(No Model.) 2 Sheets—Sheet 1.

A. J. PULVER.

FURNACE.

No. 601,983. Patented Apr. 5, 1898.

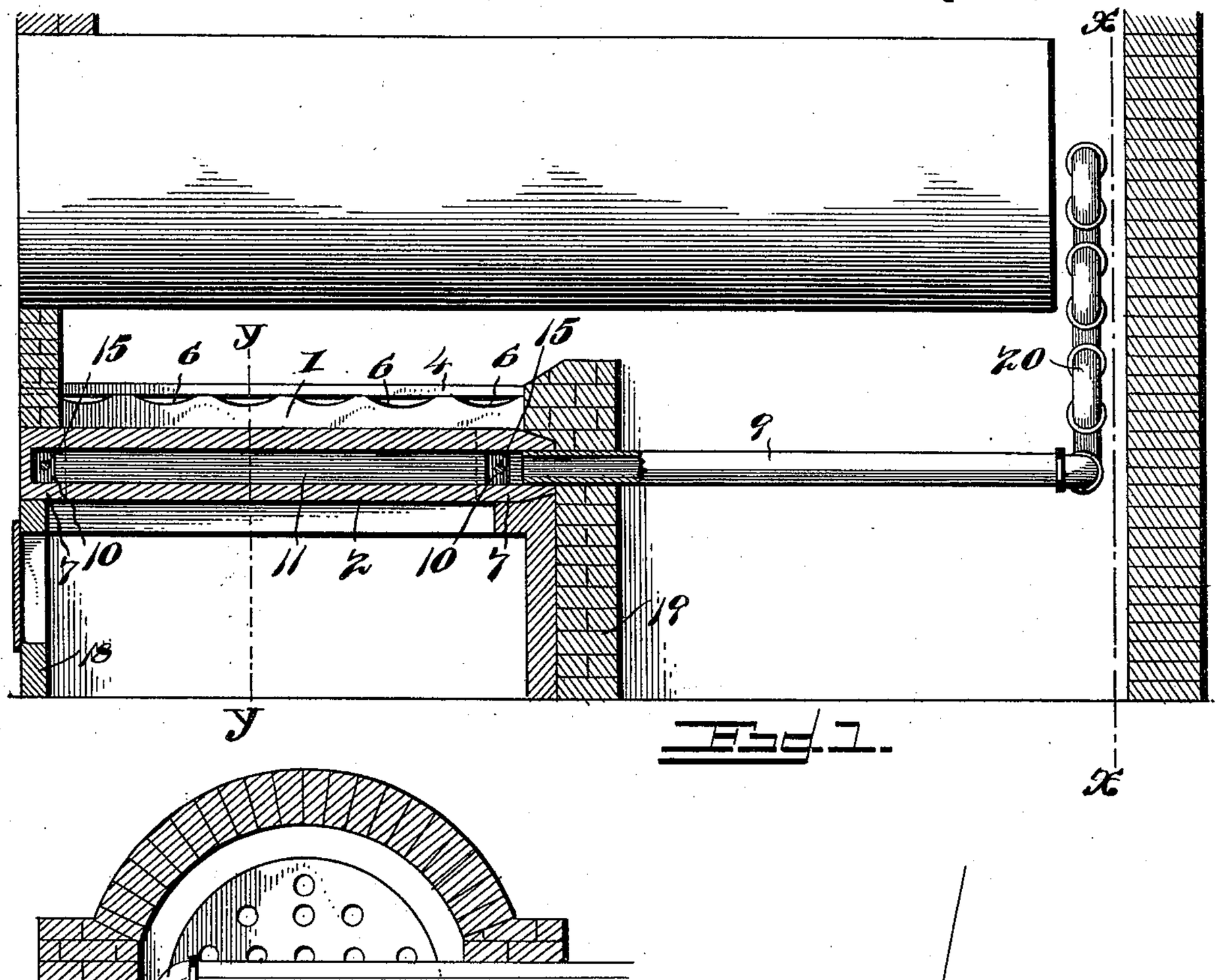

Fig. 1.

