

No. 720,571.

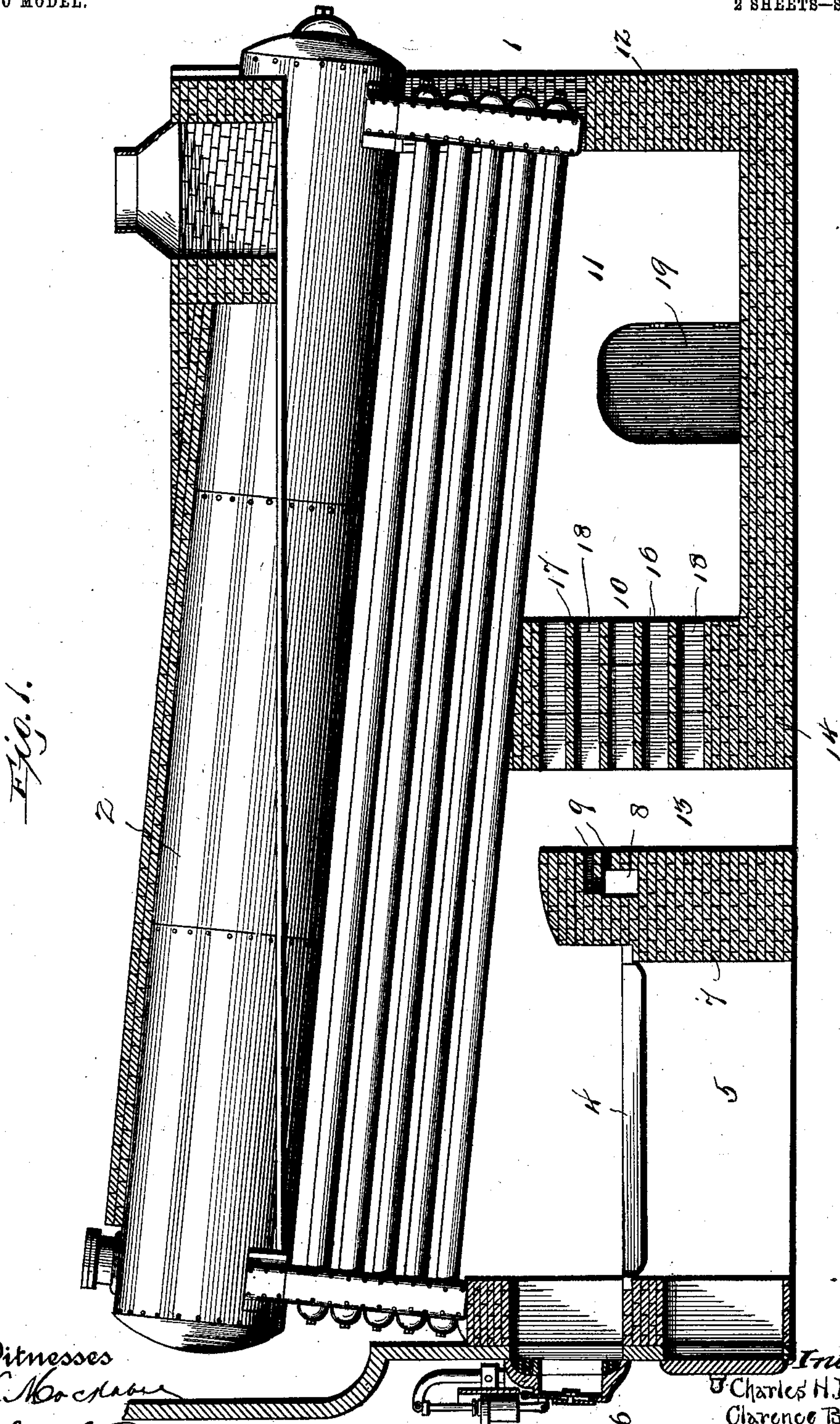
PATENTED FEB. 17, 1903.

