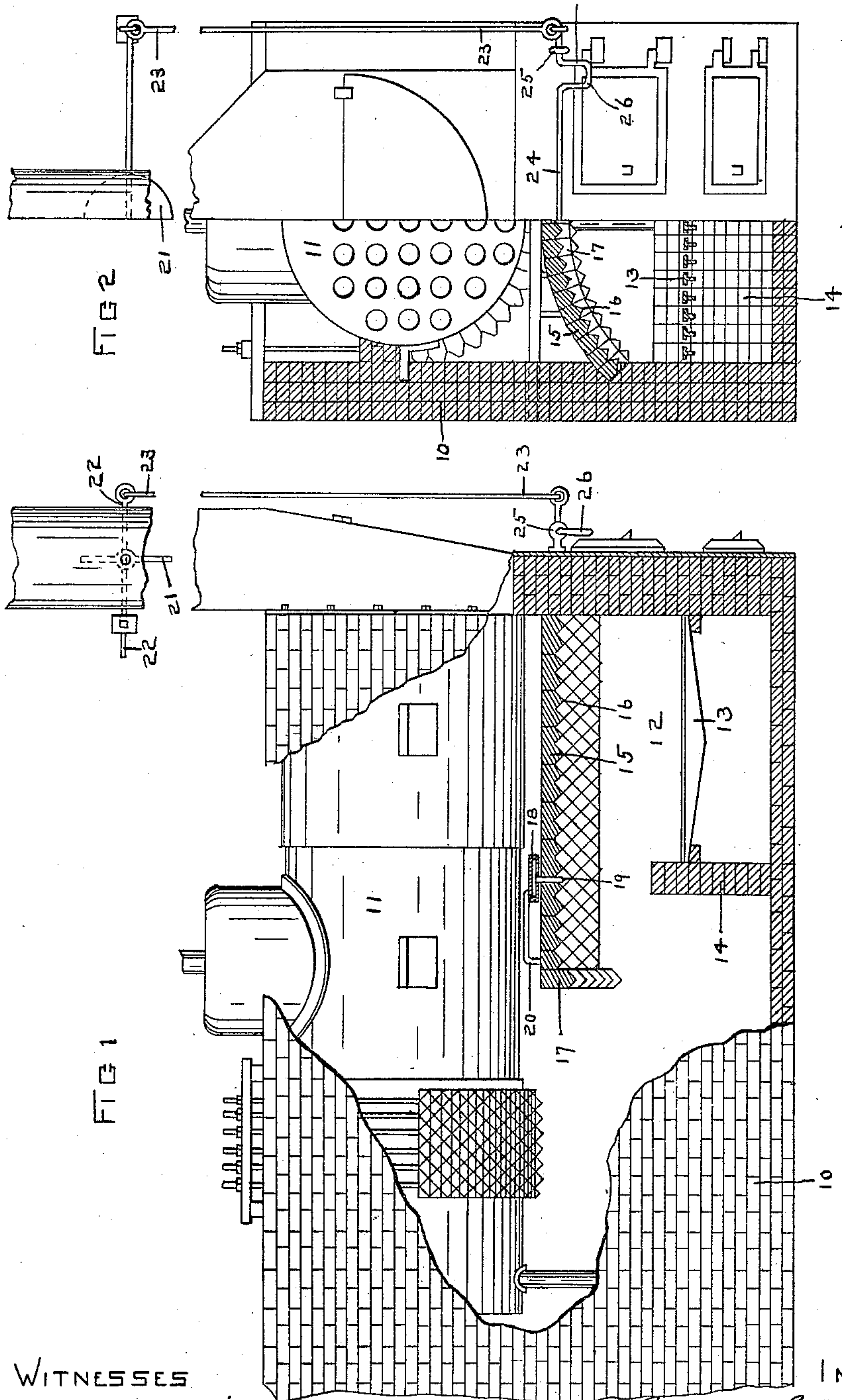


S. L. SHEUERMANN.  
SMOKE PREVENTING FURNACE.

APPLICATION FILED APR. 22, 1907.

