

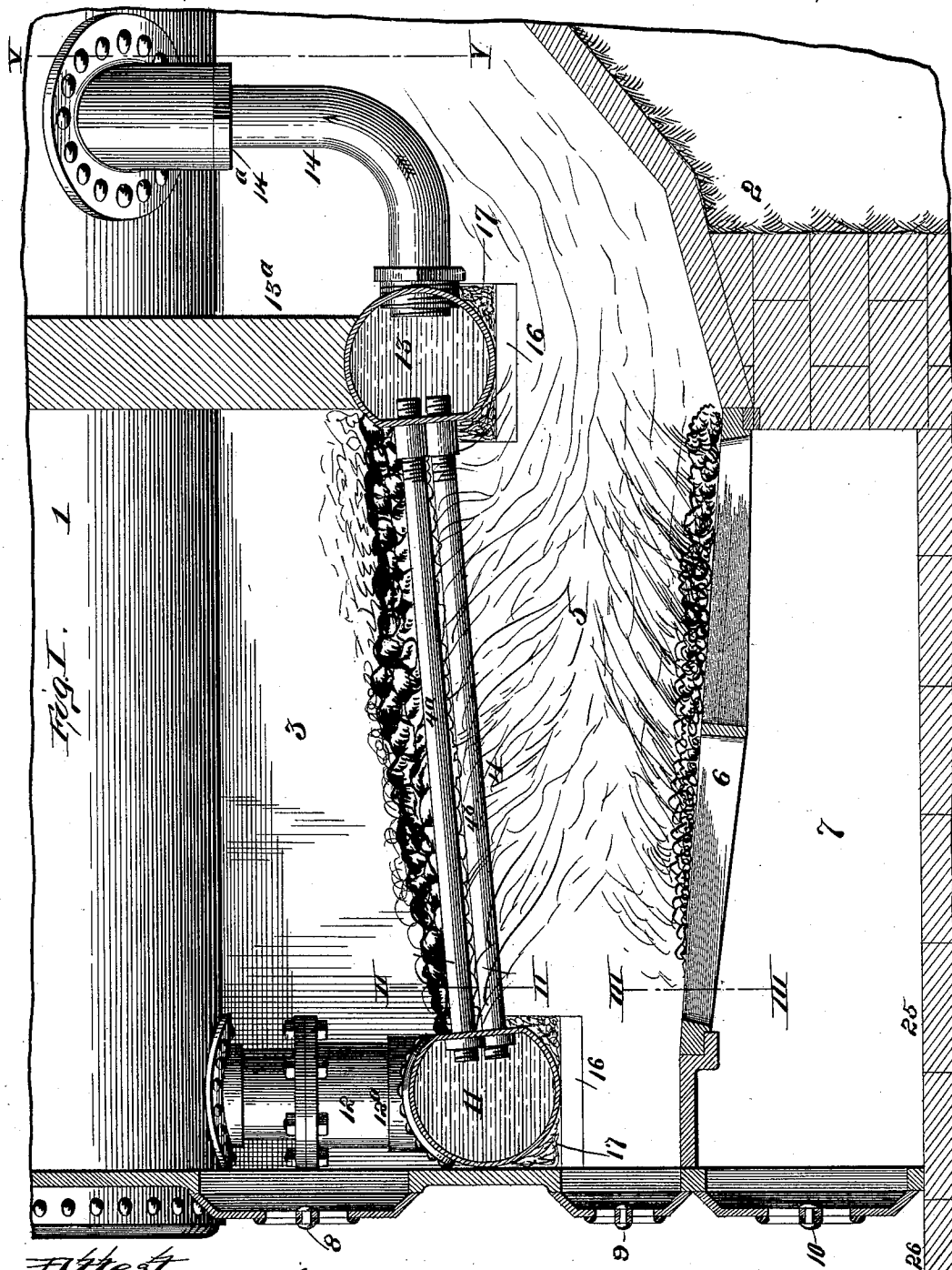
(No Model.)

3 Sheets—Sheet 1.

J. O'BRIEN & C. K. PICKLES.
BOILER FURNACE.

No. 593,851.

Patented Nov. 16, 1897.



