

No. 721,695.

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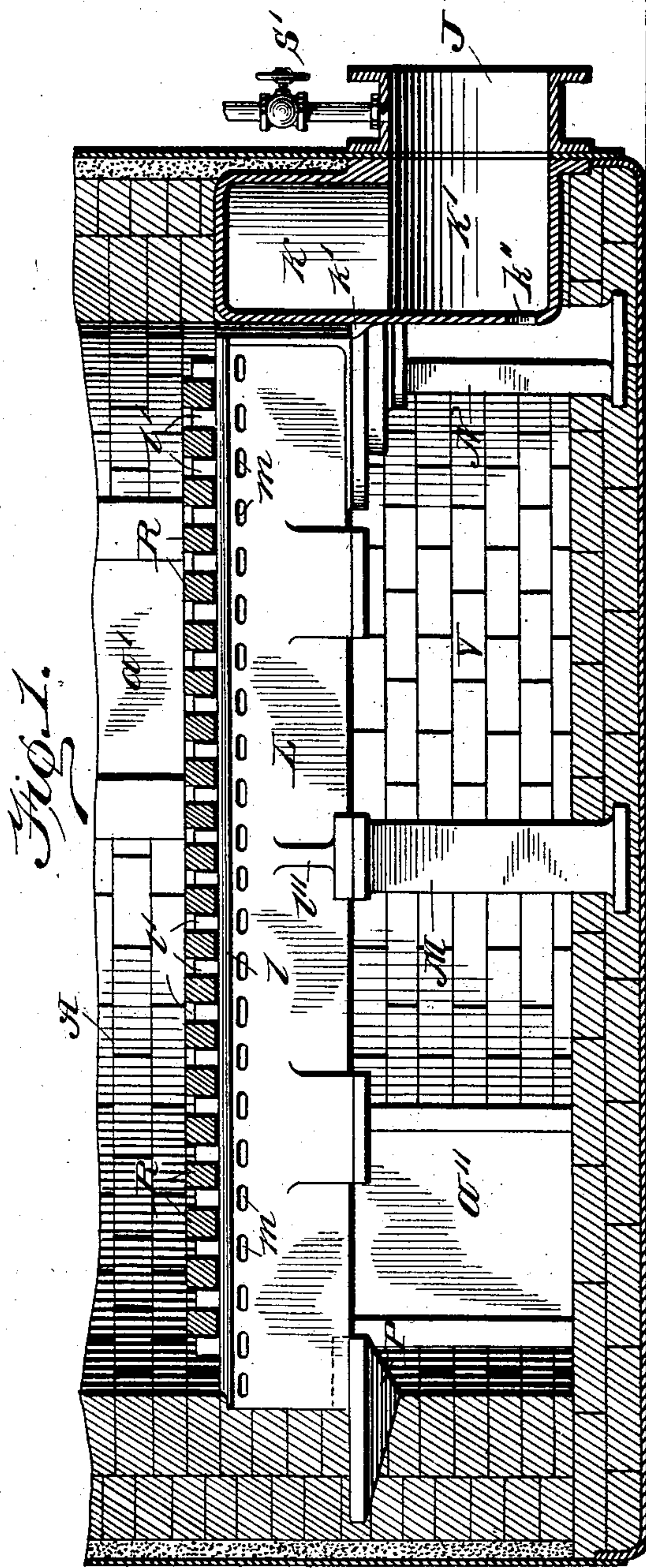
O. N. GULDIN.

DEVICE FOR FEEDING AIR AND STEAM TO FURNACES.

