

(No Model.)

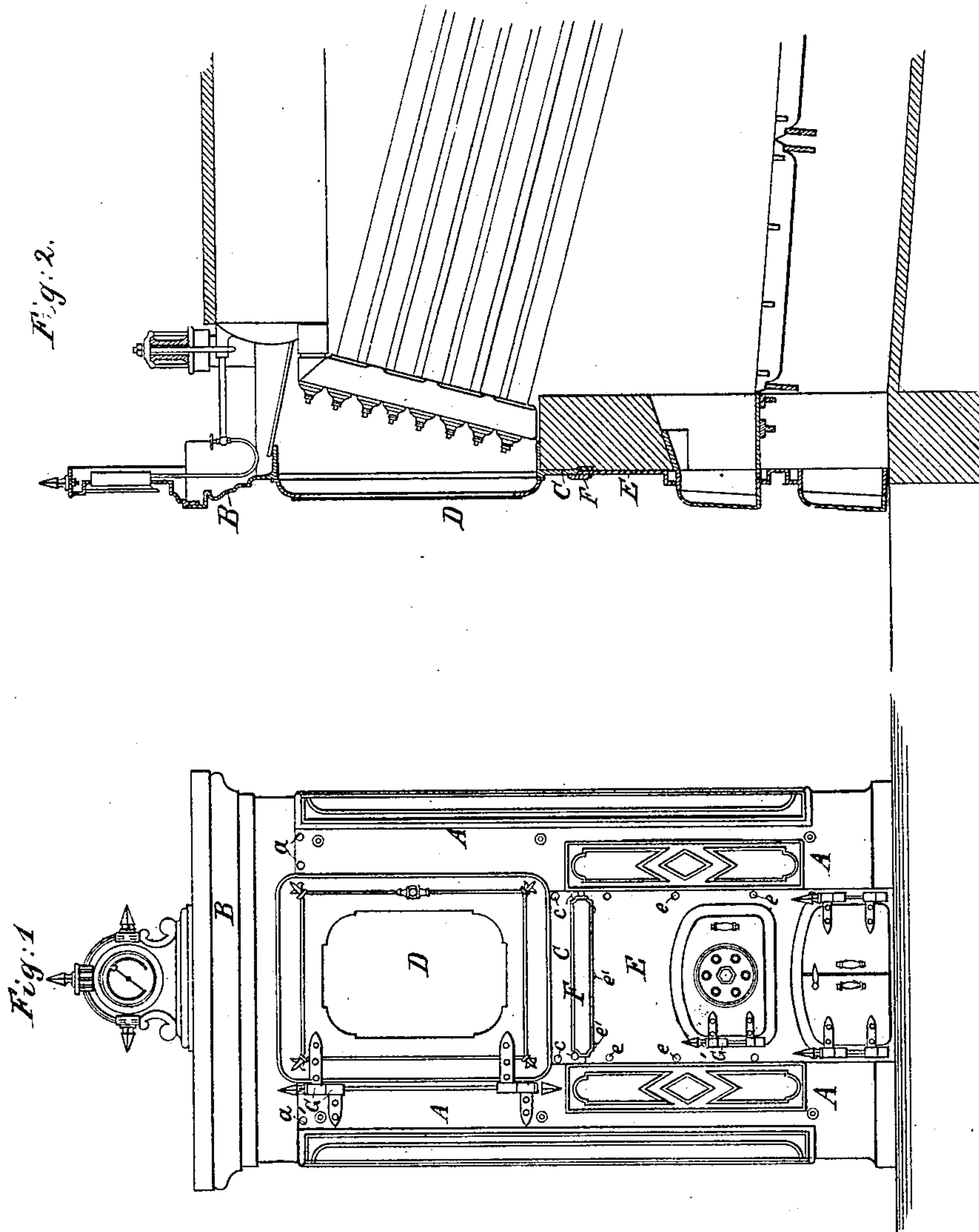
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N. W. PRATT.

BOILER FRONT.

No. 273,600.

Patented Mar. 6, 1883.



WITNESSES—
M. F. Boyle
A. H. Gentner

INVENTOR—
N. W. Pratt
by his attorney
Thomas D. Stearns.

(No Model.)

