

No. 640,726.

Patented Jan. 2, 1900.

G. E. WILDER.
STEAM BOILER FURNACE.

(Application filed Dec. 15, 1898.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

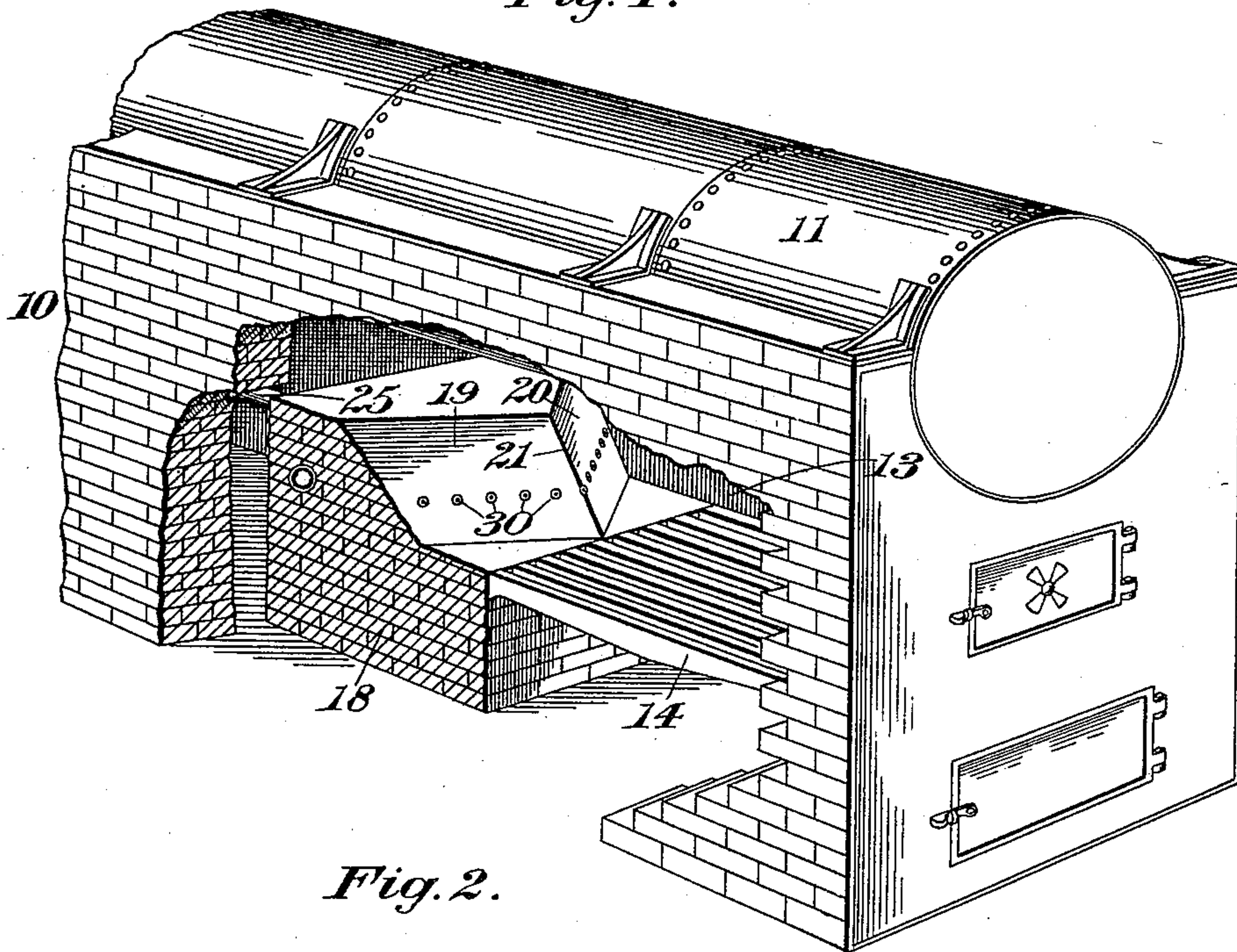
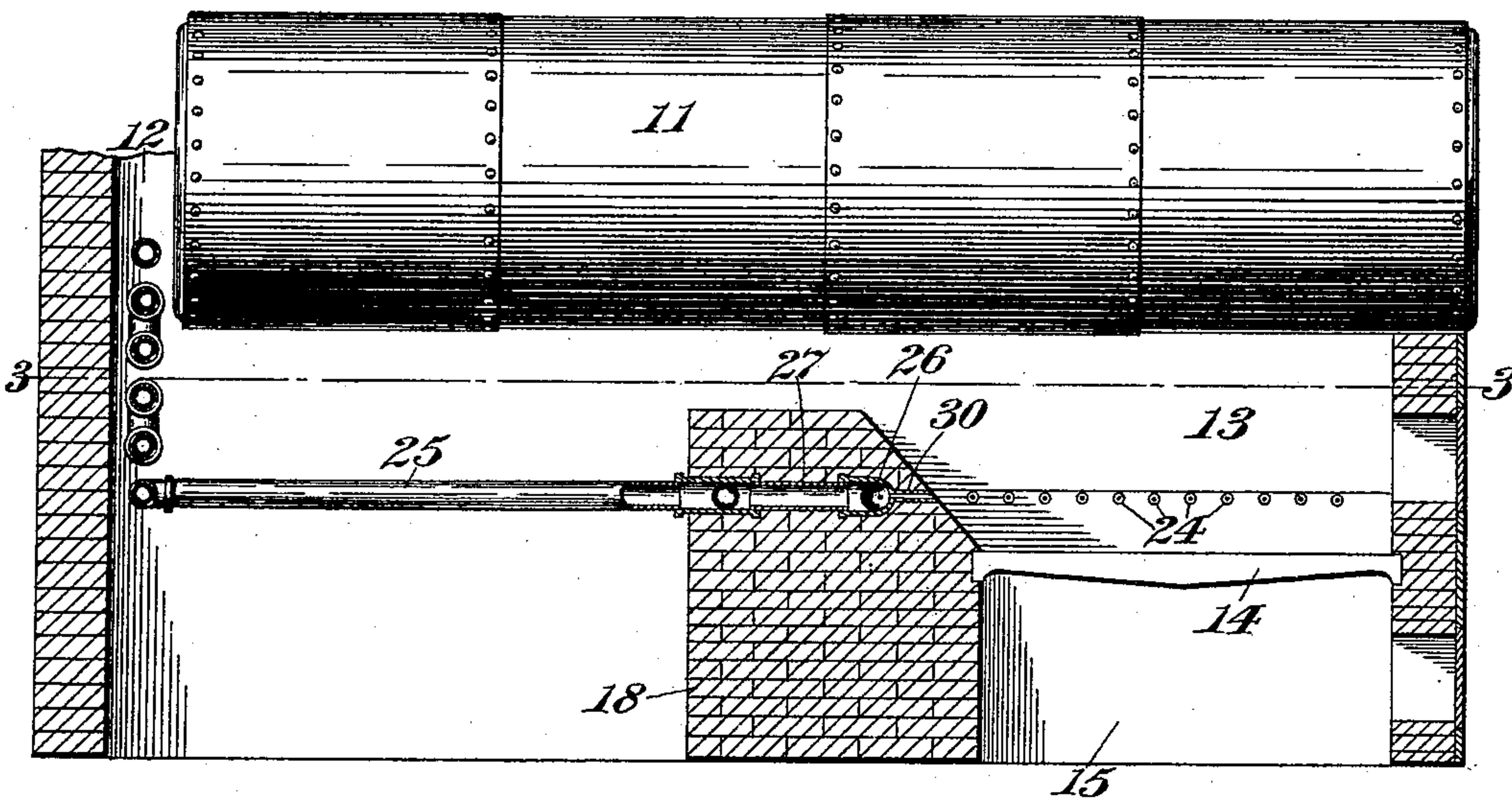