APPLICATION FILED FEB. 8, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses

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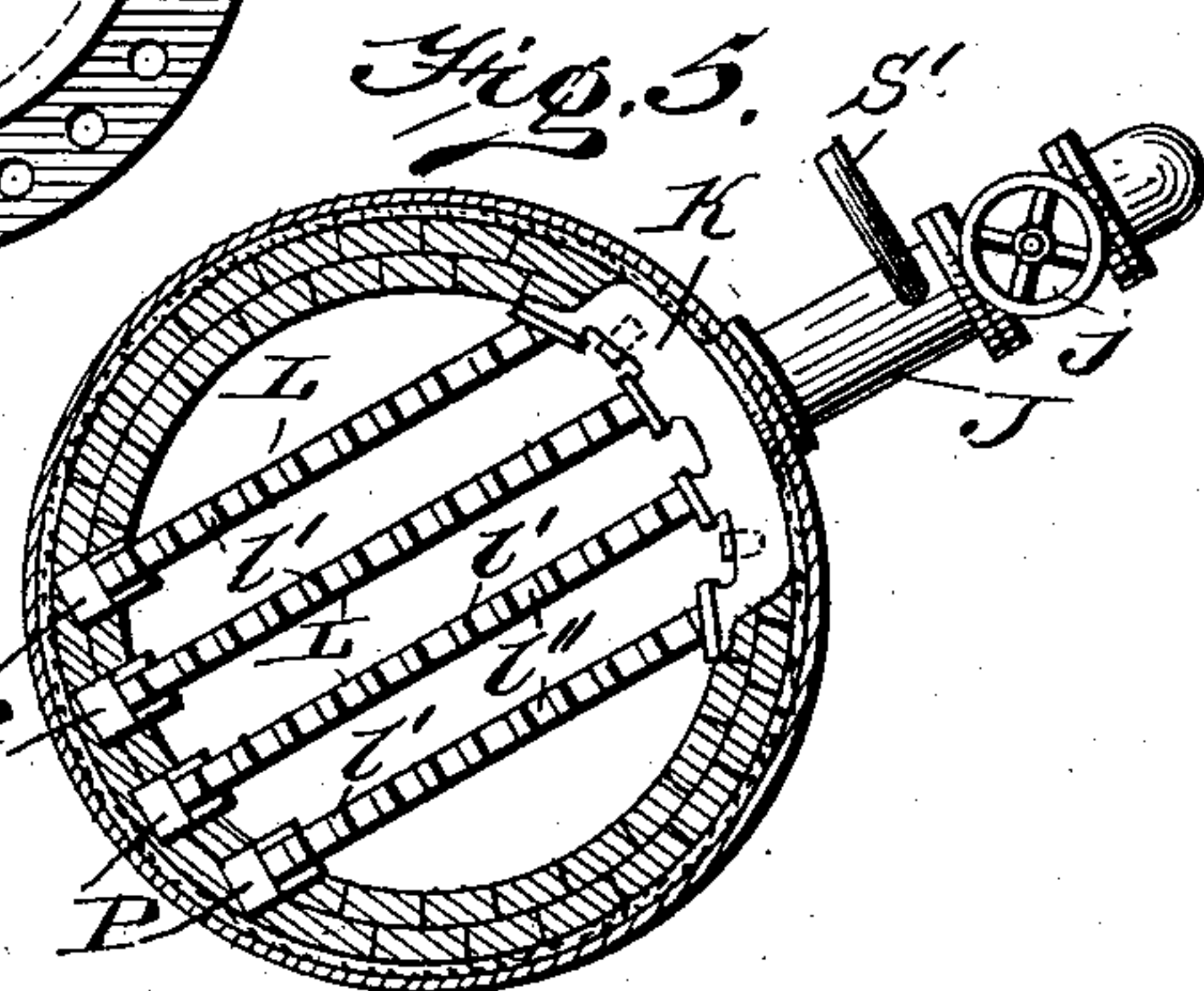
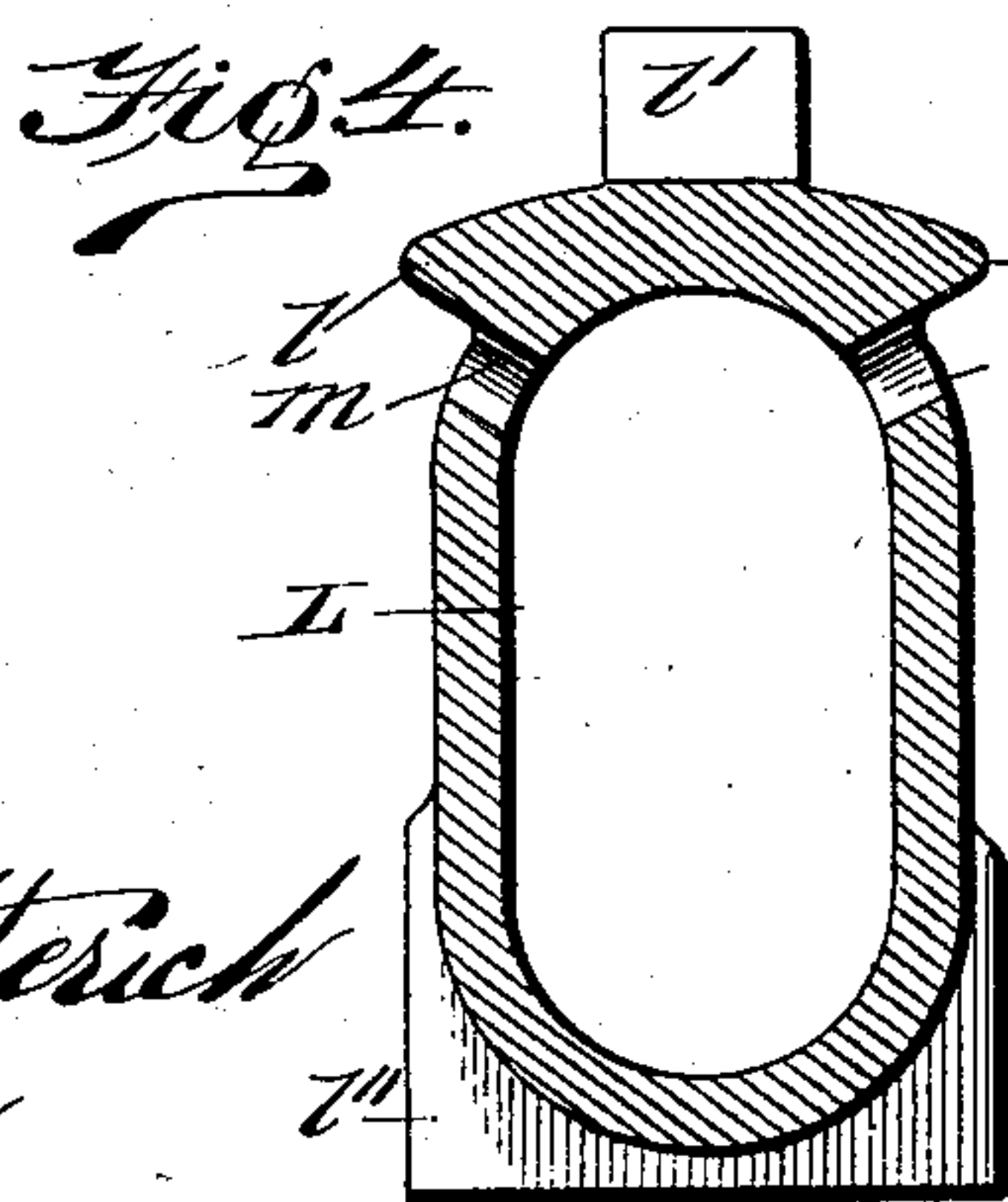