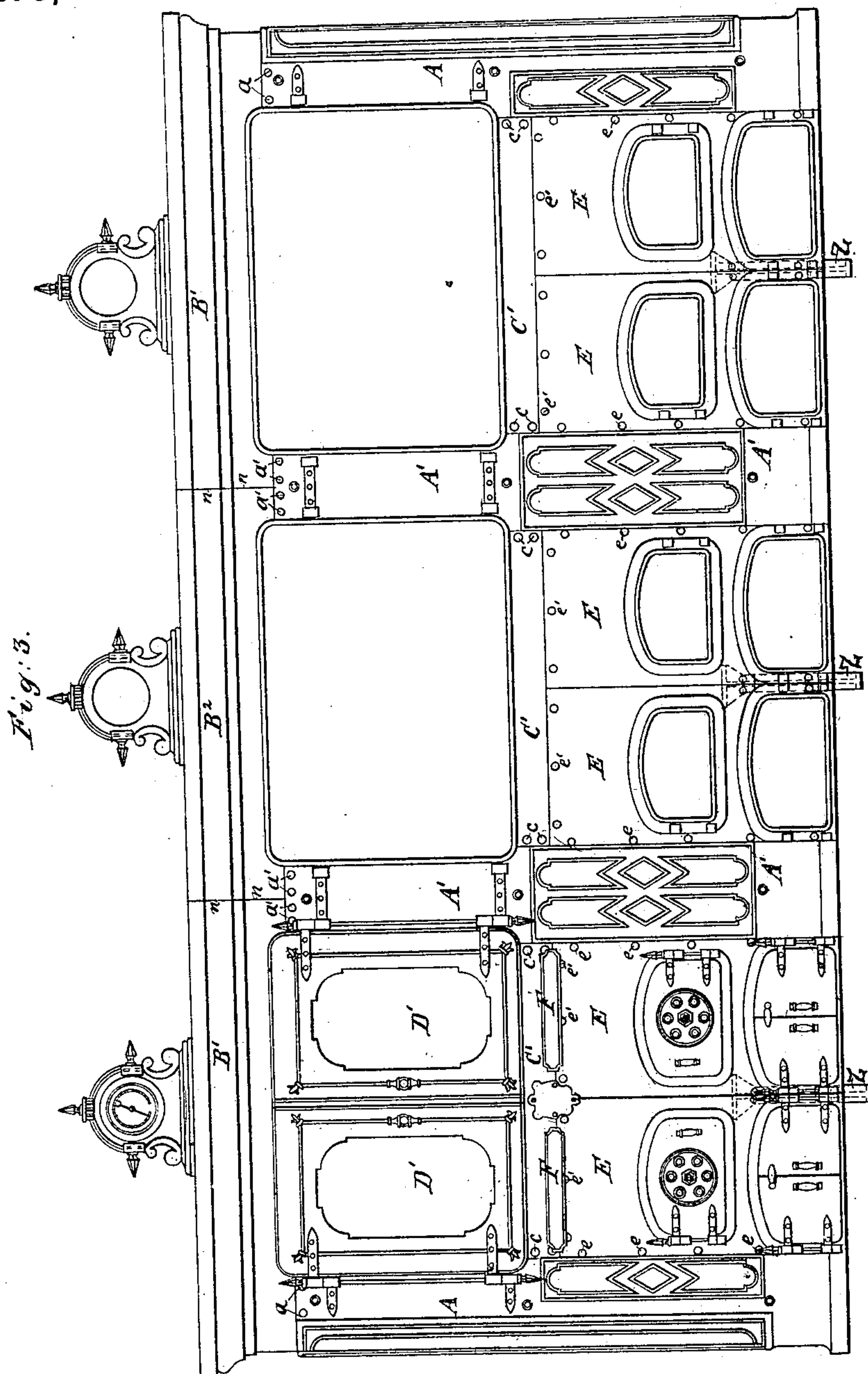
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Thomas D. Stetson.

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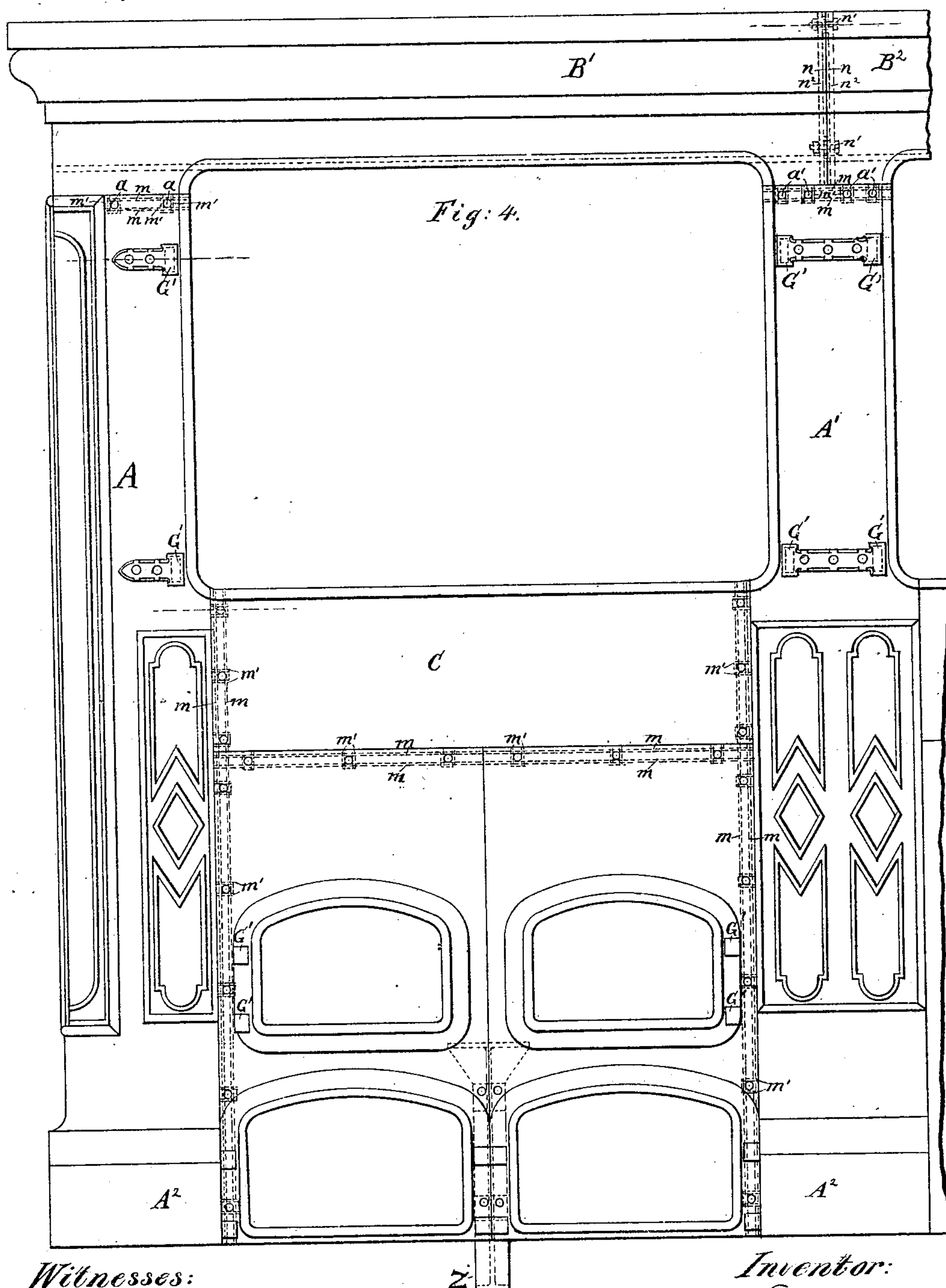
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Inventor:
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4 Sheets—Sheet 4.

