

No. 684,852.

Patented Oct. 22, 1901.

O. D. ORVIS.

STEAM BOILER FURNACE.

(Application filed June 29, 1900. Renewed Mar. 22, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 2.

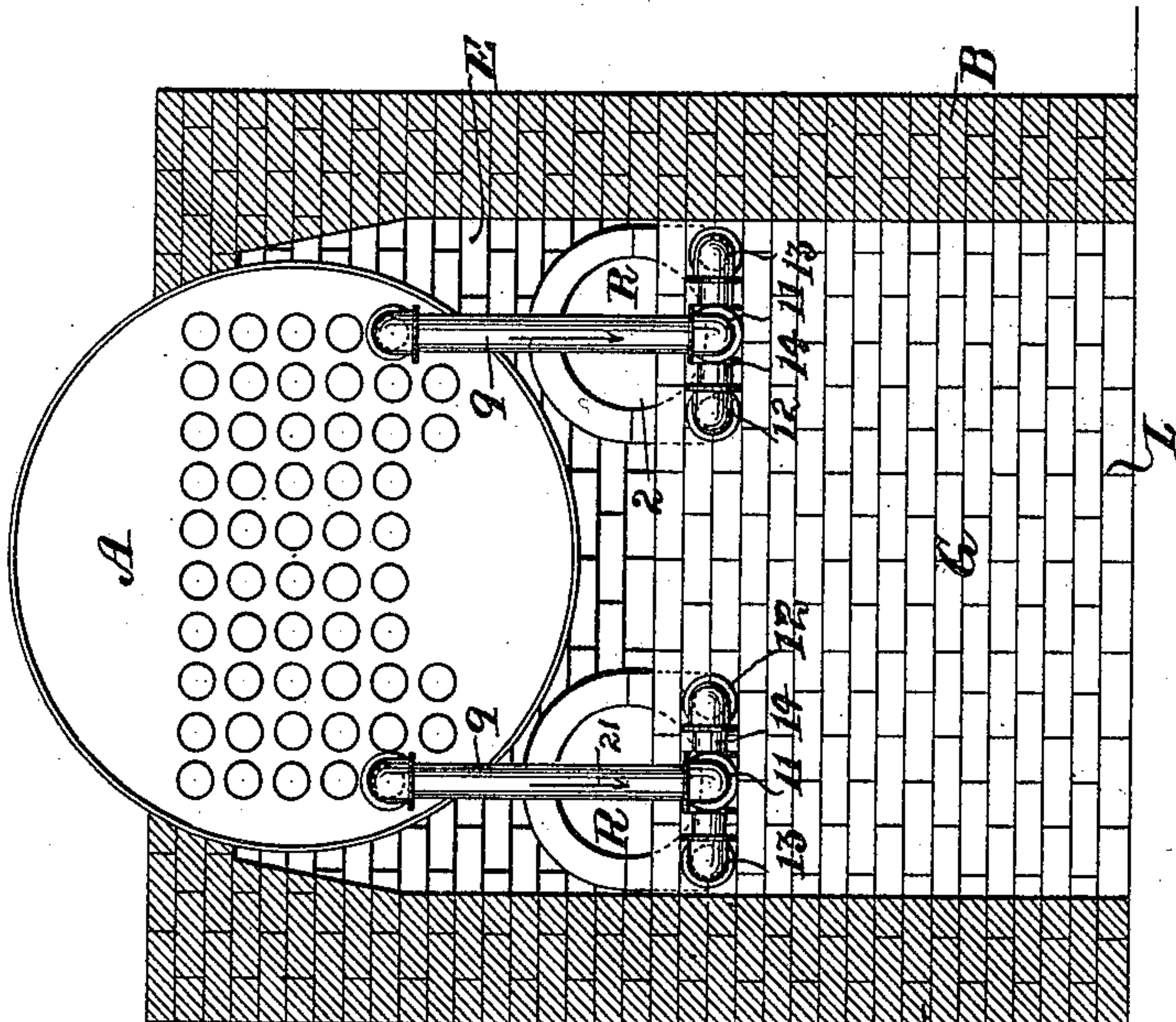
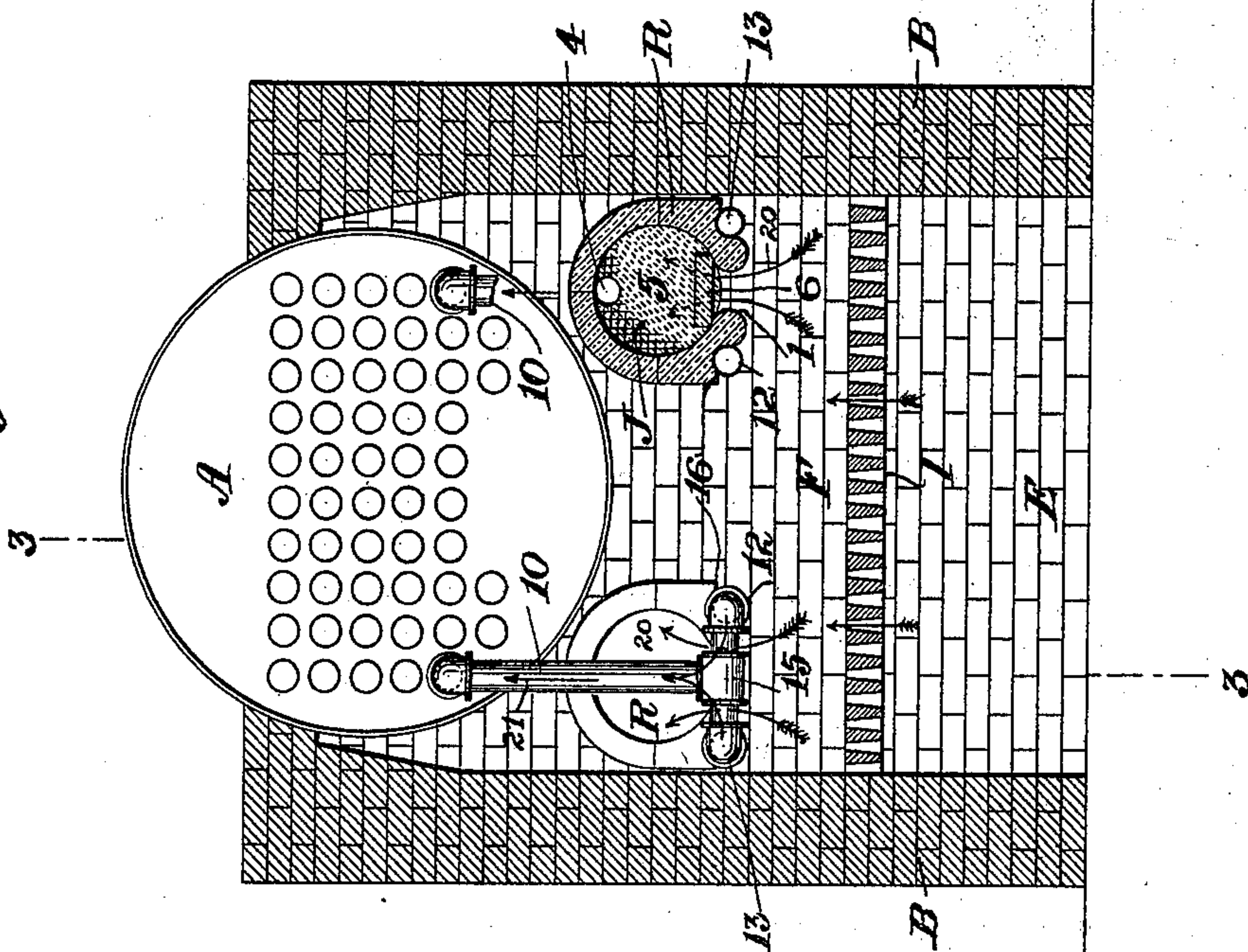


Fig. 1.