C. H. EDDINS & C. BUDDIE.
SMOKE CONSUMING FURNACE.

APPLICATION FILED JUNE 10, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses

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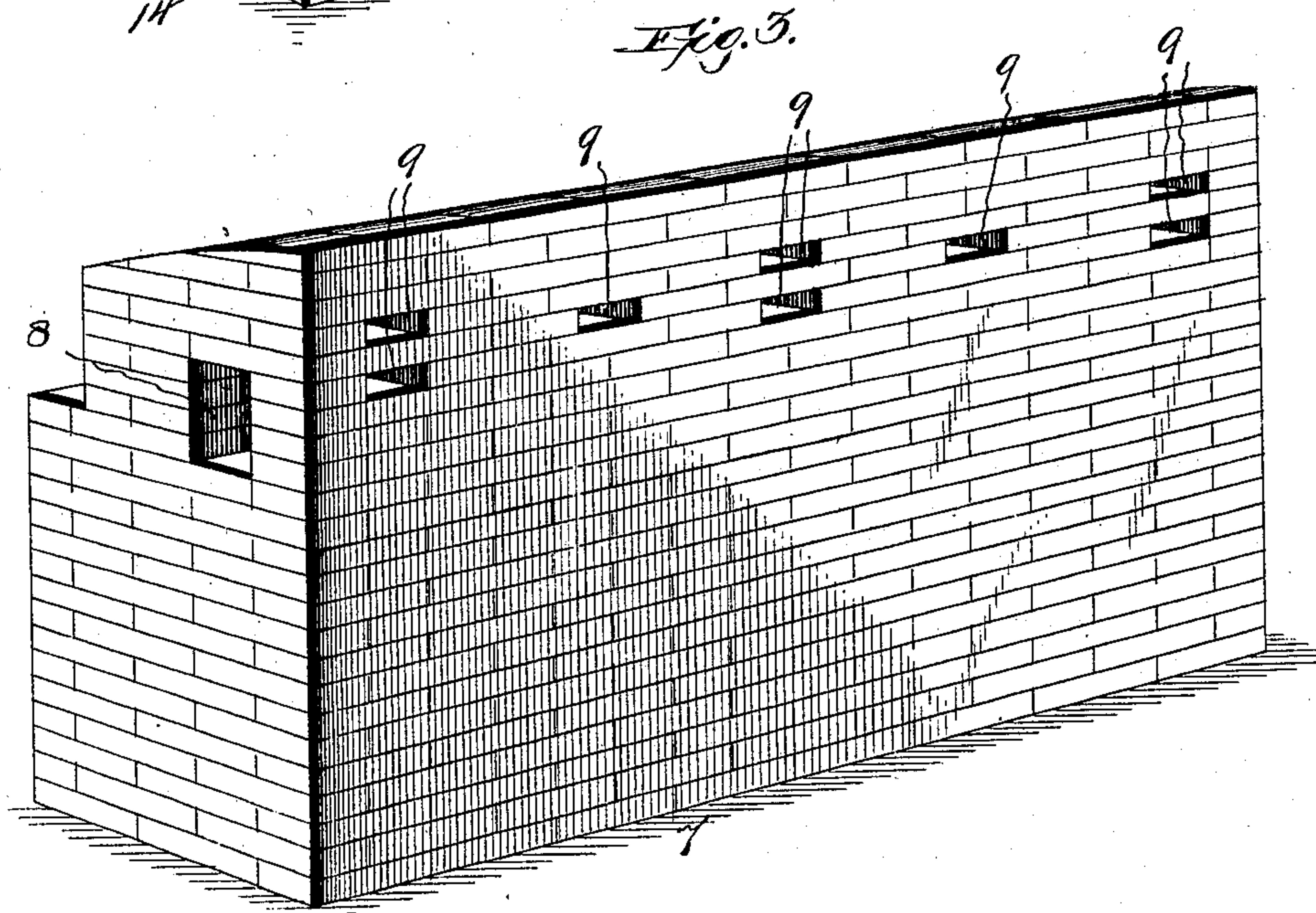
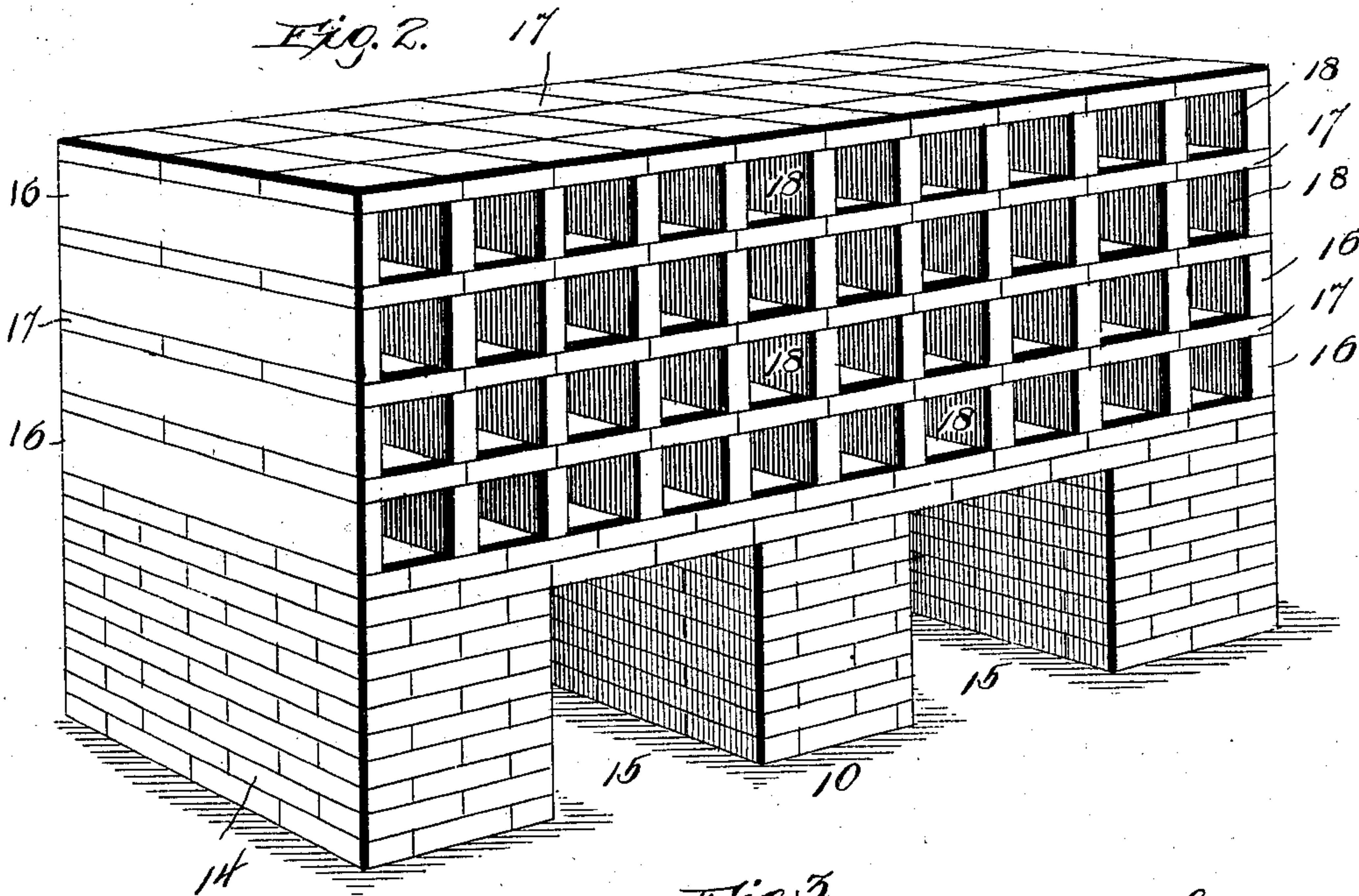
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2 SHEETS—SHEET 2.