2 SHEETS—SHEET 1.



WITNESSES

*Blanche Sedgwick*  
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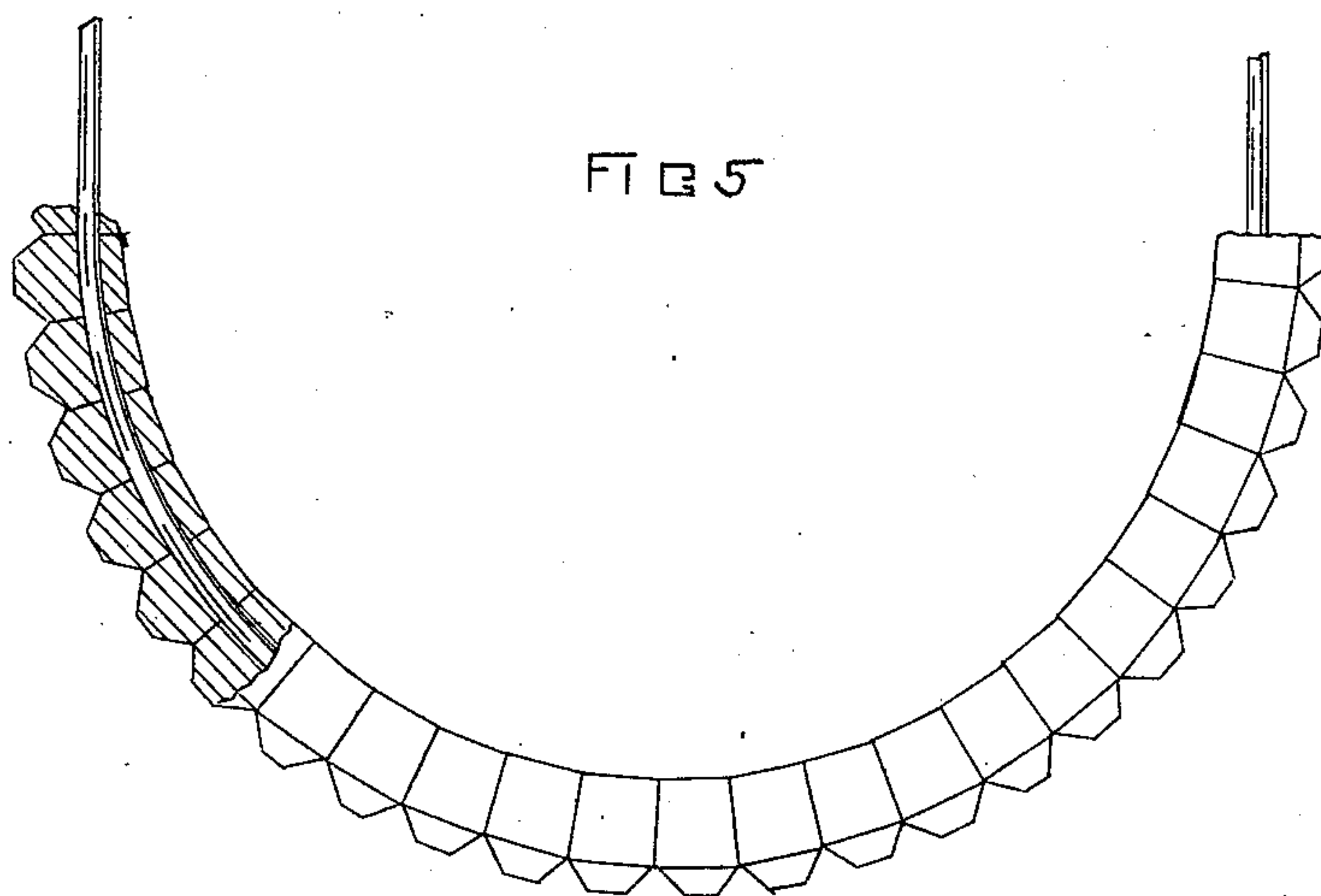
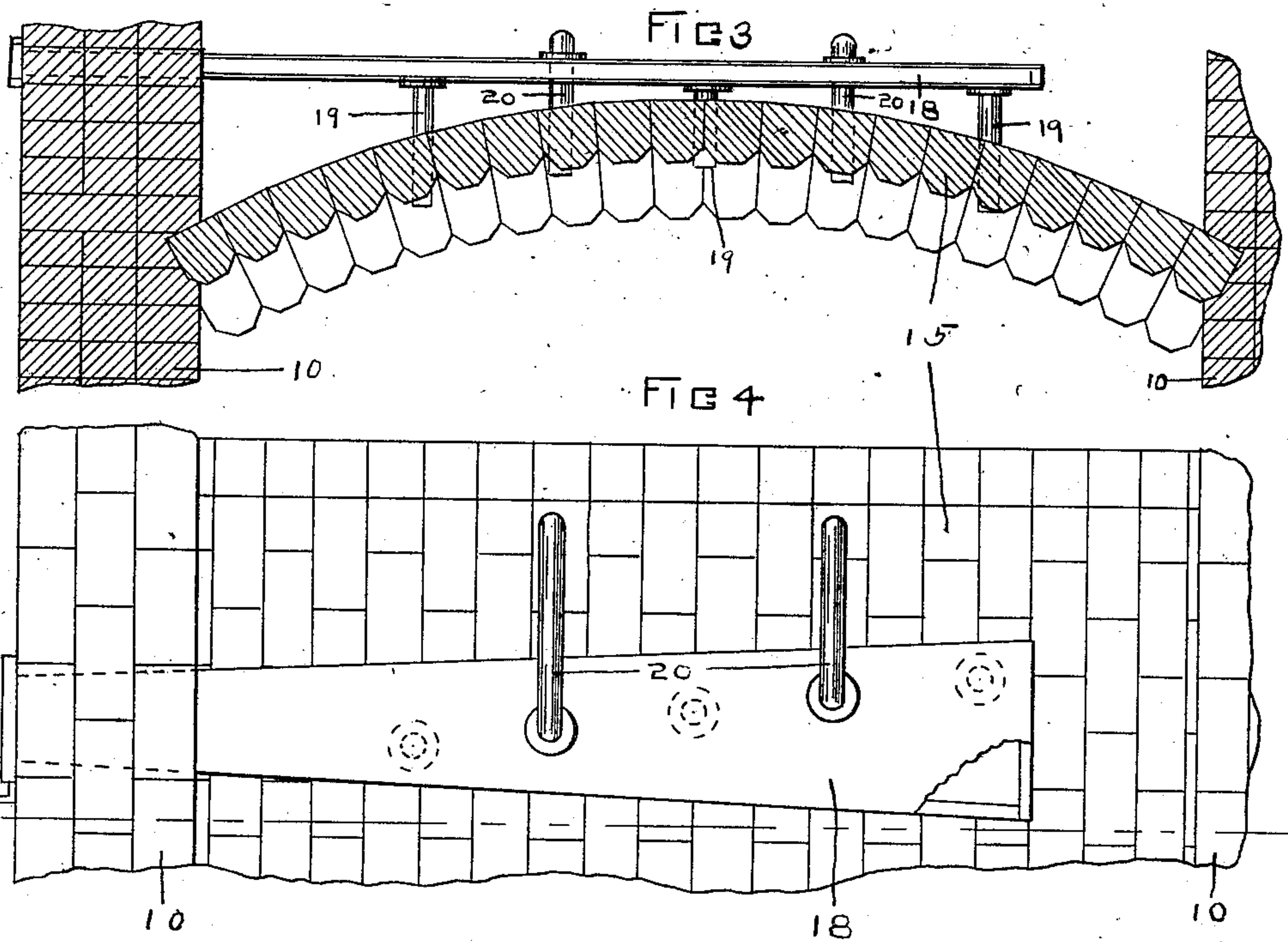
No. 891,298.