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Fig: 5.

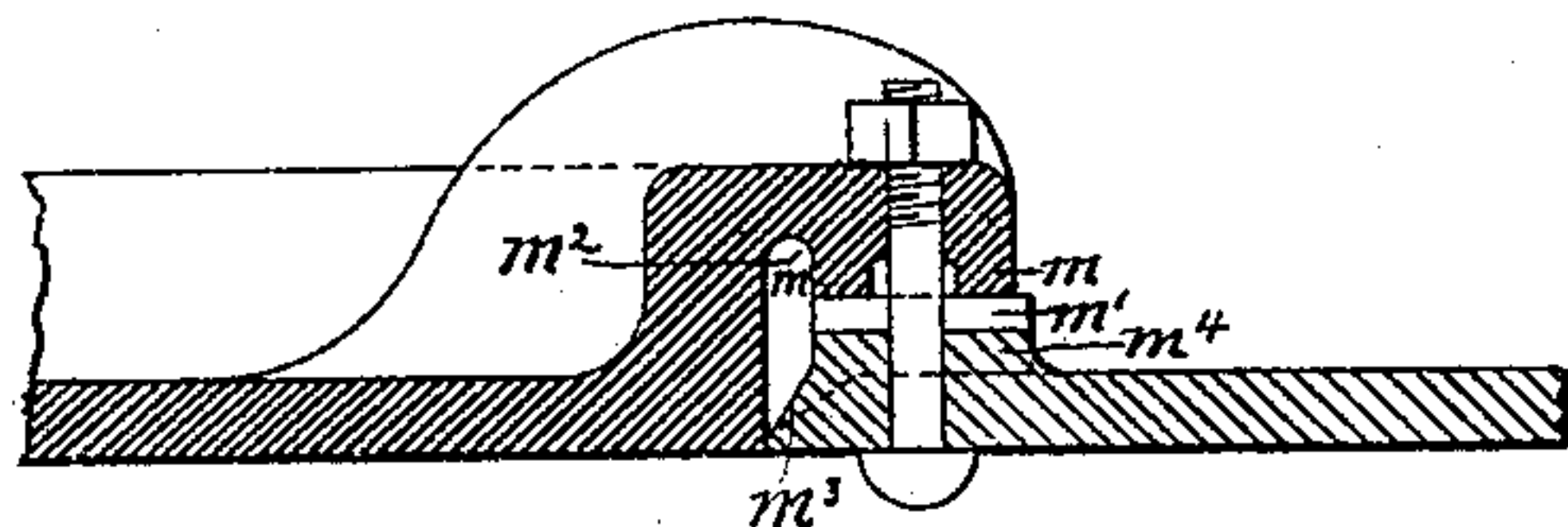


Fig: 6.

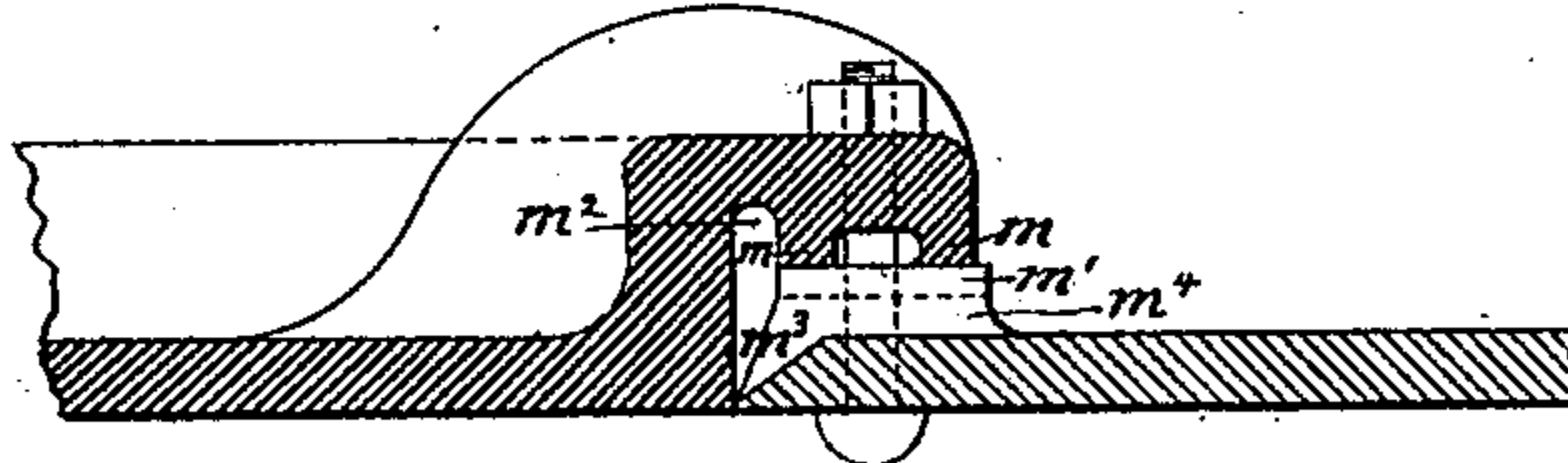


Fig: 8.