Fig. 2.



Witnesses

J. L. Edwards Jr.
W. A. Beuhorn

By his Attorneys,

Guert E. Wilder Inventor

C. A. Snow & Co.

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Fig. 3.

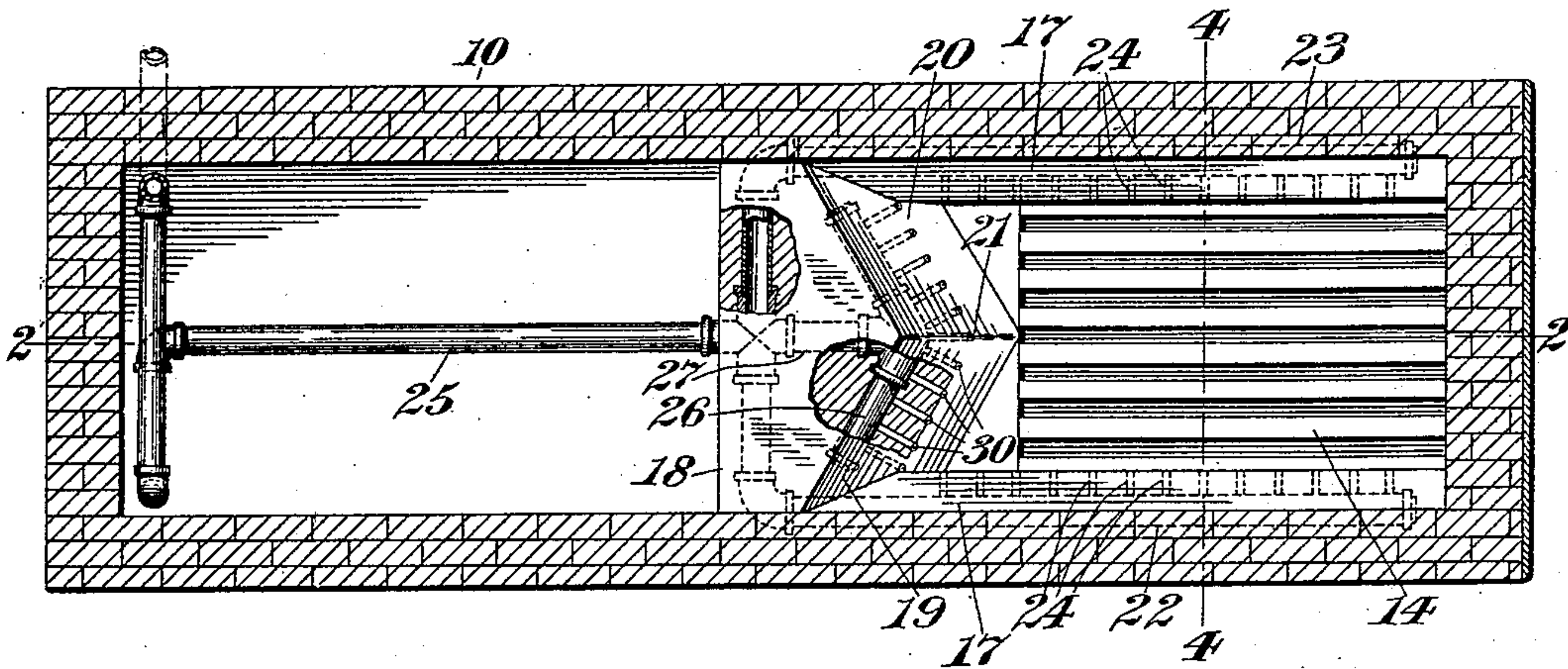
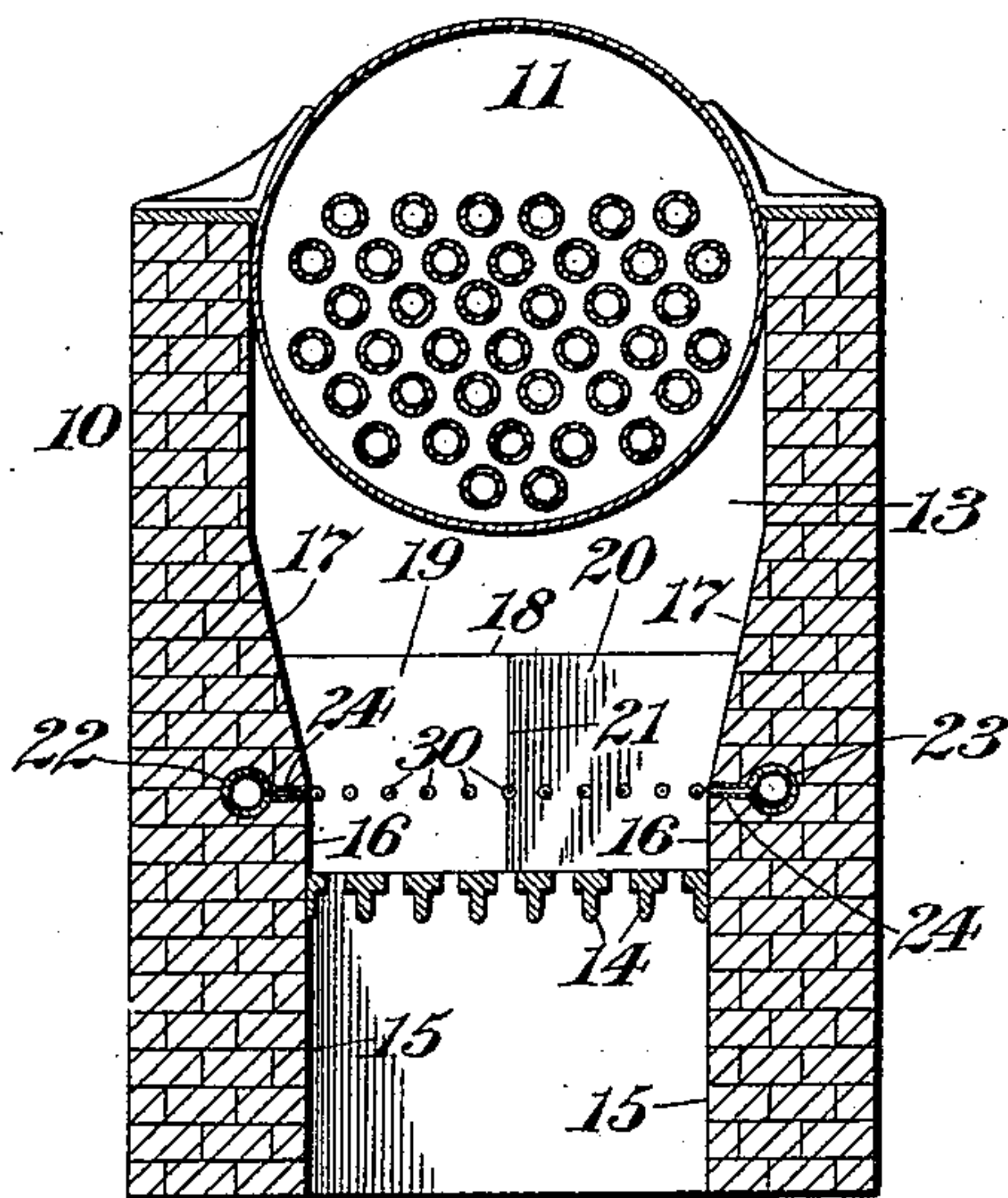