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# UNITED STATES PATENT OFFICE

SOLOMON L. SHEUERMAN, OF DES MOINES, IOWA.

## SMOKE-PREVENTING FURNACE.

No. 891,298.

Specification of Letters Patent.

Patented June 23, 1908.

Application filed April 22, 1907. Serial No. 369,508.

*To all whom it may concern:*

Be it known that I, SOLOMON L. SHEUERMAN, a citizen of the United States, residing in Des Moines, county of Polk, and State of Iowa, have invented a new and useful Improvement in Smoke-Preventing Furnaces, of which the following is a specification.

The object of my invention is to provide a means of construction for a furnace which will prevent, to a great extent, the creating of smoke from incomplete combustion and which will be further adapted to consume that which cannot be prevented.

A further object is to provide, in such a construction, an automatic means of closing the damper when the feed doors are open and to thus prevent the inward rush of cool air into the fire-box when fuel is being thrown in.

My invention consists of certain details of construction hereinafter set forth, pointed out in my claims and illustrated in the accompanying drawings in which

Figure I shows a side elevation view of my construction a portion of the same being in section; Fig. II shows a front elevation view of the same also partially in section; Fig. III shows a detail view of the arch over the fire-box; Fig. IV shows a detail view of the air reservoir or supply which I employ; and, Fig. V shows a detail view of the brick girdle, which is designed to engage the under portion of the boiler.

Referring to the accompanying drawings the reference numeral 10 is used to indicate the bricked-in frame of a furnace, provided with a boiler 11 mounted in the usual and ordinary manner.

The numeral 12 indicates the fire-box of the furnace and the numerals 13 indicate grate bars, the rear extremities of which are supported by a partition wall 14 which extends upwardly a slight distance above the grate bars.

The numeral 15 indicates an arch mounted between the side walls of the frame immediately above the fire-box and extending rearwardly to a point beyond the partition wall 14. The said arch is constructed, preferably of brick or tiling and the under surface of the said arch, being that surface immediately over the fire-box, is provided with numerous projecting points or raised portions 16 designed for purposes hereinafter set forth.

The numeral 17 indicates a row of bricks extending downwardly from the inner end of

the said arch the lower portion of said bricks being below the lower surface of said arch, as fully shown in the drawings, and designed for purposes hereinafter set forth. The boiler 11 is located centrally above the said arch and extends from the forward part of the furnace to a point near the rear, a sufficient space being left between the rear of the boiler and the rear wall of the bricked-in frame to permit of the upward passage of the heat into the tubes in the boiler.

Extending transversely across the upper portion of the arch 15, from one of the side walls of the bricked-in frame of the furnace to a point near the opposite side wall, is a frame 18 said frame being parallel with, and located immediately above, the wall 14. The said frame 18 is wedge shaped in conformation, as shown in the drawings, and is very flat the broadened part of the wedge being innermost and the narrow part of the wedge extending through the said side wall of the bricked-in frame, the whole frame 18 being sealed so as to be adapted to conduct air. The outer portion of the said wedge 18 is open to admit the air and, extending downwardly from the under portion of the said frame are three air tubes 19, one located immediately above the central portion of the arch, and the other two located at equal distances therefrom and one on each side thereof, all of said tubes extending through the said arch and their lower ends being open to provide an exit for the air. Extending rearwardly from the upper portion of the said frame 18 are air tubes 20, said tubes projecting downwardly through the said arch at a point immediately in front of the rear row of bricks, and so located as to be evenly spaced and arranged transversely across the said arch, for purposes hereinafter set forth.

The numeral 21 indicates a damper secured in the flue of the furnace, and the numeral 22 indicates an arm mounted at right angles to the damper shaft, said arm being loosely connected, by means of a rod 23, to a cross bar 24, mounted in bearings 25, secured on the forward portion of the furnace immediately above the furnace doors.

The numeral 26 indicates lugs secured to the cross bar 24 said lugs engaging their respective furnace doors, for the purpose of causing the opening of the door to operate the cross bar 24 in its bearings, thus obviously moving the rod, operating the damper shaft, upwardly, and thus closing the damper.