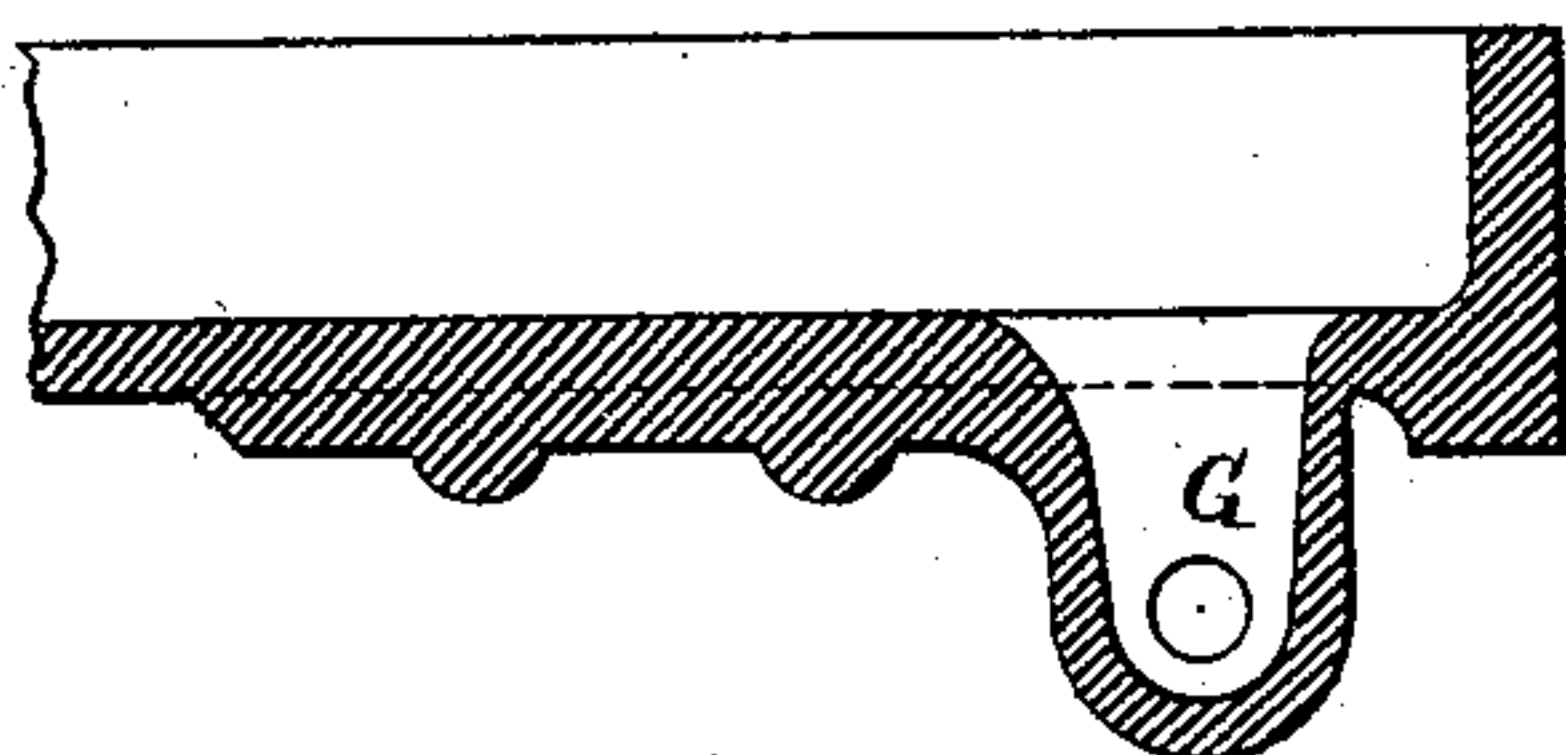


Fig: 7.