Attest
M. E. Durand

By

Inventors
Chas. K. Pickles
John O'Brien
Wright Bros

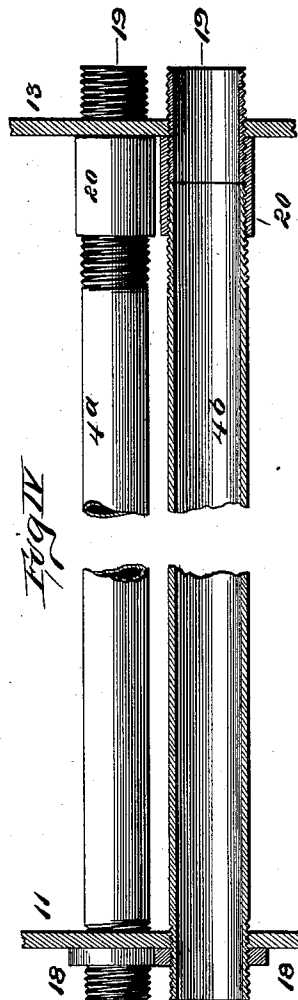
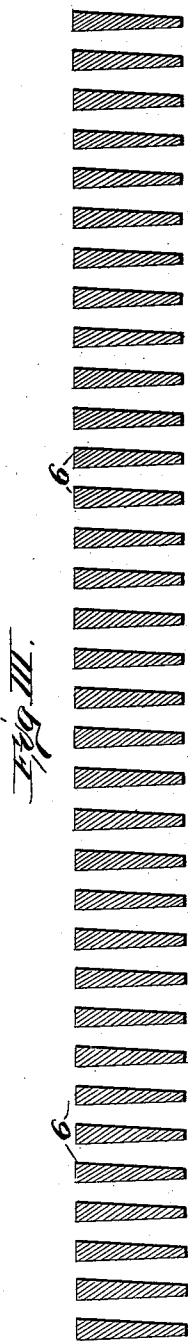
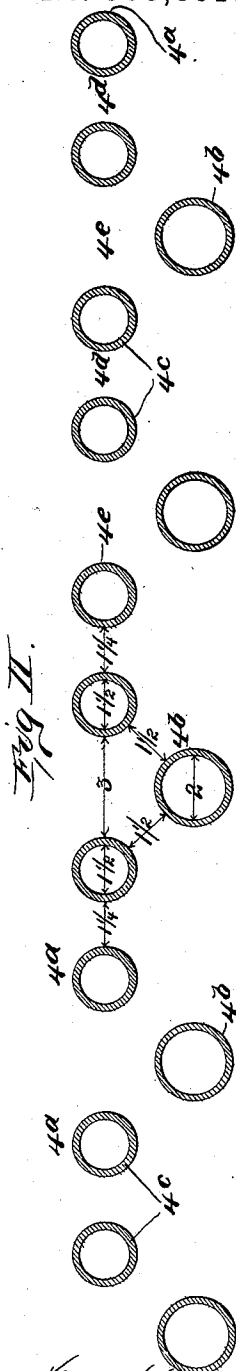
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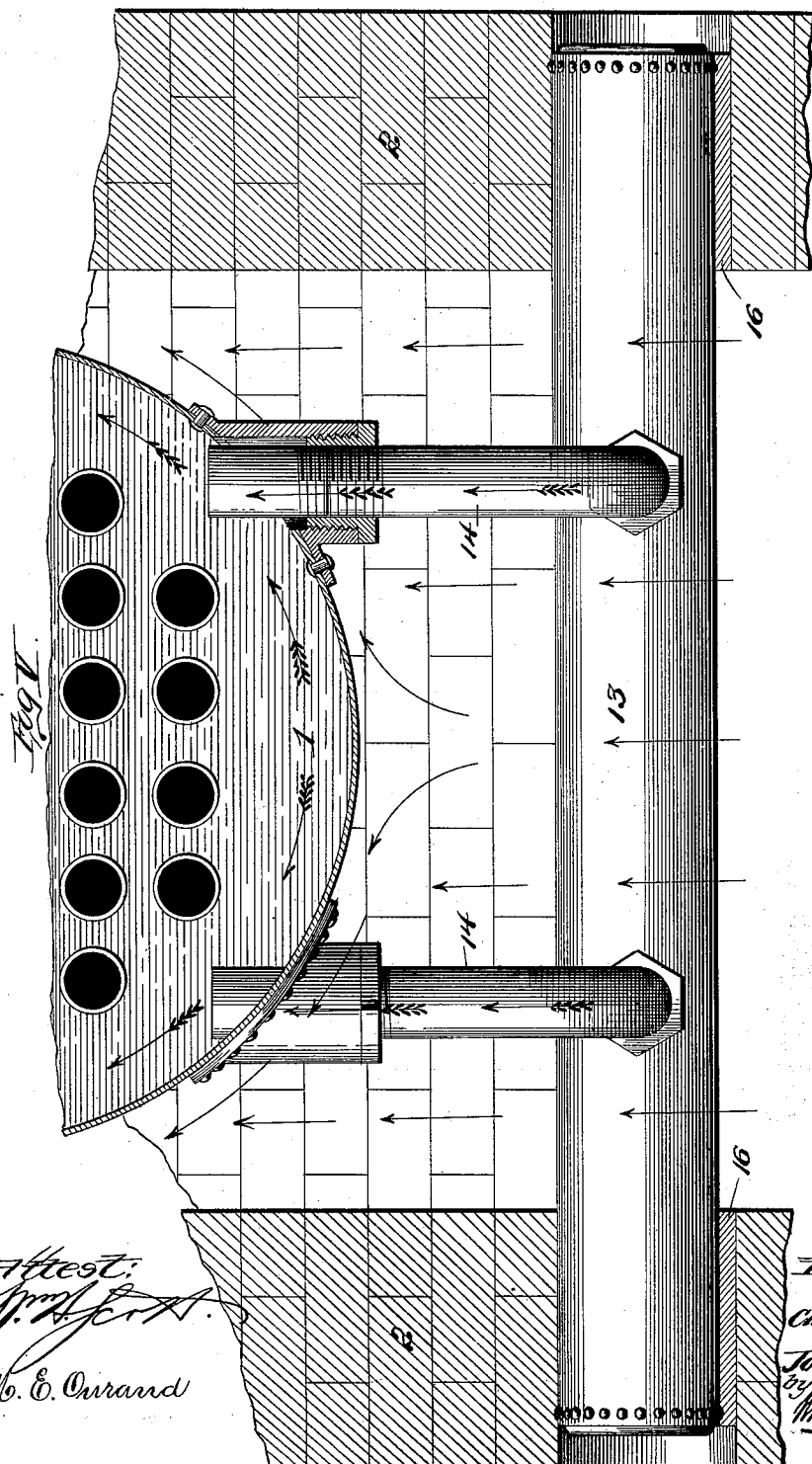
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UNITED STATES PATENT OFFICE.