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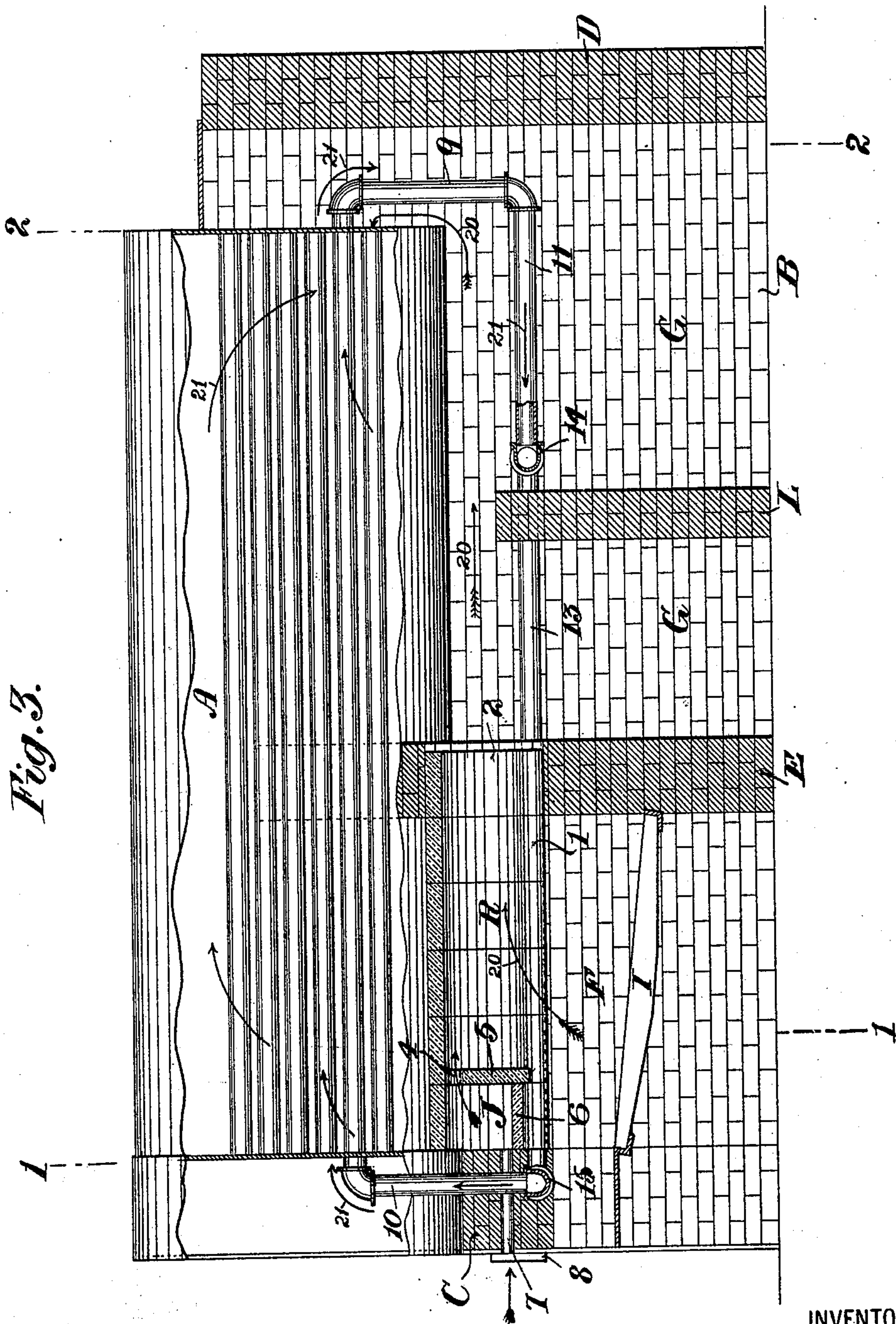
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UNITED STATES PATENT OFFICE.

OREL D. ORVIS, OF NEW YORK, N. Y., ASSIGNOR OF FIFTY-ONE ONE-HUNDREDTHS TO WILLIAM L. WILKENS, OF SAME PLACE.

STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 684,852, dated October 22, 1901.

Application filed June 29, 1900. Renewed March 22, 1901. Serial No. 52,435. (No model.)

To all whom it may concern:

Be it known that I, OREL D. ORVIS, a citizen of the United States of America, residing at Manhattan borough, New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Steam-Boiler Furnaces, of which the following is a specification.

My invention has reference to improvements in steam-boiler furnaces, and has for its object to provide a furnace for the generation of steam or for other purposes in which the gases resulting from the distillation and partial combustion of the solid fuel are consumed at a high even temperature for the purpose of producing the best available economy during ordinary conditions, while when firing takes place, with the usual consequent lowering of temperature, the gases arising are still in a great measure consumed by the regenerative action of the furnace, and loss in efficiency caused by the escape of gases rich in unconsumed carbon is prevented.

With this object in view my invention consists, essentially, in a furnace provided with a dead wall forming with the side and front walls a confined fire-chamber and retorts located in said fire-chamber beneath the boiler and extending contiguous with the side walls of the furnace and said retorts being open at their bottoms and provided with openings at their front ends for the admission of air and their rear ends being open to communicate with the usual combustion-chamber.

My invention also relates to means for insuring a proper water circulation and to using the circulating-pipes for supporting the retorts.

The nature of my invention will best be understood when described in connection with the accompanying drawings, in which—

Figure 1 represents a transverse vertical section on the line 1 1, Fig. 3. Fig. 2 is a transverse vertical section on the line 2 2, Fig. 3. Fig. 3 is a longitudinal vertical section on the line 3 3, Fig. 1.

Similar letters and numerals of reference designate corresponding parts throughout the several views of the drawings.

In the example illustrated I have shown my improvements applied to an ordinary return tubular boiler A, having the usual setting, consisting of the side walls B B, the front wall C, and the rear wall D, although it must be understood that my improvements may be applied to boilers of other constructions or to furnaces adapted for other purposes.

In place of the usual bridge-wall, which permits the passage of the products of combustion over its top, I substitute a dead wall E, which extends completely across the furnace and is made high enough to entirely close off the fire-chamber F from the combustion-chamber G. This dead wall may serve as a support for one end of the grate I in the usual manner. In the fire-chamber F and a short distance below the adjacent portion of the boiler A are located two retorts R R, made of suitable refractory material and preferably arranged adjacent to the side walls B B of the furnace. The said retorts extend in the longitudinal direction of the furnace, starting from the back of the front wall and passing through the dead wall E, and are provided at their bottoms with comparatively narrow openings 1, extending throughout their entire length, for the entrance of the products of combustion. The rear ends of the retorts are open, as at 2, for the passage of the products of combustion into the usual combustion-chamber G, back of the dead wall E, while their front ends are closed with the exception of an aperture or apertures 4 for the admission of air into said retorts from the outside of the furnace. The closure of the front end of the retorts may be effected in any suitable manner; but in practice I prefer to form an air-chamber J at the front end of each retort by means of a vertical plate 5, having the aperture 4 therein, and a horizontal closing-plate 6, placed horizontally across the front part of the retort. This air-chamber is in communication with the external air by a passage 7, formed in the masonry of the front wall C, or through a pipe laid in said masonry. The quantity of air admitted to the chamber J may be regulated by a register 8 or other usual device.

The aperture 4 is preferably located at the top of the air-chamber J, while the admission-passage 7 enters at the bottom of said chamber, so that the cold air is thoroughly diffused in the chamber and heated before its admixture with the burning gases passing through the retort. If desired, air previously heated in any usual manner may be supplied to the retorts. For obtaining a proper circulation of water and also to support the retorts R R throughout their entire length pendent water-legs 9 and 10, located, respectively, at the rear and front of the boiler and communicating with the water-space thereof, are provided, and said legs are connected with each other by pipes 11, 12, and 13 with the interposition of suitable headers 14 and 15. In the present instance a single pipe 11 leads from each of the rear water-legs 9 to the headers 14, from each of which latter extend two pipes 12 and 13, connected at their forward ends with the headers 15. The pipes 12 and 13 pass below the retorts R R, and the latter are provided with suitable shoulders 16, which rest upon said pipes, and therefore the retorts are uniformly supported throughout their entire length. The water-pipes may be supported just in front of the headers 14 by a wall L, extending across the combustion-chamber, which also acts as a bridge-wall in the combustion-chamber G.