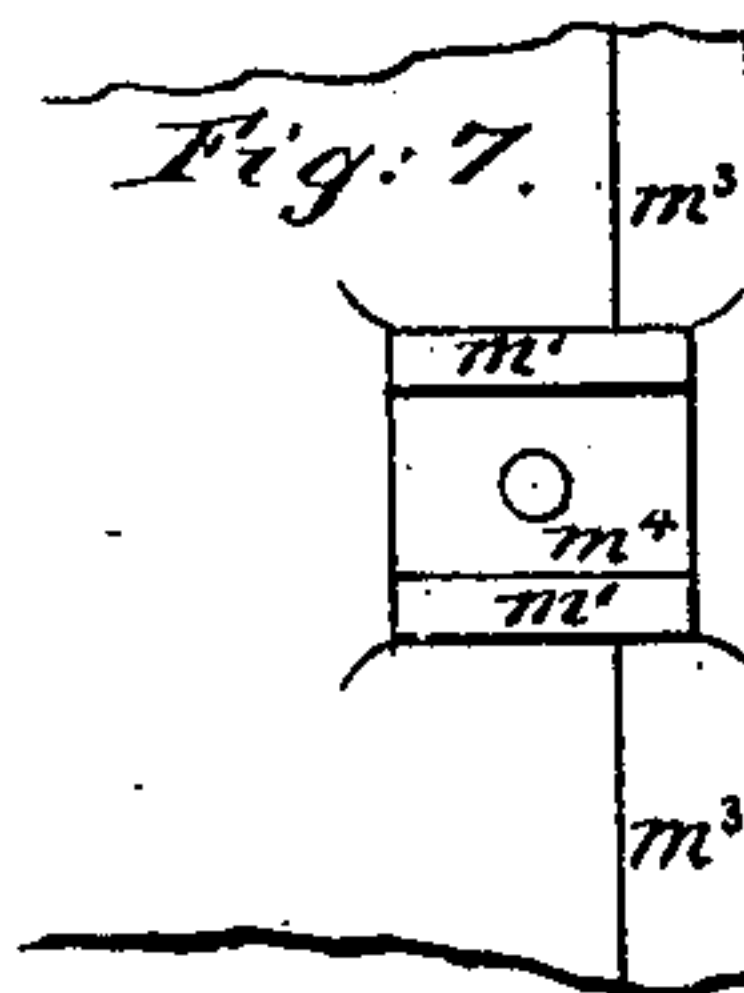


Fig: 9.

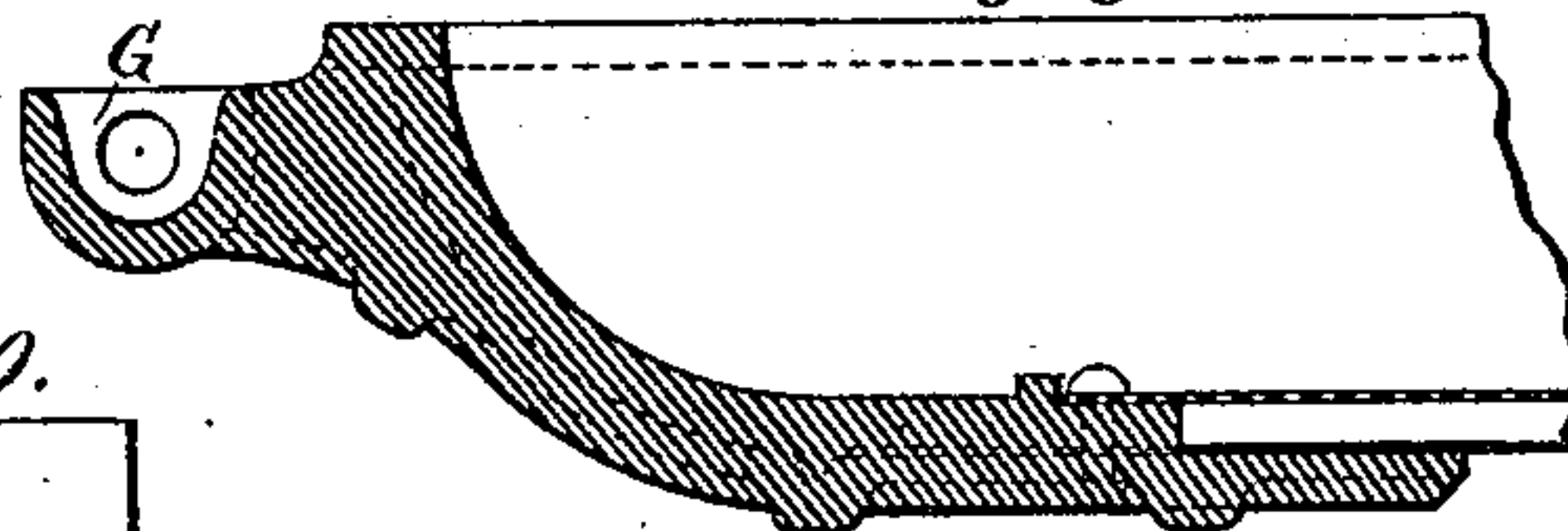


Fig: 10.