JOHN O'BRIEN AND CHARLES K. PICKLES, OF ST. LOUIS, MISSOURI.

BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 593,851, dated November 16, 1897.

Application filed October 17, 1892. Renewed May 5, 1896. Serial No. 590,382. (No model.)

To all whom it may concern:

Be it known that we, JOHN O'BRIEN and CHARLES K. PICKLES, of the city of St. Louis, in the State of Missouri, have invented a certain new and useful Improvement in Boiler-Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

Our invention relates to certain improvements in downdraft-furnaces; and it consists in features of novelty hereinafter fully described, and pointed out in the claims.

Figure I is a detail vertical section illustrative of our invention. Fig. II is an enlarged transverse section of the upper grate, taken on line II II, Fig. I. Fig. III is an enlarged transverse section of the lower grate, taken on line III III, Fig. I. Fig. IV is an enlarged detail view illustrating the method of securing the tubes of the upper grate to the manifolds. Fig. V is an enlarged detail vertical section taken on line V V, Fig. I.

Referring to the drawings, 1 represents a steam-boiler.

2 represents the setting of the furnace.

3 is the fire-box; 4, an upper grate; 5, a combustion-chamber and lower fire-box; 6, a lower grate, and 7 the ash-pit.

8 is the door to the fire-box 3, 9 the door to the chamber 5, and 10 the door to the ash-pit 7.

11 is a front manifold communicating with the boiler through means of one or more pipes 12.

13 is an inner manifold communicating with the boiler through one or more pipes 14. The grate 4 is composed of hollow tubes 4^a 4^b, which form a communication between the manifolds 11 and 13.

The water circulates from the boiler through the pipe or pipes 12 into the manifold 11, through the grate 4 into the manifold 13, and through the pipes 14 back into the boiler.

The fuel is deposited onto the grate 4 through the door 8, where it burns, the draft passing in through the door 8, down through the fuel on the grate 4, and under the inner manifold 13.

13^a is a partition closing the space between the manifold 13 and the boiler 1.