Witnesses

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UNITED STATES PATENT OFFICE.

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SMOKE-CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 720,571, dated February 17, 1903.

Application filed June 10, 1902. Serial No. 111,040. (No model.)

To all whom it may concern:

Be it known that we, CHARLES H. EDDINS and CLARENCE BUDDIE, citizens of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Smoke-Consuming Furnaces, of which the following is a specification.

This invention relates to furnaces, particularly of the steam-boiler type, and has special reference to certain new and useful improvements comprising means for consuming the smoke and other combustible products usually escaping from furnaces or fires and constituting what is commonly known as the "smoke" nuisance.

In carrying out the invention one of the objects thereof is to provide a construction and arrangement of parts requiring a minimum amount of alteration in a furnace and which will not interfere in the least with the draft thereof, while at the same time comprehending positive and reliable means for feeding oxygen containing air from the outside of the furnace to the smoke and other products of combustion and thoroughly mixing the same under such conditions as to insure a thorough consumption of the smoke and other combustible products which pass out of the fire-box of the furnace.

The invention also contemplates a construction which can be readily adapted to any ordinary type of furnace and which through the medium of its provision for consuming the smoke and other combustible products effects a material saving or economy in fuel.

With these and many other objects in view, which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts, as will be hereinafter more fully described, illustrated, and claimed.

The essential feature of the invention involved in the formation of the supplemental fire-wall and its special relation to the air-feeding bridge-wall are necessarily susceptible to modification, according to the particular conditions under which the invention is applied to a furnace; but a preferred embodi-

ment of the improvements is shown in the accompanying drawings, in which—

Figure 1 is a vertical longitudinal sectional view of a smoke-consuming furnace constructed in accordance with the present invention. Fig. 2 is a perspective view showing the preferable construction of fire-wall employed in the carrying out of the invention. Fig. 3 is a similar view of the air-feeding bridge-wall, showing more plainly the preferable manner of arranging the air-distributing ports of this wall contiguous to the rear upper edge thereof.

Like reference-numerals designate corresponding parts throughout the several figures of the drawings.

The improvements constituting the present invention may obviously be associated with different types of furnaces; but for illustrative purposes the same are shown in the drawings as applied to a furnace of the steam-boiler type.

Referring particularly to the drawings, the numeral 1 designates the furnace-casing, constructed in any approved form and having mounted therein the boiler 2, which is illustrated as of the kind set at an angle or obliquely to the base or bottom line of the furnace.

The furnace in its general organization also includes in the front part thereof beneath the front end of the boiler the grate 4, beneath which is the ordinary ash-pit 5. It is preferable in the carrying out of the invention that, in addition to the means hereinafter described for feeding oxygen containing air to the smoke and other combustible products from the fire, there be employed supplemental air-feeding means in the shape of an air-feeding door 6. This air-feeding door 6 is preferably of the construction disclosed in our other application, Serial No. 107,215, filed May 14, 1902; but the essential feature thereof, as far as the present invention is concerned, resides in the said door comprising means for feeding air to the fire upon the grate immediately after the introduction of green fuel. The said air-feeding door 6 therefore acts in a supplemental capacity to the air feeding

and mixing means, which will now be described.

One of the important features of the invention resides in utilizing the bridge-wall 7 as
 5 a means for supplying or introducing air from the exterior of the furnace throughout the interior portion thereof immediately in rear of the wall. The said bridge-wall 7 occupies its usual location in the furnace—that
 10 is, the same extends transversely across the entire width of the furnace-casing, forms the rear wall of the fire-box, and is built up from the base or bottom of the furnace. The said bridge-wall may be constructed of fire-brick
 5 or any other suitable material and terminates at its upper end short of the boiler parts thereabove to permit the fire, smoke, and other products of combustion to pass over the top of the bridge-wall into the portion of the
 10 furnace in rear thereof.