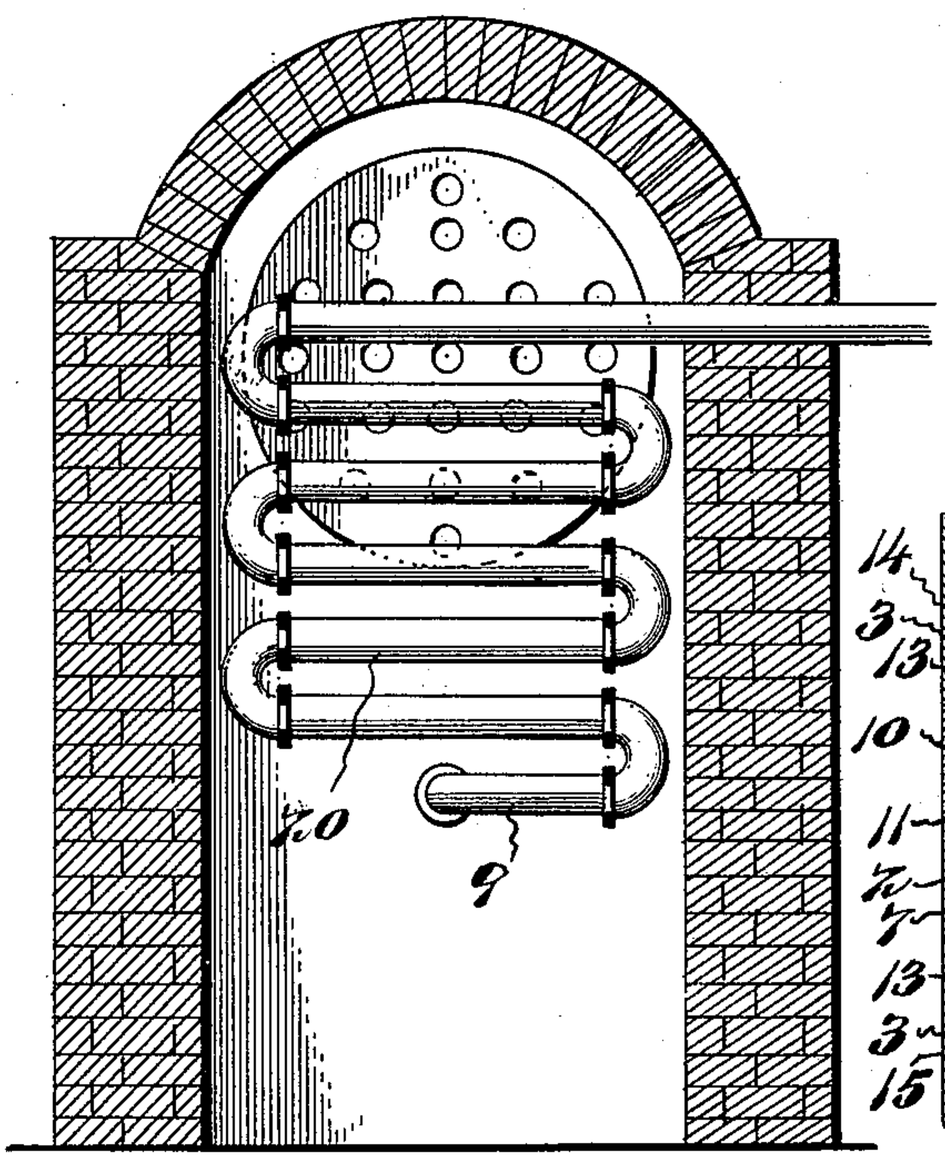

Fig. 2.

