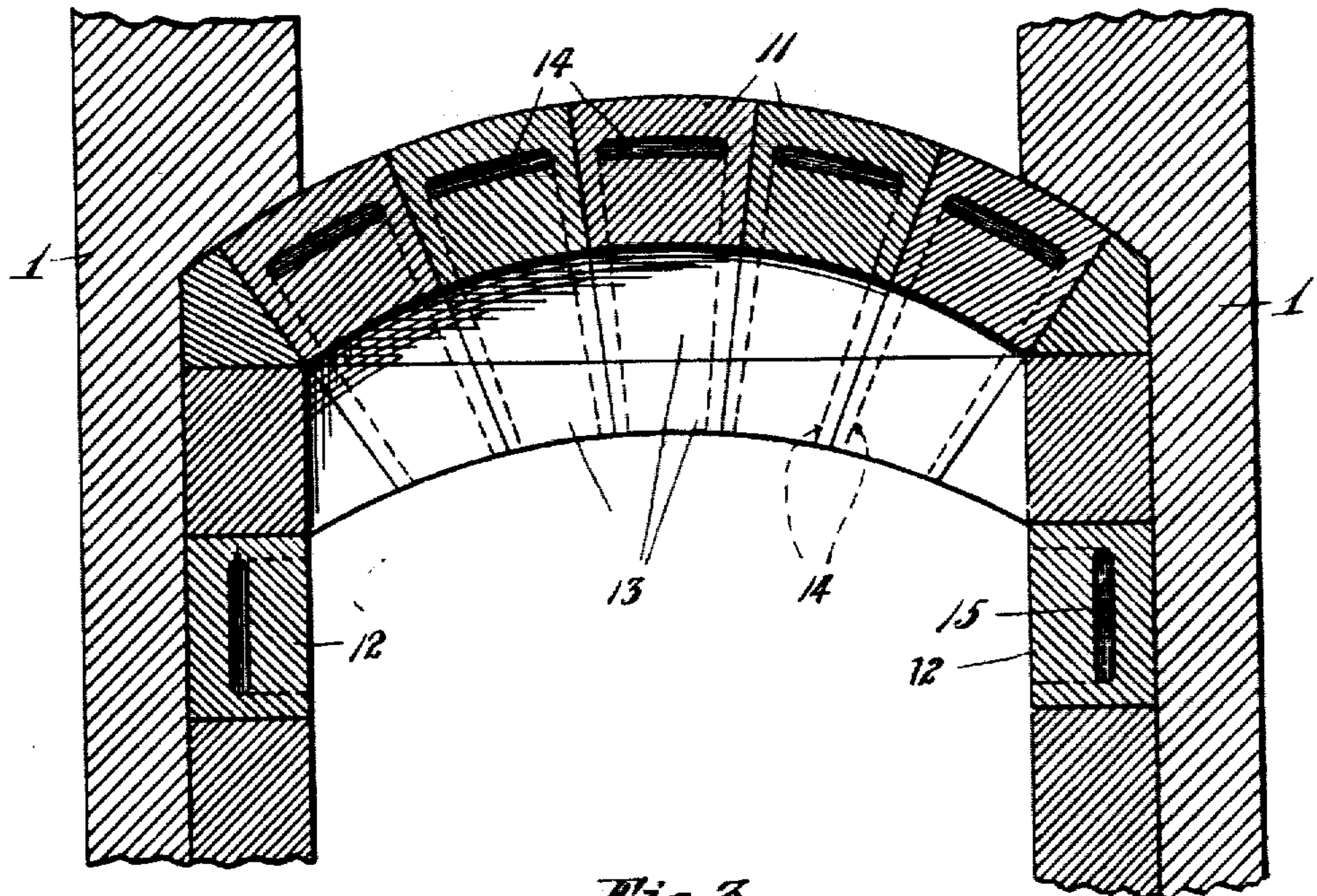
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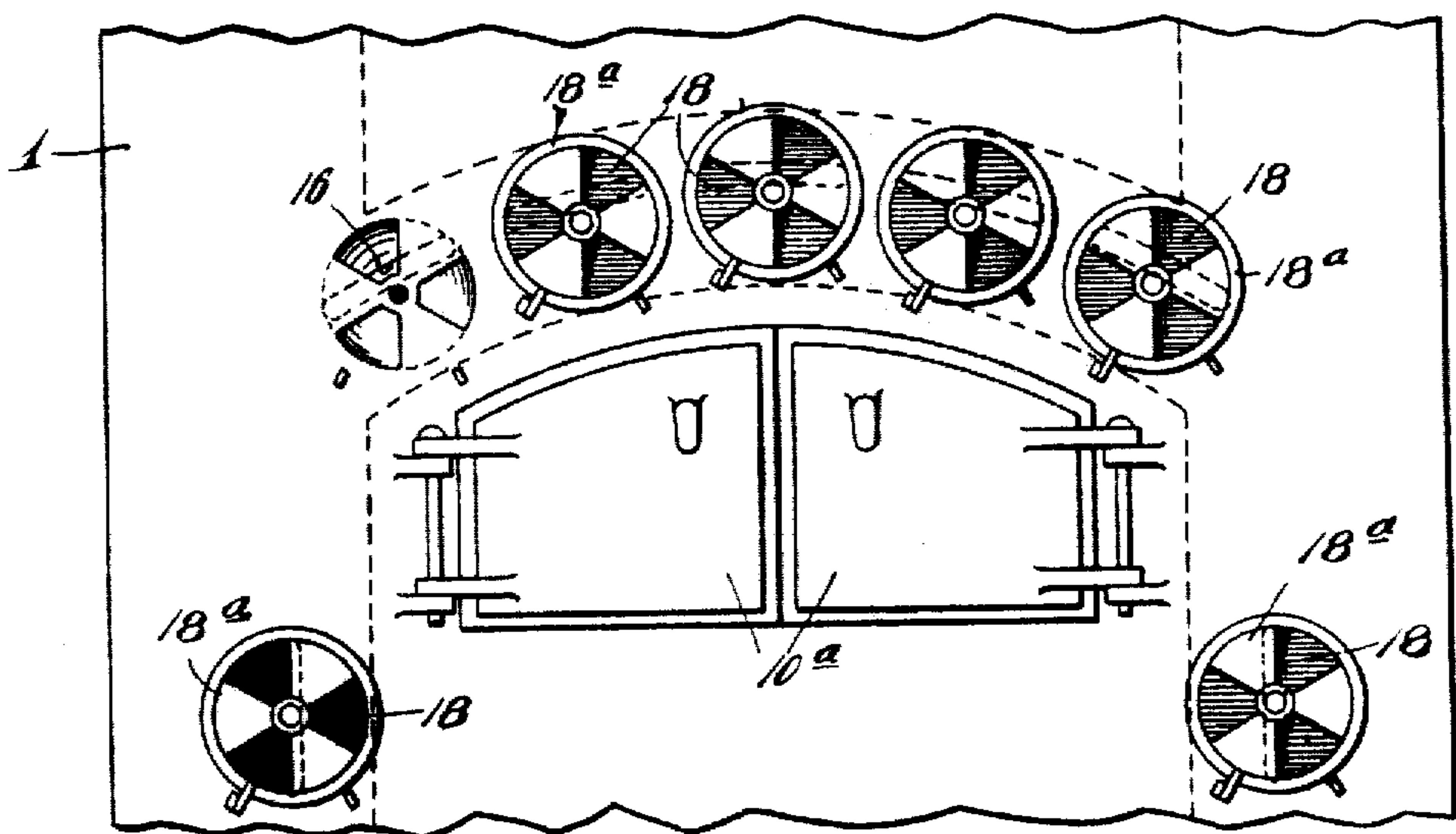
APPLICATION FILED MAY 23, 1906.