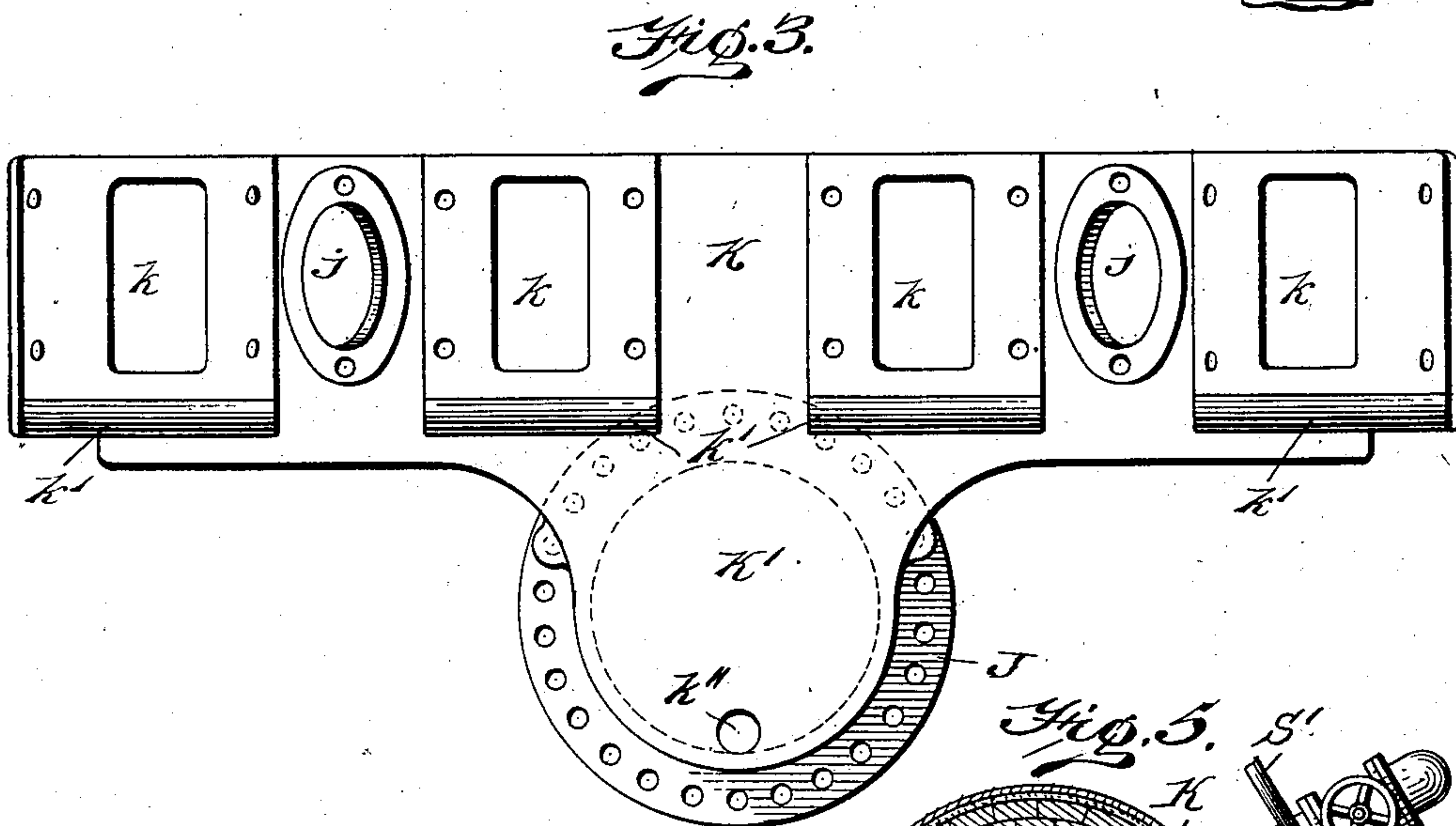
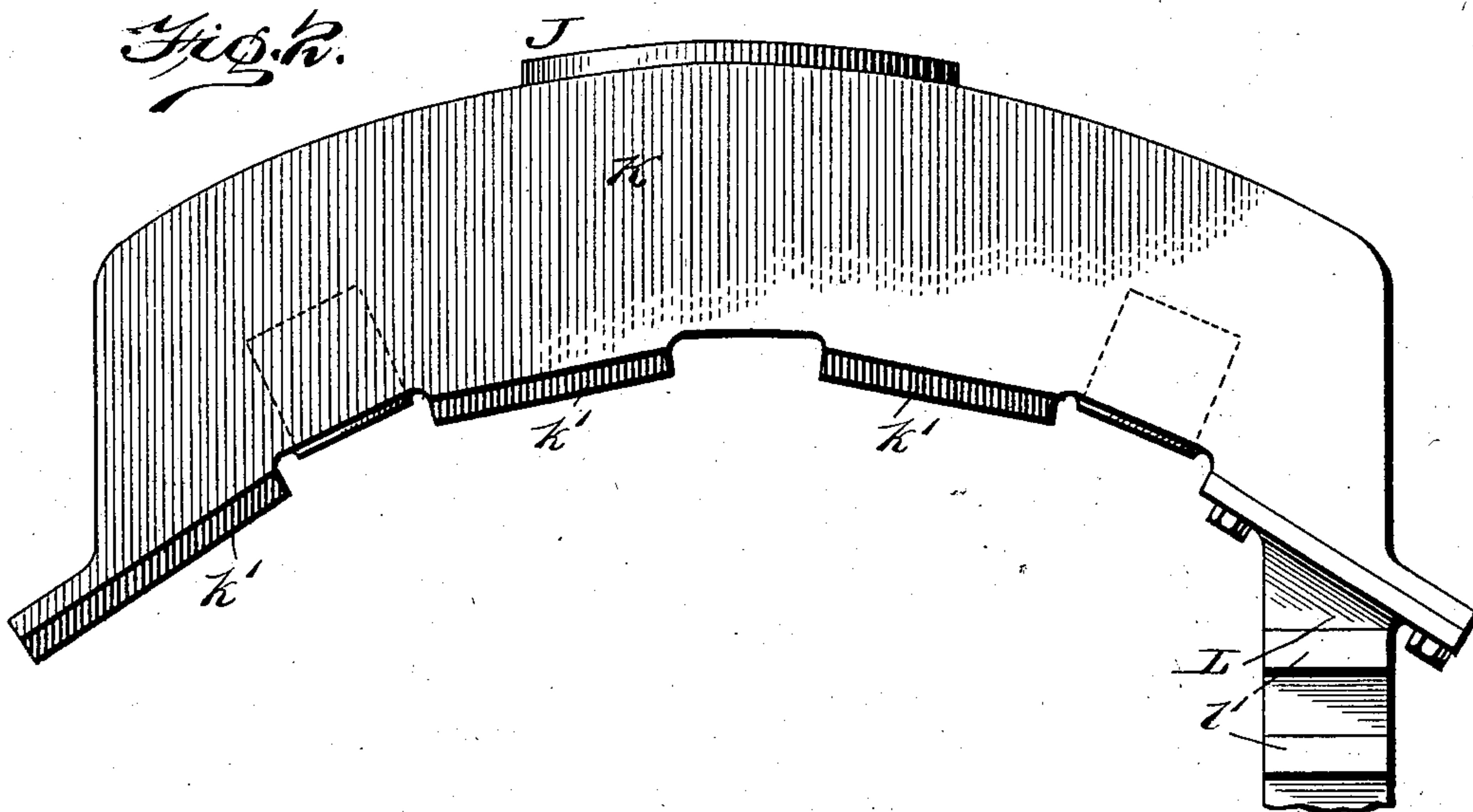
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