The gases resulting from the combustion of the fuel on the grate I are drawn from the fire-chamber F through the retorts R R, in which latter they are mixed with the air admitted through the apertures 4 in such quantity as may be necessary to obtain substantially complete combustion within the combustion chambers formed by the retorts. The more or less consumed gases issuing from the rear end of the retorts enter the usual combustion-chamber G in close proximity to the bottom of the boiler and on leaving said combustion-chamber pass through the boiler-tubes and are lead to the chimney from the front of the boiler through the uptake and usual draft connections, all as indicated by arrows 20. The circulation of water through the boiler and pipe system is as indicated by arrows 21.

The front portion of the boiler—that is, the portion thereof within the fire-chamber—and the retorts are subjected to the direct action of the burning gases and to radiation, whereby the retorts are brought to and maintained at a high temperature and the alternations of high and low temperatures so destructive to the boiler are avoided, since a lowering of temperature is to a large extent prevented by the regenerative action of the highly-heated retorts. By properly regulating the supply of heated air passing through the apertures 4 a very perfect combustion of the gases at a high temperature is insured by reason of the incandescent condition of the retorts and the formation of smoke and soot

is practically prevented. The radiant heat of the retorts is transmitted to the front portion of the boiler and to the front portion of the circulating-pipes. While the furnace is being fired, with consequent tendency to lower the temperature, the retorts again act as regenerators to supply heat to the gases, thus tending to prevent a substantial reduction of temperature. The products of combustion on entering the usual combustion-chamber G are at a very high temperature, and a completion of combustion takes place at a higher temperature than usual.

While I have herein shown two retorts in the fire-chamber, it is evident that a greater number could be arranged therein or only a single retort used and that said retort or retorts could be supported by other means than the circulating-pipes of the boiler. It is also evident that the retorts may terminate at the front face of the dead wall E and the latter provided with corresponding passages communicating with the interior of the retorts and the usual combustion-chamber G.

What I claim as new is—

1. A furnace provided with a dead wall forming with the side and front walls a confined fire-chamber, and a retort located in said fire-chamber and open at its bottom for the entrance of the gases of combustion; said retort being provided at its front end with an air-heating chamber having an admission-opening and a discharge-opening in communication with the interior of the retort, and said retort being open at its rear end for the discharge of the gases, substantially as described.

2. A furnace provided with a dead wall forming with the side and front walls a confined fire-chamber, and retorts located in said fire-chamber and open at their bottoms for the entrance of the gases of combustion; said retorts being provided at their front ends with openings for the admission of external air and their rear ends being open and extended through the dead wall to communicate with the combustion-chamber, substantially as described.

3. A steam-boiler furnace provided with a dead wall forming with the side and front walls thereof a confined fire-chamber, and retorts located in said fire-chamber beneath the boiler and extending contiguous with the side walls of the furnace; said retorts being open at their bottoms and provided with openings at their front ends for the admission of air and their rear ends being open and extended through the dead wall to communicate with its combustion-chamber, substantially as described.

4. A steam-boiler furnace provided with a dead wall forming with the side and front walls thereof a confined fire-chamber, retorts located in said fire-chamber beneath the boiler and extending contiguous with the side walls of the furnace and said retorts being

open at their bottoms and provided with openings at their front ends for the admission of external air and with open rear ends, and circulating-pipes placed in communication with the water-space of the boiler and passing through the fire-chamber and supporting the retorts, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

OREL D. ORVIS.

Witnesses:

EUGENIE P. HENDRICKSON,
A. FABER DU FAUR, Jr.