Fig. 4.



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J. L. Edwards Jr.
H. A. Bembord

Guert E. Wilder Inventor

By his Attorneys.

C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

GUERT ELMORE WILDER, OF SANDUSKY, OHIO.

STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 640,726, dated January 2, 1900.

Application filed December 15, 1898. Serial No. 699,365. (No model.)

To all whom it may concern:

Be it known that I, GUERT ELMORE WILDER, a citizen of the United States, residing at Sandusky, in the county of Erie and State of Ohio, have invented a new and useful Steam-Boiler Furnace, of which the following is a specification.

My invention relates to steam-boiler furnaces of that class wherein an air-blast is injected into the grate-chamber; and the object in view is to provide an improved construction by which the flame and products of combustion are caused to expand in an upward direction from the plane of the grate-chamber for the intimate admixture of the air-blast with the products of combustion and also to insure spreading or lateral separation of the heat into currents as it passes over the bridge-wall, whereby the heat is caused to envelop the boiler along the sides thereof and the volume of the products of combustion is augmented by the air, which attains increased combustion within the fire-box or grate-chamber.

To the accomplishment of these ends my invention in one aspect consists of a furnace having the side walls of its combustion-chamber expanded laterally and outwardly above the plane of the grate, a bridge-wall with its face adjacent to the grate arranged to slope in opposite directions from a central ridge, and air-blast pipes or twyers embedded in the side walls of the combustion-chamber below the inclined portions thereof and having a plurality of injecting-nozzles, which discharge air into the combustion-chamber above the grate.

The invention further consists in the novel construction and arrangement of parts, which will be hereinafter fully described and claimed.

To enable others to understand the invention, I have illustrated the preferred embodiment thereof in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a perspective view with a portion of the boiler-setting broken away and illustrating the novel construction of the bridge-wall. Fig. 2 is a vertical longitudinal sectional view through the boiler and the furnace on the plane indicated by the dotted

line 2 2 of Fig. 3. Fig. 3 is a horizontal section on the plane indicated by the dotted line 3 3 of Fig. 2. Fig. 4 is a vertical transverse section through the combustion-chamber on the line 4 4 of Fig. 3, looking in the direction of the bridge-wall.

Like numerals of reference denote like and corresponding parts in each of the several figures of the drawings.