Any fuel that falls through the grate 4 is caught by the lower grate 6, upon which it burns, the draft passing in through the door 10, up through the grate 6, and beneath the manifold 13.

The manifolds 11 and 13 are supported in the side walls or setting of the furnace, metal plates 16 being preferably placed beneath the manifolds, and a non-combustible packing 17, such as mineral wool or asbestos, being preferably placed between the walls of the furnace and the manifold, as shown in Fig. I.

The pipes 12 are preferably made with telescope joints 12^a, as shown in Fig. I, to provide for expansion and contraction without injury to the parts. The pipes 14 are provided with bends of such a character as to permit them to spring or yield under expansion and contraction of the parts, and both the pipes 12 and 14 are located free of the walls of the furnace, so that they can yield under expansion and contraction, which they could not do were they located in the walls. This arrangement of the pipes 12 and 14 permits the manifolds to be supported by the walls of the furnace without interfering with or being affected by expansion and contraction.

By supporting the manifolds, and consequently the grate 4, in the side walls of the furnace the boiler 1 and the pipes 12 and 14 are relieved of unnecessary strain caused by carrying the weight of these parts.

The tubes 4^a and 4^b of the grate 4 are attached to the manifolds, as shown in Fig. IV. They are tapped into the flattened sides of the manifold 11, where they are held by jam-nuts 18. At the other end they are connected to the manifold 13 by means of short nipples 19, tapped into the manifold and connected to the pipes or tubes by short sleeves 20, which have a threaded connection with the pipes or tubes and with the nipples, as shown. To insert the tubes, they are screwed into the manifold 11, with the sleeves 20 well screwed back onto the tubes, the nipples 19 having been inserted into the manifold 13. The inner ends of the tubes are then brought in line with the nipples 19 and the sleeves 20 are screwed outwardly on the tubes onto the nipples. This forms a very easy and convenient method of securing the tubes to the

manifolds after the latter are in place in the furnace, or even before the manifolds are placed in position.

To form a perfect support for the fuel, as well as to provide for a perfect and free circulation of the draft, we arrange the tube 4^a and 4^b as shown in Fig. II, the tubes 4^a being arranged in pairs, (the pairs being represented by 4^c,) there being a less distance or space 4^d between the tubes of each pair than there is distance or space 4^e between the adjacent tubes of two pairs of the tubes. The tubes 4^b are located beneath the center of the spaces 4^c. As shown in Fig. II, the spaces 4^d are preferably one and one-fourth inches wide, the spaces 4^e are preferably three inches wide, and the spaces between the tubes 4^b and the adjacent tubes 4^a are preferably each one and one-half inches wide. The tubes 4^a we prefer to make one and one-half inches in diameter, and the tubes 4^b preferably two inches in diameter. By thus arranging the grate the main body of the fuel is well supported, while the finer particles are free to drop onto the lower grate without clogging the spaces between the tubes. There is also provided a free and ready circulation for the passage of the draft.

The grate 6 is an ordinary bar grate, the spaces between the bars being less than the spaces between the tubes of the upper grate.

The bottom 25 of the ash-pit 7 is on a line with the floor 26 of the boiler-room. The grate 6 is preferably placed about midway between the floor 25 and the grate 4, thus di-

viding the space between the bottom 25 and the grate 4 into the chamber 5 and the ash-pit 7.

We claim as our invention—

1. In a downdraft boiler-furnace, the combination of the boiler, manifolds communicating with the boiler, and water-tubes connecting the manifolds; said water-tubes being arranged in an upper and lower series; the upper series being arranged in pairs with less distance between the tubes of each pair than the adjacent tubes of two pairs, and the tubes of the lower series being arranged beneath the wider spaces of the upper series; substantially as and for the purpose set forth.

2. In a downdraft boiler-furnace, the combination of a boiler, manifolds communicating with the boiler, water-tubes arranged in an upper and lower series, and connecting the manifolds, and a lower, ordinary grate; the tubes of said upper grate being arranged in an upper and lower series; those of the upper series being arranged in pairs, with less distance between the tubes of each pair than between the adjacent tubes of two pairs, and the tubes of the lower series being arranged beneath the wider spaces of the upper series; substantially as and for the purpose set forth.

JOHN O'BRIEN.

CHARLES K. PICKLES.

In presence of—

GEO. H. KNIGHT,

ALBERT M. EBERSOLE.