2 SHEETS—SHEET 2.

*Fig. 2.*



*Fig. 3.*



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# UNITED STATES PATENT OFFICE.

JOHN C. TELLER, OF MINNEAPOLIS, MINNESOTA.

## FURNACE.

No. 819,183.

Specification of Letters Patent.

Patented May 1, 1906.

Application filed May 23, 1905. Serial No. 281,773.

*To all whom it may concern:*

Be it known that I, JOHN C. TELLER, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to furnaces, and especially to those that are used in connection with water-tube boilers for generating steam.

The primary object of my invention is to provide certain improvements whereby a more perfect and complete combustion is obtained, thereby accomplishing two important results—to wit, the burning of the smoke and economy in the use of fuel.

To the above ends the invention consists of the novel devices and combinations of devices hereinafter described, and defined in the claims.

In the accompanying drawings, which illustrate the invention, like characters indicate like parts throughout the several views.

Figure 1 is a view in vertical section taken longitudinally through a furnace and a water-tube boiler, the same having incorporated therein the several features of my invention.

Fig. 2 is a transverse vertical section, on an enlarged scale, taken approximately on the line  $x^1 x^2$  of Fig. 1, some parts being removed and some being broken away; and Fig. 3 is a front elevation of substantially those parts of the furnace that are located in front of the parts shown in Fig. 2.