The boiler-setting 10 in its general construction is similar to ordinary structures familiar to those skilled in the art, and it accommodates the horizontal boiler 11, of any preferred style of pattern. The setting and the boiler are mutually arranged to provide the back connection or return-chamber 12, by which the products of combustion are conducted from the longitudinal flue beneath the boiler into the tubes of the boiler itself.

The combustion-chamber 13 is below the front end of the boiler 11, and in this combustion-chamber is the grate 14, which may be of any approved construction. The combustion-chamber of my improved furnace is peculiarly constructed for the purpose of permitting the products of combustion and the flame to expand in an upward direction above the grate, and these side walls contain the air-blast pipes or twyers that deliver a multiplicity of thin streams of atmospheric air into the combustion-chamber on a plane above the grate for the purpose of intimately combining with the flame and products of combustion in order to attain increased combustion of the fuel and the gases, thereby consuming the carbon in the smoke. The side walls 15 of the combustion-chamber rise perpendicularly, as at 16, for a certain distance above the horizontal plane of the grate, and above the perpendicular sections of the walls the latter are flared or inclined upwardly and outwardly in opposite directions to each other, as at 17. The cross-sectional area of the combustion-chamber on the plane of the laterally-flared portion 17 of the side walls is greater than the cross-sectional area of that portion of the combustion-chamber between the perpendicular portion 16 of the side walls, and the ascending flame and products of combustion from the fuel on the grate 14 are permitted to expand within the enlarged upper portion of the combustion-chamber.

The bridge-wall 18 is erected vertically within the combustion-chamber in the ordinary position of the grate 14 therein, and this bridge-wall, constructed as represented by the drawings, constitutes one of the important improvements which I have made in the furnace, because said bridge-wall serves to divide or spread the flame and products of combustion into a thin sheet for the purpose of causing the currents to envelop the sides and bottom of the boiler which are exposed to access by the heat as it traverses the longitudinal flue, whereby a more uniform and equable distribution of the heat is obtained for impingement against the entire under surface of the boiler. This bridge-wall 19 has its side next to the grate formed with oppositely-inclined faces which diverge rearwardly toward the sides of the combustion-chamber from the central ridge or crown 21. This ridge or crest is in the plane of the longitudinal axis of the boiler-setting, so as to lie centrally in the combustion-chamber 13, and the faces 19 20 of the bridge-wall slope at corresponding angles from the crest 21 toward the side walls 15. The inclined faces of the bridge-wall are of corresponding area, and said faces not only incline laterally from the crest toward the side walls 15, but they also slope upwardly and rearwardly from the plane of the grate 14. This bridge-wall rises a suitable distance above the grate, so as to form between its upper edge and the bottom of the boiler a passage over which the products of combustion may pass freely to the longitudinal flue, and by sloping the faces rearwardly and upwardly from the grate the products of combustion may escape from the combustion-chamber without hindrance or checking from the bridge-wall. At the same time, however, the central ridge or crest between the oppositely-inclined faces 19 20 of the bridge-wall serves to divide or deflect laterally the flame and products of combustion, so as to create currents and effect the distribution of the circulating gases in a manner to cause the gases to be spread out in a comparatively thin sheet and to envelop the entire lower surface of the boiler.

The combustion of the smoke and gases within the chamber 13 is promoted by admitting atmospheric air to the chamber on opposite sides thereof, and in order to obtain maximum efficiency in the admixture of the air-blast with the smoke and gases without lowering the temperature of the combustion-chamber the blast is delivered from opposite sides of the combustion-chamber in a plane above the grate thereof and in a multiplicity of thin streams or currents. The air-blast pipes 22 23 are embedded in the perpendicular section 16 of the side walls 15, so as to lie below the inclined sections 17 of said side walls, and these blast-pipes are equipped with a number of nozzles 24, which extend through the brickwork of the walls 15 and project into the chamber 13. The nozzles open into the

chamber above the grate 14 and on the same horizontal plane one with the other, and these nozzles are thus arranged to deliver the plurality of air-jets into the smoke and gases which arise from the burning fuel on the grate 14. By embedding the blast-pipes in the walls 15 of the combustion-chamber the pipes are protected by the brickwork from the deteriorating effect of the heat, and as the nozzles deliver the air-currents through the side walls the currents or blasts of air deflect the heat away from the side walls toward the central line of the combustion-chamber, whereby the brickwork is protected in a measure from destruction by the intense heat within the combustion-chamber.