To adapt the bridge-wall for the purpose of feeding air into the furnace at the rear side of the wall, the latter has formed therein a longitudinal air-supply channel 8, which is
 5 entirely inclosed within the wall and extends longitudinally thereof throughout its entire extent, the said air-supply channel 8 having one or both ends in communication with the
 10 outer air exterior to the furnace, at the side or sides thereof.

In conjunction with the main air-supply channel 8, extending longitudinally through the bridge-wall, there is associated with such channel a plurality of air-distributing ports
 5 9. These air-distributing ports 9 pierce the rear side of the bridge-wall 7 contiguous to the upper rear edge thereof and have their inner ends in communication with the supply-channel 8. The said distributing-ports 9
 10 are also preferably arranged in several longitudinal rows to provide a maximum distributing area for the air, which is drawn out of the channel 8 and distributed into the smoke and other combustible products which
 5 pass over the top of the bridge-wall into the space at the rear thereof.

An important feature of the invention resides in combining with the air-feeding bridge-wall 7 a supplemental fire-wall 10. This supplemental fire-wall 10 is built upright within the furnace and extends from the base thereof to and against the lower portion of the boiler, besides extending transversely across the entire width of the furnace to constitute
 5 a complete baffling-wall for the smoke and other products of combustion, so that the latter are compelled to pass through the cells of the fire-wall before the same can reach the enlarged closed combustion-chamber 11, formed
 10 in the back portion of the furnace between the fire-wall 10 and the extreme rear or back wall 12 of the furnace-casing proper.

The intermediately-located upright fire-wall 10 is spaced a sufficient distance from the rear
 5 side of the bridge-wall 7 to provide between the said two walls an intervening suction-chamber 13, which is closed in at the sides by

the walls 7 and 10, respectively, and is in communication at the top with the space
 70 above the bridge-wall 7.

An important feature of the invention to be observed in this connection is the fact that the suction-space 13 is not a combustion-chamber and does not perform the functions
 75 of chambers of this character which have heretofore been located directly in rear of the bridge-wall, but in contradistinction thereto is intended to be of such dimensions and so confined between the walls 7 10 as to provide a narrow channel or passage for the air
 80 and within which is created and maintained a suction by the passage of the products of combustion from the bridge-wall, passing from the latter almost directly into the flues of the wall 10. In other words, the fire-wall
 85 10, which extends to the bottom of the boiler, is disposed in very close proximity to the bridge-wall to provide an intervening narrow chamber or channel for suction and mixing purposes, the final mixing of the air with the
 90 gases being completed within the passages of the fire-wall and ignition thereof initiated as the mixed products pass from said passages into the combustion-chamber for final combustion.

The upright supplemental fire-wall 10 is of peculiar formation. The said wall surmounts a supporting-base 14, constituting the lower portion of the wall and built of masonry or brick, besides being usually provided with
 100 the openings 15, directly adjoining the base or bottom of the furnace. The main portion of the supplemental fire-wall 10, which is arranged on the supporting-base 14, may be properly characterized as being of a "cellular"
 105 formation, as the same essentially consists of a stacked bank of tiles 16 and 17, arranged to provide a multiplicity of rows of prolonged or extended straight transverse flue-passages or openings 18, extending entirely through the
 110 wall 10 and in communication, respectively, with the suction-chamber 13 and the rear closed combustion-chamber 11. The tiles 16 are arranged vertically upon edge and in spaced relation to provide the partition-walls
 115 of the flue passages or openings, while the tiles 17 are laid closely together and horizontally upon the vertically-disposed tiles 16 to constitute the tops and bottoms of the said flue passages or openings. It will be observed by reference to Fig. 1 of the drawings that several
 120 lengths of the cells 16 are preferably employed to provide passages or openings 18 of a very considerable length, thus insuring a final and thorough mixing of the products of combustion
 125 with the air drawn into the said passages or openings prior to the discharge of the mixed products into the closed combustion-chamber 11. This relative proportion and disposition of the several instrumentalities is a very im-
 130 portant feature of the invention, and it is by reason of the same that successful results are accomplished. In these particulars also the invention differs from that type of furnaces