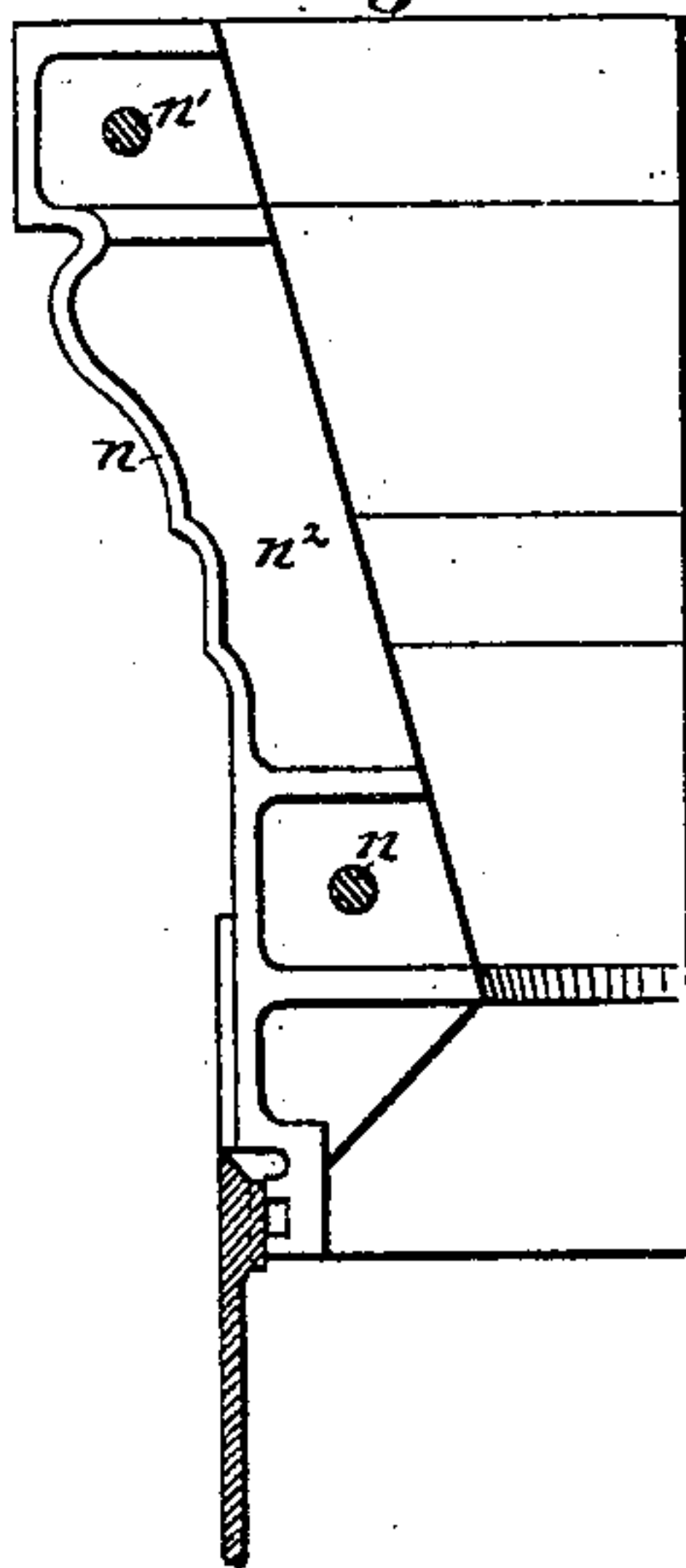
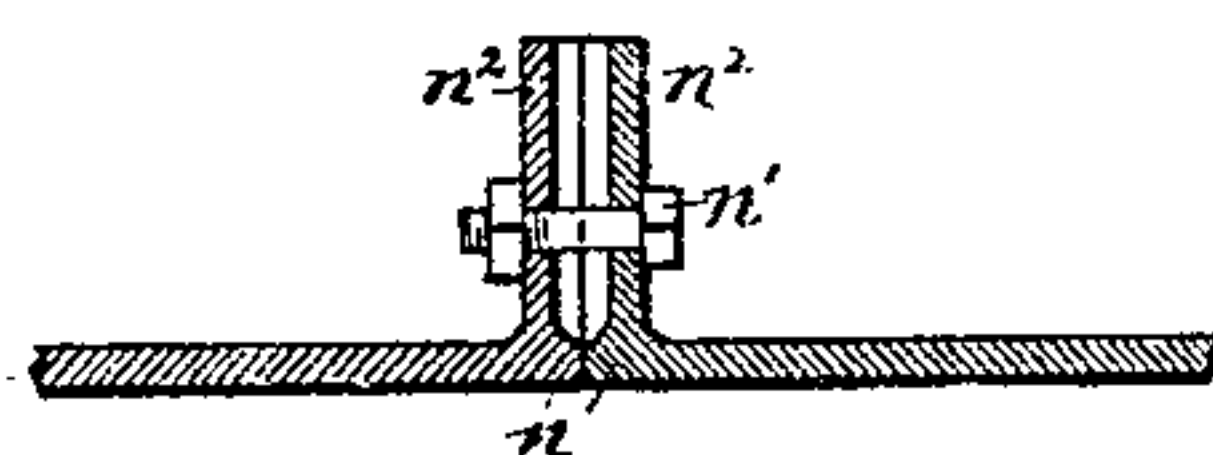


Fig: 11.



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UNITED STATES PATENT OFFICE.

NATHANIEL W. PRATT, OF BROOKLYN, ASSIGNOR TO THE BABCOCK & WILCOX COMPANY, OF NEW YORK, N. Y.

BOILER-FRONT.

SPECIFICATION forming part of Letters Patent No. 273,600, dated March 6, 1883.

Application filed July 27, 1882. (No model.)

To all whom it may concern:

Be it known that I, NATHANIEL W. PRATT, a citizen of the United States, residing at the city of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Boiler-Fronts; and I do hereby declare that the following is a full and exact description thereof.

My invention is more particularly intended for what are known as the "Babcock & Wilcox Water-Tube Boilers;" but some advantages thereof may be realized with other forms of steam-generators.

My objects are to facilitate the construction and the setting up of the parts to increase their durability, and also to facilitate repairs in case of fracture, or of other accidents to any of the parts. By a judicious dividing of the boiler-fronts into separate parts I am enabled to construct the fronts for steam-generating apparatus of widely-varying capacity with a relatively small number of patterns.

The accompanying drawings represent what I consider the best means of carrying out my invention.