In practical operation, the incomplete combustion having taken place, the heat rises and comes in contact with the roughened under surface of the arch and it is obvious that the same will be heated to an intense degree. As the gases, caused by the incomplete combustion, rise, it is obvious that they come in contact with the intensely heated lower surface of the arch and, as the same is roughened and has many projecting points, it presents a greater surface against which the gases will strike, and it is also obvious that the gases may travel in the crevices formed between the roughened points, as described. As the gases come in contact with the intensely heated surface it is obvious that they will, to a great extent, be consumed and will prevent, to a great extent, the formation of smoke. As the heat, gases, and small amount of smoke formed, travel out of the fire-box and over the partition 14 they come in contact with the partially heated air being admitted through the air tubes 19, and it is obvious that this introduction of air, at this point, mingling with the gases and smoke as formed will consume, to a great extent, the smoke already formed. The object of the air ducts, extending rearwardly from the upper portion of the wedge shaped frame 18 and projecting downwardly immediately in front of the brick forming the rear of the arch, are to prevent the retention of gases in the angle formed in the said arch, and to admit oxygen to the smoke and gases, which will naturally collect in this pocket formed as described, and, further, to assist in the deflection of the heat and gases as they travel out from beneath the arch. The heat, gases, and small amount of smoke which has not been consumed, will thus, after being released by the arch, bound upwardly and I have provided a brick girdle, encircling the lower portion of the boiler 11, at the point where they will naturally come in contact with the said boiler. The under portion of the bricks forming the said girdle are also roughened, as are the bricks forming the under surface of the arch, and as the said gases and smoke come in contact with these intensely heated bricks it is obvious that a further consumption of the said smoke will be accomplished. The heat, gases, and what little smoke, if any there is, which has not been consumed, then travel to the back of the boiler and upwardly and forwardly through the tubes and out the forward portion of the boiler of the flue. The object of the damper in the flue, and the automatic means I employ for opening and closing the same, is to provide for the damper being closed and the draft cut off at all times when the feed doors are open. This will prevent the inward rush of cool air upon the fire-box and intensely heated arch, which would tend to prevent

the necessary operation of my construction, on the gases, and, obviously, will also prevent the rush of heat, gases and smoke to an outlet. The frame 18, which I employ as an intake to the air and the supply for the air pipes, is, as previously stated, wedge shaped the broadened portion of the wedge being innermost. It is obvious that the cool air being taken in at the side of the furnace and traveling over the heated arch will become heated, and the further it travels inwardly the more heated it will become, and it is equally obvious that as air heats it expands, hence my object in providing a wedge shaped reservoir or supply.

I am aware that furnaces, for the prevention or consumption of smoke, employing air ducts have been invented and used prior to this time but in all of such furnaces the air is taken in at the forward part of the furnace and travels over the arch to the point where it is desired to admit it.

A different construction of the air tubes, leading from the wedge shaped reservoir, or a different number of same, may be employed without altering my invention the principal feature of which is to provide a means of conveying air from said reservoir through the arch.

Having thus described my invention what I claim and desire to secure by Letters Patent of the United States is:

1. In a furnace the combination with the fire box and an arch thereover, of an air duct consisting of a receptacle of elongated form extending in the same approximate straight plane throughout and having a closed inner end and an open outer end, the latter extending through one of the side walls of the furnace so as to have its said open outer end in communication with the outer air, said receptacle overlying the arch and being spaced therefrom, a series of short vertical depending tubes leading from the bottom of said receptacle through the arch, and a second series of tubes leading from the top of the receptacle then extending rearwardly beyond the rear side of the receptacle and then downwardly to extend through said arch.

2. In a furnace, the combination with the fire box and an arch thereover, of an air receptacle located above and spaced from said arch and having one end open and supported in one of the side walls of the furnace, and a series of tubes leading from the bottom of said receptacle to project through the said arch.

3. In a furnace, the combination with the fire box and an arch thereover, of an air receptacle spaced from the top of said arch and having an open end supported from one of the furnace side walls, a series of tubes connected to said duct and extending through the said arch, and a second series of tubes connected to the top of said receptacle then



leading rearwardly and then downwardly to extend through the arch at points away from the side of said receptacle.

4. In a furnace the combination with a  
5 fire box and an arch thereover, of an air receptacle located above the arch comprising a top, bottom, sides, and a closed and an open end, said sides being inclined with respect to one another whereby the receptacle is of  
10 least width at its open end and has its open end portion projected through one of the furnace side walls, and a series of tubes connected to said receptacle bottom and leading through said arch.

5. In a furnace, the combination with the 15  
fire-box and an arch thereover of an air receptacle supported above the arch and having an open end portion of less size than its closed end portion, the said open end portion being projected through one of the sides of 20  
the furnace to have communication with the outer air and open-ended tubes opening into the receptacle and projected through and below the arch at remote points.

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