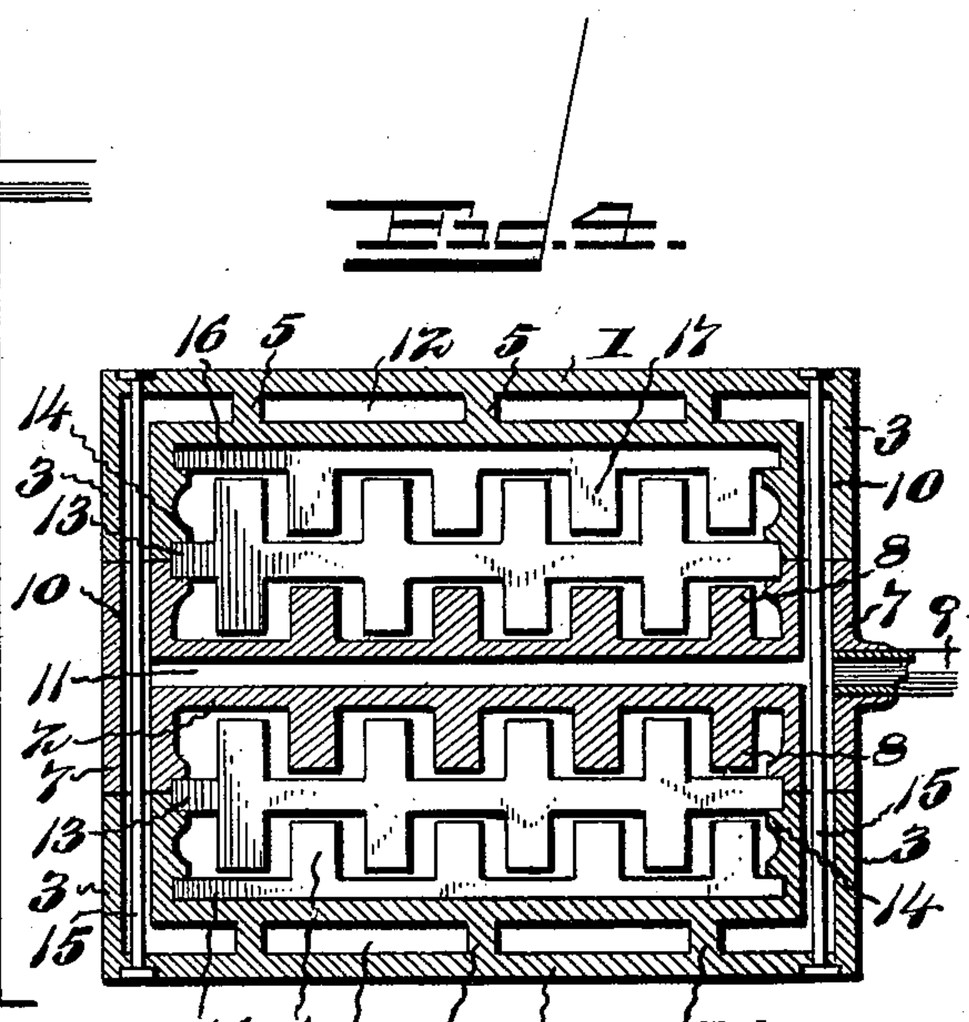

Fig. 4.

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(No Model.) 2 Sheets—Sheet 2.

A. J. PULVER

FURNACE.

No. 601,983. Patented Apr. 5, 1898.

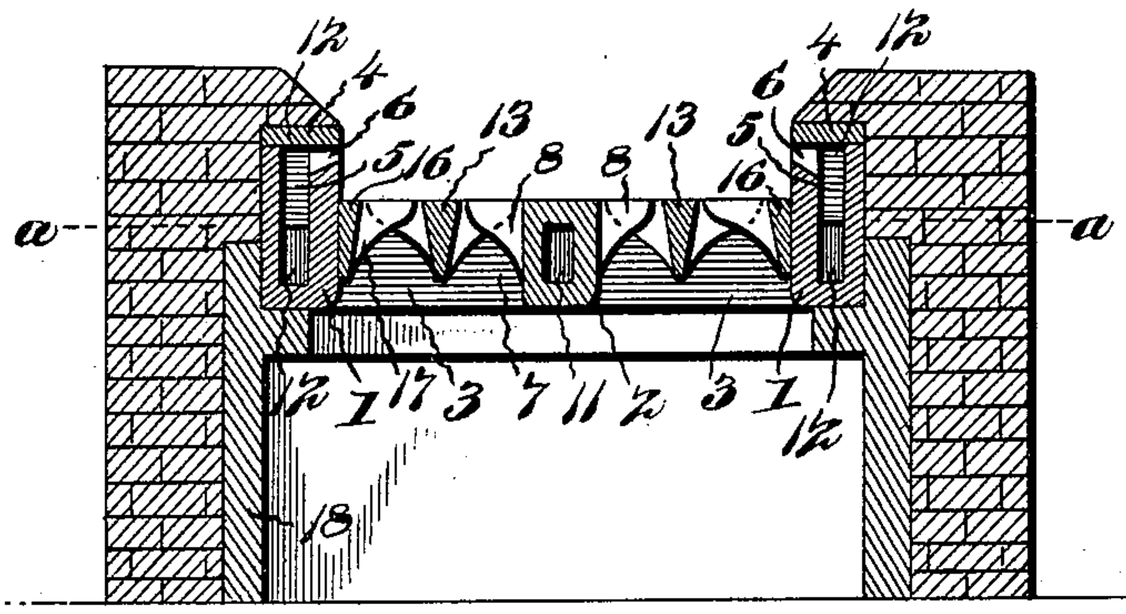


Fig. 3.