OLAF N. GULDIN, OF FORT WAYNE, INDIANA.

DEVICE FOR FEEDING AIR AND STEAM TO FURNACES.

SPECIFICATION forming part of Letters Patent No. 721,695, dated March 3, 1903.

Application filed February 8, 1902. Serial No. 93,181. (No model.)

To all whom it may concern:

Be it known that I, OLAF N. GULDIN, a citizen of the United States, residing at Fort Wayne, in the county of Allen and State of Indiana, have invented certain new and useful Improvements in Devices for Feeding Air and Steam to 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.

This invention relates to devices for feeding and distributing high-pressure air-blast and steam in divided streams or jets into the body of fuel in any kind of a furnace, but more particularly in a gas-producing furnace.

The object of my invention is to provide for the use of a high-pressure air-blast and for distributing the same in divided streams or jets for more evenly and quickly heating the body of fuel to uniform high incandescence, and thereby provide for more effectively decomposing steam, resulting in an increased percentage of combustible carbonic oxid and a corresponding decreased percentage of deleterious carbonic acid in the gases produced. By the use of a high-pressure divided air-blast a more complete and uniform combustion takes place in the body of fuel, more rapidly heating the same and forming a more uniformly heated or incandescent body of fuel. The same pipes and ports which serve for distributing or feeding the air-blast in divided streams also serve for distributing steam in jets, which impinge on the incandescent fuel in the same places previously acted on by the jets of air. Air and steam may also be passed together through the distributing pipes and ports into the body of fuel above the grate.