Figure 1 is an elevation of a front for a Babcock & Wilcox boiler having only one steam-drum and one furnace. Fig. 2 is a longitudinal section thereof. Fig. 3 is an elevation of a front for a Babcock & Wilcox steam-generating apparatus containing six steam-drums with but three furnaces. The right-hand side of this figure shows certain parts removed. Figs. 1 to 3 are all on the same scale. Fig. 4 is a front elevation of a part corresponding to Fig. 3, the proportions of one part being changed, whereby the addition of certain pieces at the base is necessitated. This figure is on a larger scale than the preceding figures. The remaining figures represent details on a still larger scale, and will be hereinafter referred to. Fig. 5 is a horizontal section taken in the plane of one of the confining-bolts. Fig. 6 is a corresponding section in a parallel plane. Fig. 7 is a view of a portion of the back face of one of the parts. Fig. 8 is a horizontal section through a portion of the door-plate. Fig. 9 is a corresponding section through a portion of one of the doors. Fig. 10 is a vertical section. Fig. 11 is a horizontal section.

Similar letters of reference indicate corresponding parts in all the figures.

Referring to Figs. 1 and 2, A A are columns constituting the sides of the front and the corners.

B is the cornice or upper cross-beam, to which the upper ends of the columns A are bolted, as shown at *a*.

C is a stout cross-beam at about the level of the crown of the furnace.

The opening between the columns A A and the cornice B and cross-beam C is closed by means of a suitable door, D, which allows ready access to the front connections of the water-tubes, as will be readily understood. The part of the front below the cross-beam C and between the columns A A is formed by a door-piece, E, cast with the proper openings and faces for the fire-door and the ash-pit door or doors. Both the cross-beam C and the plate E are bolted to the columns A by bolts *c* and *e*, and the beam C and plate E are also connected by means of bolts *e'*. The parts C and E, but more particularly the part C, are exposed to a very intense heat. By making those parts in separate pieces I not only allow for the unequal expansion and contraction, which might result in breakage, but I am also enabled to make the part E comparatively light, while the beam C, which has to take up the greatest amount of strain, can be made quite heavy. Furthermore, the fact that the seats for the fire-doors and the ash-pit doors are cast in one piece with the door-piece E increases the resistance of the latter to warping; but in case the door-piece E should, notwithstanding this fact, crack under some extraordinary circumstances, the damage can be easily repaired by removing the door-piece E and inserting a new one instead, while, if the parts C and E were cast in one piece, the removal of such piece when damaged and the insertion of a new one would be attended with great difficulties, as is obvious on inspection of the drawings.

In order to produce a better aspect of the entire structure when completed, I propose to cover the joint between the beam C and piece E by means of a plate, F, which may carry the name or address of the builder or any other information for the public; or such plate F

may simply be provided with more or less elaborate artistic ornaments. This plate F offers, also, another advantage, inasmuch as by its use I avoid the necessity of making a good fit on the line of the joint between the beam C and plate E.

Referring to Fig. 3, it will be seen that I utilize in a great measure the parts as above described for composing the front of steam-generating apparatus having any desired number of steam-drums and furnaces. According to the construction illustrated in this figure, I employ one furnace with two fire-doors and two ash-pit doors (made in halves, if desired) for every pair of steam-drums and their respective water-tubes. The columns A A at the corners are the same as in the preceding figures. Between the furnaces I arrange columns A', the right and left sides of which are exactly correspondent to the inner sides of the corner columns, A. The columns A A' A' A are connected at the top by means of a cornice composed of three parts, B' B² B'. The parts B' B' are counterparts of each other, their outer ends being formed similar to the ends of the cornice B in Fig. 1. The inner ends of the parts B' B' and the ends of the part B² are cut off square, so as to be applied together, as shown, and to meet in the center lines of the columns A' A', to which they are bolted by means of bolts a'.

Between each pair of columns—as A A' or A' A'—extends a cross-beam, C', similar to but longer than the cross-beam C of Fig. 1, and the openings below said cross-beams C' are closed by means of two pieces, E E, exactly corresponding to the piece E in Fig. 1.

A small casting, Z, may be used to hold each pair of plates E together at the line of their joint, near the bottom.

The opening opposite the front connections between the water-tubes is in this case preferably closed by means of two doors, D' D', opening in opposite directions, and it will be noticed that one single pattern will suffice for both these doors, as the casting has simply to be turned upside down to change it from a right-hand to a left-hand door, and vice versa.

It will be seen from the foregoing that I can conveniently construct fronts of steam-generating apparatus of widely-varying capacities with only the following patterns: one right and one left hand corner column, A A, one middle column, A', one cornice, B, one right and one left hand cornice, B', one central cornice, B², two transverse beams, C and C', two doors, D and D', one piece, E, and one set of fire and ash-pit doors.

I will now describe certain details of construction by which I still further increase the facility of manufacture, fitting, and mounting of the parts.

All the various pieces are intended to be made of cast-iron, and at each joint between two pieces are made to overlap each other. The underlapping part of the back pieces—as the cornices at the joint with the columns, or

the latter and the cross-beam at the joint with the plate E—is formed with longitudinal lands *m m*, respectively, and the corresponding outer overlapping parts, or those presented to view, are internally formed with a sufficient number of transverse ridges or lands, *m' m'*. (See Fig. 4.) In this manner only few points of contact of small area are formed, and the work of fitting is reduced to simply chipping the short transverse lands until they apply upon the longitudinal lands in the proper places in such manner as to keep the parts in the desired relative positions when properly bolted up.

It is not necessary that the longitudinal lands run along the entire length of the joint, so long as they are presented opposite the transverse lands which are to apply against them, and particularly at the corners of the cornices B and B' I prefer to omit them for reasons of facility in casting, and to make those lands *m* in front and at the sides of short length only.