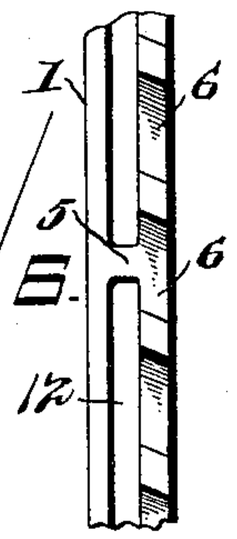
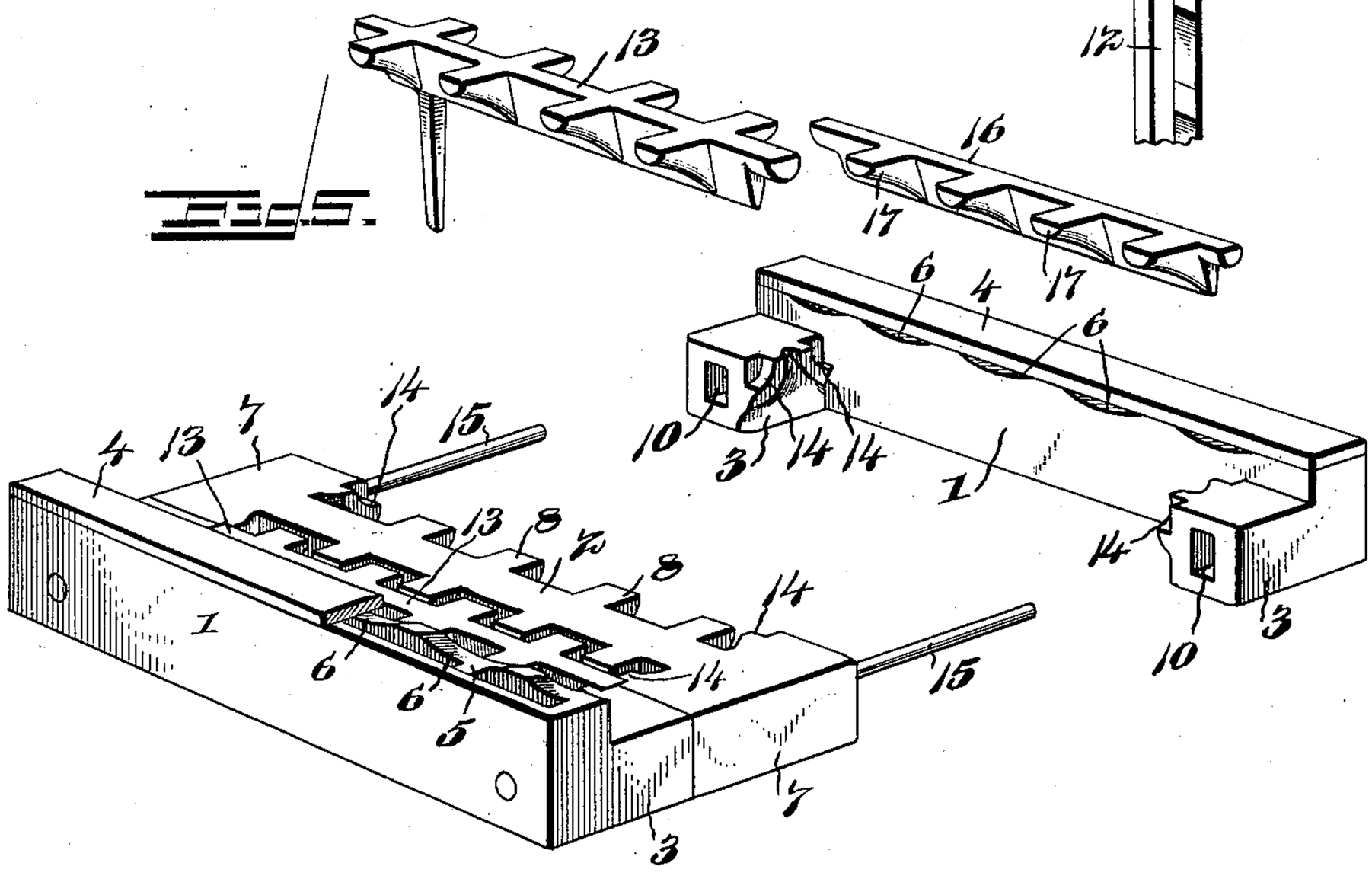


Fig. 6.