In raising the heat in a gas-producing furnace—that is, heating the body of fuel to incandescence—it has heretofore been the common practice to admit the air-blast through a pipe at one side of the generator or ash-pit, resulting in the blast striking on the opposite side of the ash-pit and crowding the fire on that side of the furnace or in finding weak uneven spots in the bed of fuel and forming channels or chimneys along the wall or through the body of fuel, leaving other portions of the fuel insufficiently burned and

heated and making an uneven fire or body of fuel. As a result of this defective heating operation the steam when admitted escapes through said channels or cooler part of fuel-bed without thorough decomposition, resulting in an excess of deleterious carbonic acid instead of the desirable carbonic oxid, which should be made to the exclusion of carbonic acid when making combustible gas. Owing to these difficulties and other causes, a comparatively low blast-pressure—usually from twelve to sixteen inches—has been carried, whereas by my improved blast-box and distributing-pipe arrangement a high-pressure air-blast of from twenty to twenty-four inches or more can safely be used and divided jets of air caused to strike in between adjacent grate-bars, causing more complete and uniform combustion of the fuel and more rapidly heating the same to incandescence. In case light fuel, such as coke, is to be used in the furnace the air-blast may be admitted with equal advantage at lower pressure, provided the volume be maintained to correspond with that which is admitted at higher pressure. For this purpose a larger fan or blower will be used, and the size of the supply pipes and ports will be correspondingly increased to maintain the volume of air at lower pressure. The size of the supply pipes and ports will be proportioned to the pressure and volume of air to be admitted to the furnace.

The above-mentioned objects and advantages are attained by means of certain improved details and features of construction, which will be pointed out in connection with the accompanying drawings, in which—

Figure 1 represents a vertical section of the base of the furnace, showing the blast-box, an air-distributing pipe or duct, and the grate-bars above the ash-pit. Fig. 2 represents a top plan view of the blast-box. Fig. 3 represents an inside elevation thereof. Fig. 4 represents a cross-section of an air-distributing pipe. Fig. 5 represents, on reduced scale, a horizontal section of a gas-producing furnace, showing the blast-box and notched distributing-pipes.

The base only of a gas-producing furnace A is shown in the drawings, as the invention may be applied to a steam-boiler or other kind of furnace where a high-pressure air-

blast in divided streams can be used with advantageous results. In a gas-producing furnace the brick walls are preferably inclosed in an iron shell in the usual manner and have suitable openings a' and a'' for permitting removal of ash and clinker and which in practice will be closed by tight-fitting doors.

The blast-box K for air and steam is preferably made of cast metal of curved or arc shape and is placed in the brick lining of the generator with its top at about the grate-level. It is preferably provided at the bottom with a drop chamber or pocket K' for connection of the air-blast pipe J, as shown in Figs. 1 and 3. The air-blast entering first this pocket is better spread and distributed into the blast-box above, so as to be supplied more uniformly to the distributing-pipes L. The box is also provided in its inner face or wall with rectangular openings k and lateral flat faces for bolting thereto the flanges of the air-distributing pipes L. Hand-holes j are also made in the inner wall and are closed by covers. A cast ledge k' may be provided just below each opening k to assist in supporting the pipes L, especially while being bolted in place. The free ends of pipes L rest upon the cast-iron shoes or brackets P in the wall opposite the blast-box, permitting expansion and contraction under changes of temperature. The distributing-pipes L serve as bearing-bars for the grate-bars R. The distributing-pipes L are preferably transversely arched at the top, as shown in Fig. 4, and are provided with lateral longitudinal flanges l and below the same with air-ports m on each side, said flanges serving to prevent ashes from dropping into the air-ports. The pipes are also each provided on top with a longitudinal row of spacing-lugs l' , forming a series of notches for spacing and holding the grate-bars, each lug being in transverse line with each pair of ports, so that the jets of air or steam shall be discharged between adjacent grate-bars, as shown in Fig. 1. The tops of bars L may be otherwise notched for holding and spacing the grate-bars. It is to be noted that the pipes L are bolted to the blast-box, so as to be readily removable and permit a worn and defective one to be replaced by a new one. Each pipe L may have at its under side near the middle a web or flange l'' , if required for large furnaces, as shown in Fig. 1, for resting on the middle supporting-column M. A supporting-column N is also provided when required adjacent to the blast-box. The outer free ends of pipes L are made flat at the bottom for resting on the shoes P and so that they may freely move during expansion and contraction due to variations of temperature.