involving the feeding of air wherein an extended or large combustion-chamber is interposed between the bridge-wall and the fire-wall of whatever character it may be. This detail method of forming the said flue passages or openings may of course be altered without affecting the essential feature of the supplemental fire-wall—namely, that of providing the same with a multiplicity of transverse flue passages or openings of extended lengths. The cellular or multiflue part of the supplemental fire-wall lies entirely within the horizontal plane of the bridge-wall 7, so that the smoke and other products of combustion are compelled to pass over the top of the fire-wall and downwardly, more or less, into the narrow suction chamber or channel 13 before the same can finally escape into and through the transverse flue passages or openings 18 of the fire-wall, hence insuring the suction action within the chamber 13 which induces or draws out a supply of air through the ports 9 from the air-supply channel 8 of the bridge-wall. It will therefore be understood that in the operation of the furnace the smoke and other combustible products from the fire sweep over the top of the bridge-wall, and then passing downwardly into the chamber 13 directly enter the flue passages or openings 18 and pass into the rear combustion-chamber 11. This circulation of the smoke and other products of combustion necessarily creates and maintains a vacuum or partial vacuum within the chamber 13, which serves to draw out a supply of air from the channel 8, which supply of air commingles and mixes with the smoke and other products of combustion in the suction-chamber and also in the flue passages or openings, and by reason of the cellular or multiflue formation of the wall 10 it will be obvious that the surfaces of the walls of the individual passages or openings 18 become very greatly heated and contribute to the ignition of the smoke and other combustible products when supplied with oxygen from the fresh air. The combustion of the smoke and other combustible products is completed within the rear closed combustion-chamber 11, and the deposits of ashes and other accumulations within the said chamber 11 may be removed from time to time through the side clean-out door or doors 19.

From the foregoing it is thought that the

construction, operation, and many advantages of the herein-described smoke-consuming furnace will be readily apparent to those familiar with the art without further description, and it will also be understood that various changes in the form, proportion, and minor details of construction may be resorted to without departing from the spirit of the invention or sacrificing any of the advantages thereof.

Having thus described the invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In a smoke-consuming furnace, the combination of the furnace-casing having within the rear thereof an enlarged closed combustion-chamber, an air-feeding bridge-wall having means for discharging air at the rear side thereof, and a hollow cellular fire-wall extending from the base of the furnace to the bottom of the boiler and arranged in close proximity to the bridge-wall to provide between the two said walls a narrow suction chamber or channel, said fire-wall having below the plane of the top of the bridge-wall a multiplicity of prolonged passages in communication with the rear closed combustion-chamber.

2. In a smoke-consuming furnace, the furnace-casing having within the rear thereof a close combustion-chamber, an upright bridge-wall provided with a longitudinal air-supply channel in communication with the outer air, and also with a plurality of air-distributing ports opening at the rear side thereof, and a supplemental upright fire-wall of greater elevation than the bridge-wall and arranged in close proximity thereto to provide between the said two walls a narrow suction chamber or channel, said fire-wall consisting of a supporting-base and a hollow cellular portion comprising a stacked bank of straight flat tiles arranged to provide a multiplicity of rows of prolonged flue passages or openings in communication with the rear combustion-chamber.

In testimony whereof we affix our signatures in presence of two witnesses.

CHARLES H. EDDINS.
CLARENCE BUDDIE.

Witnesses:

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