Fig. 5.



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UNITED STATES PATENT OFFICE.

ANDREW JACKSON PULVER, OF MILAN, OHIO, ASSIGNOR OF ONE-HALF TO HOMER W. FISK, OF SAME PLACE.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 601,983, dated April 5, 1898.

Application filed May 13, 1897. Serial No. 636,380. (No model.)

To all whom it may concern:

Be it known that I, ANDREW JACKSON PULVER, a citizen of the United States, residing at Milan, in the county of Erie and State of Ohio, have invented a new and useful Furnace, of which the following is a specification.

This invention has for its object to promote the combustion of gases liberated from fuel when burning and to prevent the too rapid burning out of the furnace-grate, the latter being constructed so as to provide passages for air, which is forced therethrough under pressure and which is heated in its travel and permitted to escape in a series of jets at a high temperature, so as to combine with the gases and consume them, whereby the heat is intensified and the fuel consumed economically.

For a full understanding of the merits and advantages of the invention reference is to be had to the accompanying drawings and the following description.

The improvement is susceptible of various changes in the form, proportion, and the minor details of construction without departing from the principle or sacrificing any of the advantages thereof, and to a full disclosure of the invention an adaptation thereof is shown in the accompanying drawings, in which—

Figure 1 is a longitudinal section of a boiler-furnace constructed in accordance with and embodying the principles of this invention. Fig. 2 is a transverse section on the line X X of Fig. 1, looking to the front. Fig. 3 is a section on the line Y Y of Fig. 1. Fig. 4 is a plan section of the complete grate on the line *a a* of Fig. 3. Fig. 5 is a detail view in perspective of the improved grate, having parts broken away and some of the elements separated, so as to show more clearly the detailed construction. Fig. 6 is a detail view of a portion of a side bar, showing more clearly the oblique disposition of the notches which form the discharge-outlets for the heated air.

Corresponding and like parts are referred to in the following description and indicated in the several views of the accompanying drawings by the same reference characters.

The grate comprises similar side bars 1 and an intermediate bar 2, which are hollow to provide a passage for the circulation of the air when the furnace is in operation. The side bars 1 have inner extensions 3 at their ends in a lower plane than the top side of the said bars 1 and which are hollow and form a continuation of the space or passage formed in the body of the bars. The space or passage formed in the bars 1 extends through the top side thereof and is closed by a cap-plate 4, which is secured in place in any convenient way, so as to be readily removable for any purpose desired.

Webs 5 connect the inner and outer walls of the bars 1 and are located at intervals in the length thereof and are formed therewith and serve to prevent warping of the bars. The top edge of the inner wall is provided with notches 6, located between the webs 5 and approaching the plane of the cap 4 from a middle point, said notches being shallow and inclining rearwardly, so as to deliver the heated air in jets of sufficient extent to readily commingle with the gases and smoke and consume them. The rearward inclination of the notches 6 causes the jets to incline toward the rear of the combustion-chamber and assist materially in promoting the draft, whereby a greater amount of air is supplied to the fire and the latter caused to burn more freely and with less waste.

The notches 6 are closed at their upper side by the cap 4 and constitute outlets for the heated air and, being shallow and of a comparatively great length, deliver the air in a thin sheet, which insures its combining with the products of combustion, so as to promote the consumption thereof.

The intermediate bar 2 (one being shown, although it will be understood that any desired number may be provided, according to the extent of the grate) is formed at its ends with cross-heads 7, corresponding with the inner extensions 3 of the side bars 1, said cross-heads and extensions alining and being in a lower plane than the top side of the bars 1. The cross-heads 7, like the extensions 3, are hollow, and the opening therein matches the openings in the parts 3, whereby a continuous passage is had. Lugs 8 project from the opposite sides of the bar 2 to provide the bed necessary for a proper support of the fuel, so as to prevent wasting thereof. The air-pipe 9 connects with the inner or rear cross-head 7 at an intermediate point, whereby the incoming air is divided and caused to pass

laterally through the side passages 10 and through the central passage 11 into the space 12 of the side bars 1 and thence into the fire-box through the outlets 6.