I prefer to supply the blast of air under pressure to the pipes 22 23 by means of a single supply-pipe 25, which is carried through the longitudinal flue of the furnace and has branched connections with said pipes 22 23, and as the air-blast traverses this pipe 25 it is heated by the escaping products of combustion which circulate through the longitudinal flue around the supply-pipe 25. In Fig. 3 of the drawings I have also represented a transverse blast-pipe 26, which is embedded in the bridge-wall 18, and this transverse blast-pipe has connection at 27 with the supply-pipe 25, so that a portion of the air-blast will enter the transverse pipe 26. A series of nozzles 30 are attached to the transverse blast-pipe 26 to discharge currents of air into the combustion-chamber on lines at right angles to the currents from the nozzles of the pipes 22 23. It will be understood that the admission of air in bulk to the combustion-chamber will have a tendency to lower the temperature of the furnace, and I therefore provide the series of nozzles which enter the combustion-chamber from opposite sides thereof, so as to divide the blasts into thin streams, the nozzles being preferably about one inch in diameter. The energy of the air-blast is reduced by friction as it traverses the blast-pipes and the nozzles thereof, so that the currents or streams will not be injected into the furnace to a line beyond the middle of the combustion-chamber, thus leaving a neutral space in the middle of the combustion-chamber for imperfect combustion to take place; but by the employment of the transverse blast-pipe the currents of air from the nozzles thereof encounter and mix with the distillations in this neutral central part of the combustion-chamber, so as to attain perfect combustion and overcome the escape of smoke.

By constructing the combustion-chamber with an enlarged or expanded upper portion and admitting the air to the combustion-chamber above the grate the volume of the gases is materially augmented, and they are free to expand at a high temperature within the combustion-chamber. This construction and arrangement of the parts not only provide space for the heat to expand and escape from

the plane of the grate, but the heat is prevented from burning out the brickwork of the fire-box. It is well understood that a bridge-wall presenting a vertical straight face across the combustion-chamber causes the flame to pass *en masse* over and into the longitudinal flue; but by making the bridge-wall with the sloping faces which are inclined in opposite direction from a central crest the circulating gases are spread out and deflected into a comparatively thin sheet which causes the gases to envelop the entire under surface of the boiler, and thereby apply the heat uniformly and evenly to the boiler-surfaces.

Changes may be made in the form and proportion of some of the parts while their essential features are retained and the spirit of the invention embodied. Hence I do not desire to be limited to the precise form of all the parts, as shown, reserving the right to vary therefrom.

Having thus described the invention, what I claim is—

1. In a boiler-furnace, the combination of a combustion-chamber, a bridge-wall having its front face inclined backward in opposite directions toward the side walls of the combustion-chamber from an intermediate ridge or crest, and also inclined backwardly and upwardly from the plane of the grate, and blast-pipes extending through the bridge-wall and having jet-nozzles opening out from the inclined faces of the latter, substantially as described.

2. In a boiler-furnace, a bridge-wall having a ridge or crest in the plane of the median line of the combustion-chamber, and the sloping faces which incline rearwardly in opposite directions from the ridge or crest, substantially as described.

3. In a boiler-furnace, a bridge-wall having a central ridge or crest located in the plane of

the median line of the combustion-chamber and sloping upwardly and rearwardly from the plane of the grate in said chamber, and the sloping faces which are inclined from the ridge or crest toward the sides of the chamber and are also inclined upwardly and rearwardly from the grate, substantially as described.

4. In a boiler-furnace, the combustion-chamber having its side walls inclined laterally in opposite directions to each other and on a plane above the grate to enlarge the cross-sectional area of the chamber in the upper part thereof, combined with a bridge-wall having its front face inclined uniformly in opposite directions from a central ridge or crest, and blast-pipes in the side walls of the chamber between the grate and the inclined upper portions of said walls, and each blast-pipe having a plurality of nozzles which discharge air through one side wall of the combustion-chamber, substantially as described.

5. In a boiler-furnace, the combination of a combustion-chamber, a bridge-wall having its front face inclined in opposite directions from a central ridge and also inclined backwardly and upwardly from the plane of the grate, the blast-pipe embedded in the bridge-wall and having the jet-nozzles projecting through the inclined faces of said bridge-wall, and other blast-pipes arranged at the sides of the combustion-chamber and having nipples arranged to discharge the air-blast transversely across the combustion-chamber, substantially as described.

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

GUERT ELMORE WILDER.

Witnesses:

FRANKLIN F. LEHMAN,
THOMAS B. HOSSEY.