The numeral 1 indicates the exterior brick-work or masonry of the furnace, within which is placed an inclined water-tube boiler of standard construction, the same comprising a stack of inclined water-tubes 2 and an overlying cylindrical dome 3 and the said parts 2 and 3 being in communication through connecting-tubes 4 and 5. This water-tube boiler is of standard construction, being what is known to the trade as the Babcock and Wilcox boiler. The intermediate portion of the tubes 2 rests upon and extends through the transverse fire-wall 6, and the spaces between the tubes in line with the said fire-wall 6 are filled in with fire-clay or brick, (indicated at 6<sup>a</sup>.) A deflecting plate or wall 7 extends laterally forward from the fire-wall 6 over the stack of tubes 2. A deflecting-par-

tion 8 extends over the tubes 2 between the fire-wall 6 and the rear wall or inclosing brick-work 1. Below and approximately in line with the partition 8 fire-clay or bricks 8<sup>a</sup> are filled in the spaces between the water-tubes 2.

The grates 9 are located in the primary combustion-chamber formed in the compartment located between the fire-wall 6 and the fire-wall of the furnace, and they are supported in the usual way.

The numeral 10 indicates a door-closed opening, which is adapted to be closed by hinged doors 10<sup>a</sup> of usual construction.

Within the primary combustion-chamber, overlying the inclined portion of the grate 9, is a fire arch or dome, made up of segmental top blocks 11, vertically-disposed side blocks 12, and vertically-disposed end blocks 13, which blocks are preferably constructed of fire-clay. The inner end plate formed by the blocks 13 preferably terminates about half-way between the grate 9 and the arched top of the dome. The top blocks 11 and end blocks 13 and certain of the side blocks 12 are formed with air-passages 14 and 15. The air-passages 14 of the aligned blocks 11 and 13 register with each other to form long inwardly-extended and then downwardly-turned air-ducts that open at the lower edge of the vertical inner wall of the dome or fire-arch. The said air-ducts 14 at their outer extremities register with air-ducts 16 in the front wall of the fire-box. The side air-ducts 15 at their outer extremities register with air-ducts 17 in the front wall of the fire-box. The inner extremities of the air-ducts 15 open into the fire-box at the sides thereof, just below the vertical inner wall of the fire arch or dome. The outer extremities of the air-ducts 16 and 17 are made flaring, and they are adapted to be opened to any desired extent and closed by means of the damper-valves 18 and 18<sup>a</sup>, respectively.

The numeral 19 indicates an outlet for the products of combustion which is located in the rear wall of the masonry 1 and communicates with a smoke-stack. (Not shown.)

With the furnace designed as above illustrated the products of combustion are made to take a winding course, substantially as indicated by the arrows marked on Fig. 1, by reference to which it will be noted that in their first passage between the water-tubes 2 they are, by the deflecting-plate 7, caused to travel rearward to or approximately to the upper ends of said tubes, from



thence along the under surface of the dome 3 over the fire-wall 6, thence vertically downward between the water-tubes, and thence again upward between the said water-tubes 5 and out through the passage 19. In taking this winding course the flame and the products of combustion are caused to travel over the entire surface of the water-tubes, thus producing extremely-hot steam-generating 10 action. The combustion is very greatly intensified in the primary combustion-chamber, and particularly in the vicinity of the inner wall of the fire-arch, by the introduction of the oxygen or air drawn into said combustion-chamber through the air-ducts 14 and 15. By this introduction of air the combustion throughout the several compartments of the fire-box is greatly increased, and by this increased combustion the smoke and all 20 combustible particles will be completely or nearly completely burned, so that there will be no annoyance from smoke and a very great economy in fuel will be effected.

My improvements in their application to 25 furnaces of the character above described and to other furnaces will add very little, if anything, to the usual cost thereof and when applied have in practice been found extremely efficient for the purposes had in 30 view. The abatement of the smoke nuisance in cities is one which has called forth much effort and which I do not believe has been satisfactorily solved prior to this invention.

I believe, however, that I have accomplished the objects of my invention—to wit, the burning of the smoke and economy in the use of 35 fuel.

From what has been said it will be understood that the furnace above described is capable of modifications within the scope of 40 my invention as herein set forth and claimed.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. In a furnace, the combination with a fire-arch having a depending transverse inner 45 wall formed of blocks provided with air-passages forming, when put together, independent air-ducts, said air-ducts having damper-controlled inlets, substantially as described.

2. In a furnace, the combination with a 50 fire-arch provided with side walls and a transverse inner wall, formed of blocks provided with air-passages which, when the blocks are put together, form independent air-ducts in the side walls below the trans- 55 verse inner wall and in the arch and depending transverse wall, and independent dampers controlling the inlets of the several air-ducts, substantially as described.

In testimony whereof I affix my signature 60 in presence of two witnesses.

JOHN C. TELLER.

Witnesses:

H. D. KILGORE,  
ROBERT C. MAYBEY.