Rocking bars 13, having lugs at their sides corresponding with the lugs 8 and entering the spaces formed between them, are journaled at their ends in bearings provided on the inner side of the end bars formed by the cross-heads 7 and inner extensions 3 when united. These bearings are formed by quadrant-shaped lugs 14, provided at the extremities of the parts 3 and 7 and on their inner side, said lugs matching and unitedly forming semicircular seats in which the extremities of the rocking bars 13 are journaled. This disposition of the bearings brings the rocking bars in line with the joints formed between the side and intermediate bars and divides the strain and weight equally on each, whereby the parts are held in alinement and prevented from slipping. When assembling the intermediate and side bars, the ends of the parts 3 and 7 are caused to abut and are faced true, so as to provide a tight joint, and the advantage of disposing the rocking bars 13 and their bearings in the manner set forth is apparent, inasmuch as it prevents the parts 3 and 7 from moving vertically when the rocking bars are in place. The several bars 1 and 2 are held together by tie-rods 15, passing through the spaces 10, formed in the parts 3 and 7, said tie-rods having nuts at their threaded ends, by means of which the bars connected thereby are drawn together. Fixed bars 16, having lugs 17, are supported at their ends by the extensions 3 of the side bars 1 and are placed against the latter with their lugs facing inward and entering the spaces between the lugs of the adjacent rocking bars, so as to prevent the formation of spaces sufficiently large for the escape of fuel before being thoroughly consumed.

A furnace-grate constructed in the manner set forth may be fitted in the fire-box of a furnace in any way found most advantageous, according to the style of the furnace and the character of boiler to be heated, and, as shown, it is set in a frame 18, which is built in by brickwork or masonry, and a part of the masonry extends over the cap-plates 4, the grate and its supporting-frame being located in advance of the bridge-wall 19 and between it and the front wall of the furnace. The air-pipe 9 connects with an air-pump, blower, or reservoir of compressed air in any desired manner, whereby the air is supplied to the grate under pressure, and this air-pipe connects with a heating-coil 20 in the rear of the boiler, whereby the incoming air is heated prior to its admission into the grate, so as to insure its being supplied to the combustion-chamber of the fire-box at such temperature as to cause it to combine with the products of combustion and prevent the wasting thereof and insure their utilization for heating the water in the boiler.

Having thus described the invention, what is claimed as new is—

1. In a furnace, the combination of intermediate and side bars having end extensions which abut and unitedly form end bars, lugs formed on the inner side of the end extensions of the bars at their extremities and unitedly forming bearings opposite the joints formed between the said extensions, and grate-bars supported at their ends in the said bearings and overlapping the joints formed between the end extensions of the aforesaid bars, substantially as and for the purpose set forth.

2. In a furnace, the combination of an intermediate and side bars, the latter having inner extensions and the former cross-heads at their ends which are connected together, quadrant-shaped lugs formed on the inner side of the cross-heads and inner extensions at their extremities and unitedly providing bearings, and rocking bars journaled at their ends in the said bearings and overlapping the joints formed between the cross-heads and inner extensions, substantially as set forth for the purpose described.

3. In a furnace, the combination of an intermediate and side bars made hollow and having hollow end extensions which are connected together and have the spaces formed therein in communication, the side bars having their spaces extending through the top side and having notches in the top edge of the inner walls, and cap-plates closing the upper side of the spaces and notches in the side bars, substantially as shown for the purpose set forth.

4. In a furnace, a hollow bar having its top side open, and having the side walls connected at intervals by transverse webs, and having notches in the top edge of a side wall, said notches being deeper at their inner ends and contracting toward their extremities and outer discharge ends and inclining rearwardly, and a cap-plate closing the top side of the bar and the said notches, substantially as described.

5. A furnace comprising hollow intermediate and side bars, the latter having inner hollow extensions and the former hollow cross-heads, tie-rods connecting the several bars and extending through the spaces formed within the end extensions thereof, cap-plates closing the spaces of the side bars and notches formed in the top edge of the inner walls thereof, and rocking bars journaled in bearings provided opposite the joints formed between the inner extensions and cross-heads, substantially as shown and described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ANDREW JACKSON PULVER.

Witnesses:
F. C. SMITH,
C. B. SMITH.