In order to prevent the necessity of forming a perfect corner between the surface of the interior land of each pair of longitudinal lands *m* and the adjacent forwardly-projecting metal, I produce a depression, *m²*, between these surfaces, as shown in Figs. 5 and 6. This feature also prevents roughness in casting in said corners under such conditions that the proper fit with the adjacent piece would be interfered with. The adjoining pieces are made with their edges beveled off on the back face, as shown at *m³* in Figs. 5, 6, and 7, so as to leave but a very narrow edge to be trimmed for securing a fit with the surface adjoining at a right angle, thus avoiding considerable loss of time in fitting.

The transverse lands *m'* are formed in pairs, and between each pair is formed a hole for the connecting-bolts *a c*, &c. The metal between each pair of such transverse lands is thickened, as shown at *m⁴* in Figs. 5, 6, and 7, whereby the strength of the casting around the bolt-holes is restored, and cracking at these places is effectually prevented.

The lugs G', forming the hinges of the several doors, are all cast together with the various parts respectively; but instead of casting them as solid lumps and then drilling the bolt-holes through the entire thickness, I cast them hollow or box-shaped—that is to say, with a depression cored into them from the rear side of the respective piece, as illustrated in Figs. 8 and 9. By this means every separate casting is made of more uniform thickness in all its parts, thus precluding undue warping while cooling, and the labor of drilling is greatly reduced, as there are only two relatively thin faces to be penetrated in every lug, instead of the entire depth thereof. This may be made the subject of a separate application for patent.

All the separate castings are properly strengthened by being cast with suitable ribs on their rear faces. This is particularly important at the places where the hollow lugs project forward to a considerable distance.

As above described, the use of one or more intermediate columns, A' , makes it desirable to use a cornice composed of two or more separate parts, the joint between these parts being placed in the center line of the columns A' . This joint is formed by simply chipping the end n of the fronts of the cornices off squarely and abutting them together. Then the bolts n' are inserted through holes formed in the ribs n^2 , which are formed at a short distance inward from the extreme ends of the fronts of the cornices, as shown in Figs. 4, 10, and 11, so that no fitting between the ribs is required.

The joints between each cornice and the center column are made overlapping, and are formed by the use of the chipping-strips, as above described. The combination of these two forms of joints is peculiarly important. If the overlapping joint were employed to connect the two cornices, the construction would involve so much labor as to render it impracticable. On the other hand, if the abutting-joint were used for connecting both the cornices with each other and with the column A' , the structure would not afford sufficient rigidity. The combination of these two forms of joints, however, as shown, offers great strength and stability of the parts, and at the same time reduces the labor of fitting to a minimum.

For burning various kinds of fuel it is desirable to construct the furnaces of various heights. I provide simple means for allowing this without necessitating a separate complete series of patterns. This is effected by simply having cross-beams C of various depths. The upper edge of the deeper cross-beam is always brought at the same level with reference to the column A or A' ; and in order to be able to use the same door-pieces for all the various heights of cross-beams, I simply raise the columns A or A' correspondingly and support them on suitable bases, A^2 , Fig. 4, of the proper height to admit the ordinary door-piece, E , the sides of the latter applying in this case both on the column A or A' and on the bases A^2 .

I claim as my invention—

1. In a boiler-front having lateral columns connected at the top by a cornice or upper cross-beam, a lower cross-beam, C , connecting the lateral columns at about the level of the crown of the furnace, in combination with said columns and with one or more door-pieces, E , closing the opening below the cross-beam, and formed with openings and faces for the fire and ash-pit doors, substantially as herein specified.

2. The combination of lateral columns A , one or more intermediate columns, A' , outer cornices, B' or B^2 , with or without one or more intermediate cornices, B^2 , two or more cross-beams, C , at a lower level, and a suitable number of door-pieces, E , all constructed and arranged to form the front of a steam-generating apparatus, substantially as herein specified.

3. In a boiler-front composed of several castings constructed to overlap each other at the joints, the combination of chipping-strips or lands, the surfaces of which are on all sides elevated over the adjacent metal on the line of the joint on one piece, with the pairs of transverse lands, having the metal between each pair thickened on the other piece, and with connecting-bolts passing one between each pair of the transverse lands, substantially as and for the purposes herein specified.

4. In a boiler-front composed of several castings constructed to overlap each other at the joints, the tapered edges of one piece adapted to be easily fitted by chipping to snugly apply against a corresponding face formed at an angle with the front surface of the other piece, in combination with the lands or chipping-strips, forming suitable bearings on the overlapping parts of both pieces, and with means for strongly securing the latter together, substantially as herein specified.

5. In a boiler-front composed of three or more upright columns, two or more cornices, and suitable door-pieces for closing the space between the columns, the combination of the two joints n or n' , m or m' , a^2 , the former between two cornices and the latter between the cornices and the column supporting the joined ends of the cornices, substantially as herein specified.

6. As a combination of pieces for composing boiler-fronts, the columns A or A' , cornices B , or B' or B^2 , door-pieces E , and bases A^2 , so as to allow the connection of the columns at about mid-height by means of cross-beams C of varying depths, substantially as herein specified.

In testimony whereof I have hereunto set my hand, at the city of New York, this 25th day of July, 1882, in the presence of two subscribing witnesses.

NAT. W. PRATT.

Witnesses:

A. H. GENTNER,
H. D. PERRINE.