By the above-described construction and arrangement of the blast-box and distributing-pipes the ash-pit is left unobstructed, so that the deposit and removal of ash and clinker will not be interfered with.

A small drain-hole k'' is provided in the

lowest part of the blast-box for draining any water of condensation from the steam into the ash-pit of the furnace.

The air-blast pipe J is provided with a valve j , and between such valve and the blast-box is connected a steam-supply pipe S', having a valve s , as shown in Figs. 1 and 5. On closing valve j steam may be admitted through pipe S' to the blast-box and discharged through the ports m of the distributing-pipes directly into the body of fuel. Four distributing-pipes L, as shown in Fig. 5, or even two, may be used in small furnaces and will not require any middle supporting-columns, such as M. (Shown in Fig. 1.) Notches l'' may be made in the top surfaces of the distributing-pipes L without resort to the particular spacing-lugs l' , (shown in Figs. 1 and 4,) it being important only that the grate-bars shall be spaced apart and arranged in transverse lines between the lateral ports m below, so that the jets of air or steam shall be discharged between the grate-bars, which rest in the notches or otherwise properly separated in fixed position.

A fire is kindled on the grate and fed with fuel, which is heated to incandescence by the air-blast, which is admitted to the blast-box K and is discharged in jets between the adjacent grate-bars, causing complete, rapid, and even combustion of the fuel, so that a deep body thereof is uniformly heated to incandescence in much less time than formerly. At any desired time after a deep body of fuel has been heated to incandescence the air-blast may be shut off by closing valve j and steam admitted by opening valve s . The steam will be discharged in numerous jets through the ports m into the body of incandescent fuel, where decomposition will be effected, resulting in the production of hydrogen and carbonic oxid. Whenever desired, both air and steam may be admitted to the blast-box and discharged into the fuel.

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

1. In a furnace, the combination with a blast-box, of air-distributing pipes having lateral ports, transverse grate-bars above the same and spacing devices between the grate-bars and directly above said ports for causing jets of air or steam to be discharged directly between said bars, substantially as described.

2. In a furnace, the combination with a blast-box, of air-distributing pipes having lateral ports, and transverse grate-bars above the same, spaced apart and arranged with the spaces in lines with the ports for causing jets of air or steam to be discharged directly between said bars, substantially as described.

3. The combination with a furnace, of a blast-box, a distributing-pipe having a series of spaced transverse notches in its top surface, and lateral ports arranged below and between the notches, and transverse grate-bars supported in said notches for causing

jets of air to be discharged directly between said bars, substantially as described.

4. In a furnace, the combination with a blast-box located in the lining, of air-distributing pipes having lateral ports, and a series of spaced lugs projecting from the top directly above such ports, and grate-bars between said lugs, substantially as described.

5. In a furnace, the combination with a blast-box in the lining, of a distributing-pipe having transverse notches at the top, lateral longitudinal flanges at its upper edges and lateral ports below said flanges, and grate-bars in said notches, substantially as described.

6. In a furnace, the combination with a blast-box in the lining, of perforated air and steam distributing pipes secured to the inner face thereof and extending across the chamber

of the furnace, an air-blast pipe and a steam-supply pipe connecting with the exterior of said blast-box, substantially as described.

7. In a furnace, the combination with a blast-box, of an air-blast pipe and a steam-supply pipe connecting therewith, distributing-pipes having lateral ports for jets of air and steam, and, at the top, a series of transverse notches in lines between said ports, and transverse grate-bars in said notches for causing jets of air and steam to be discharged directly between said bars, substantially as described.

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

OLAF N. GULDIN.

Witnesses:

R. S. ROBERTSON,
GEO. W. MCKEE.