

No. 742,146.

PATENTED OCT. 27, 1903.

O. L. BADGER.
WARM AIR FURNACE.

APPLICATION FILED JAN. 13, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

FIG. 1.

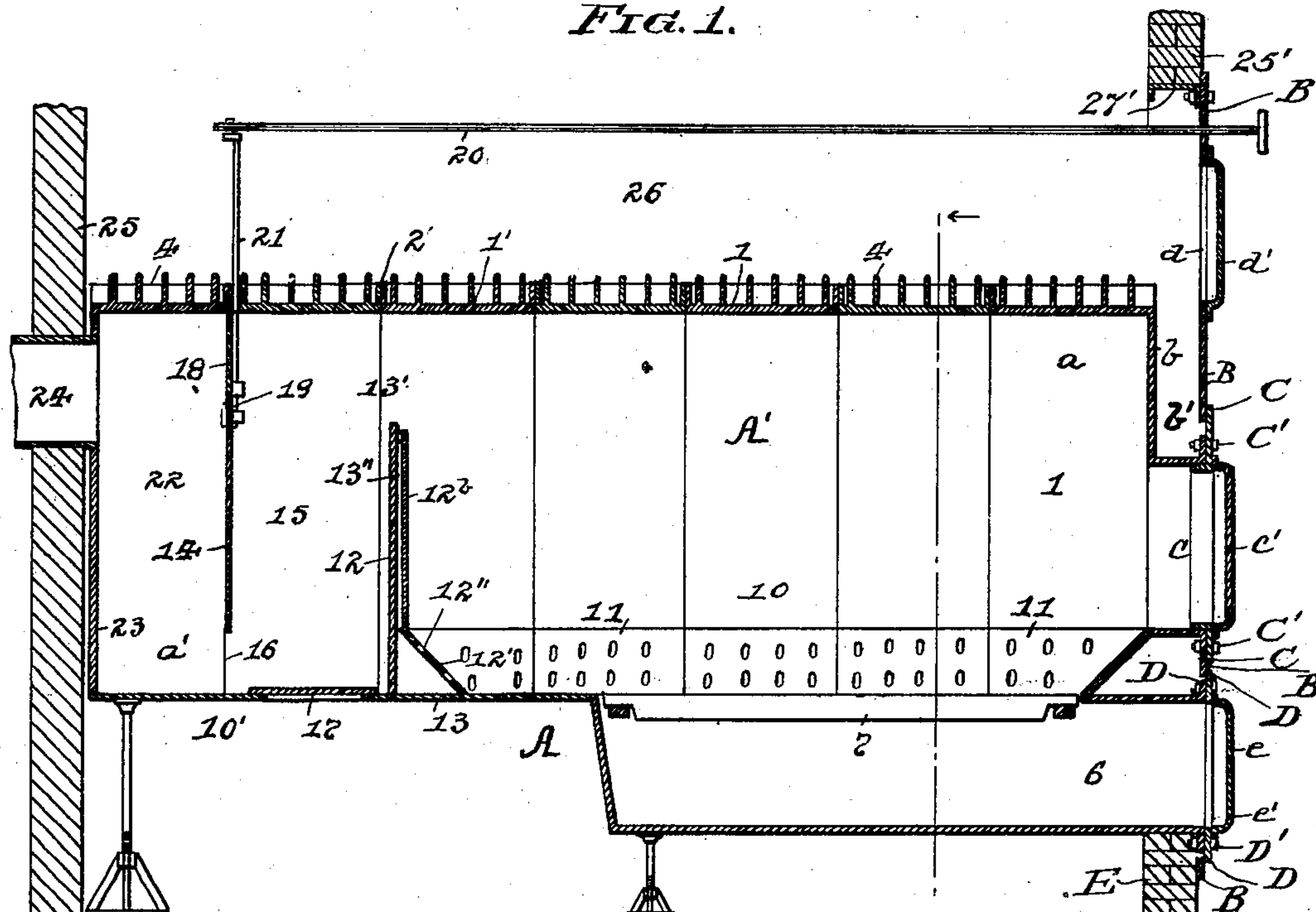


FIG. 3.

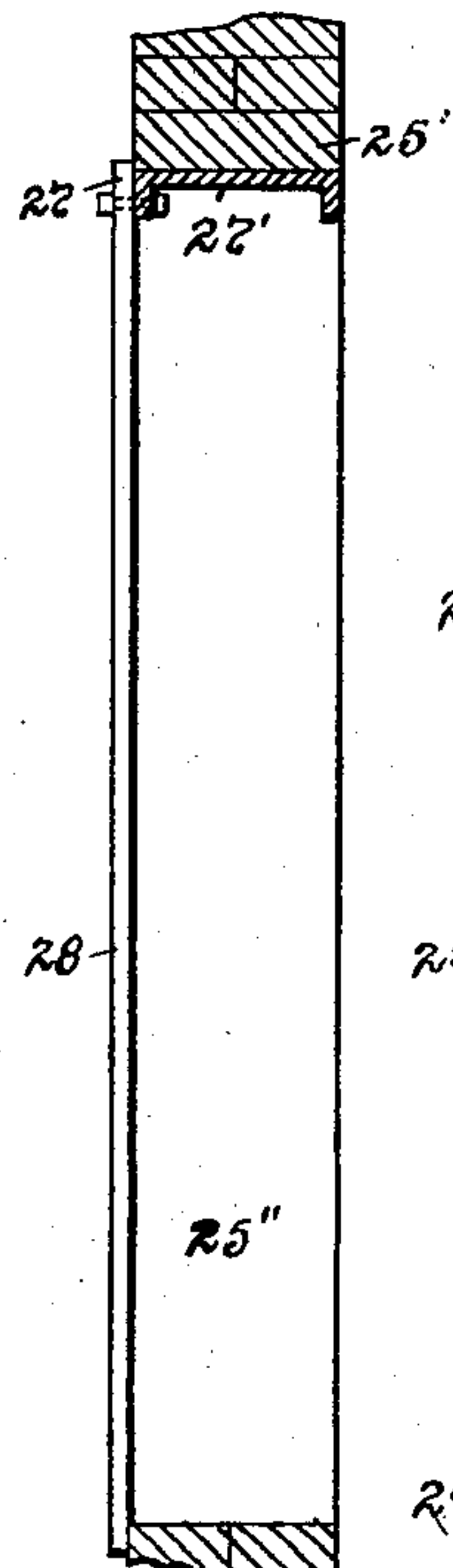
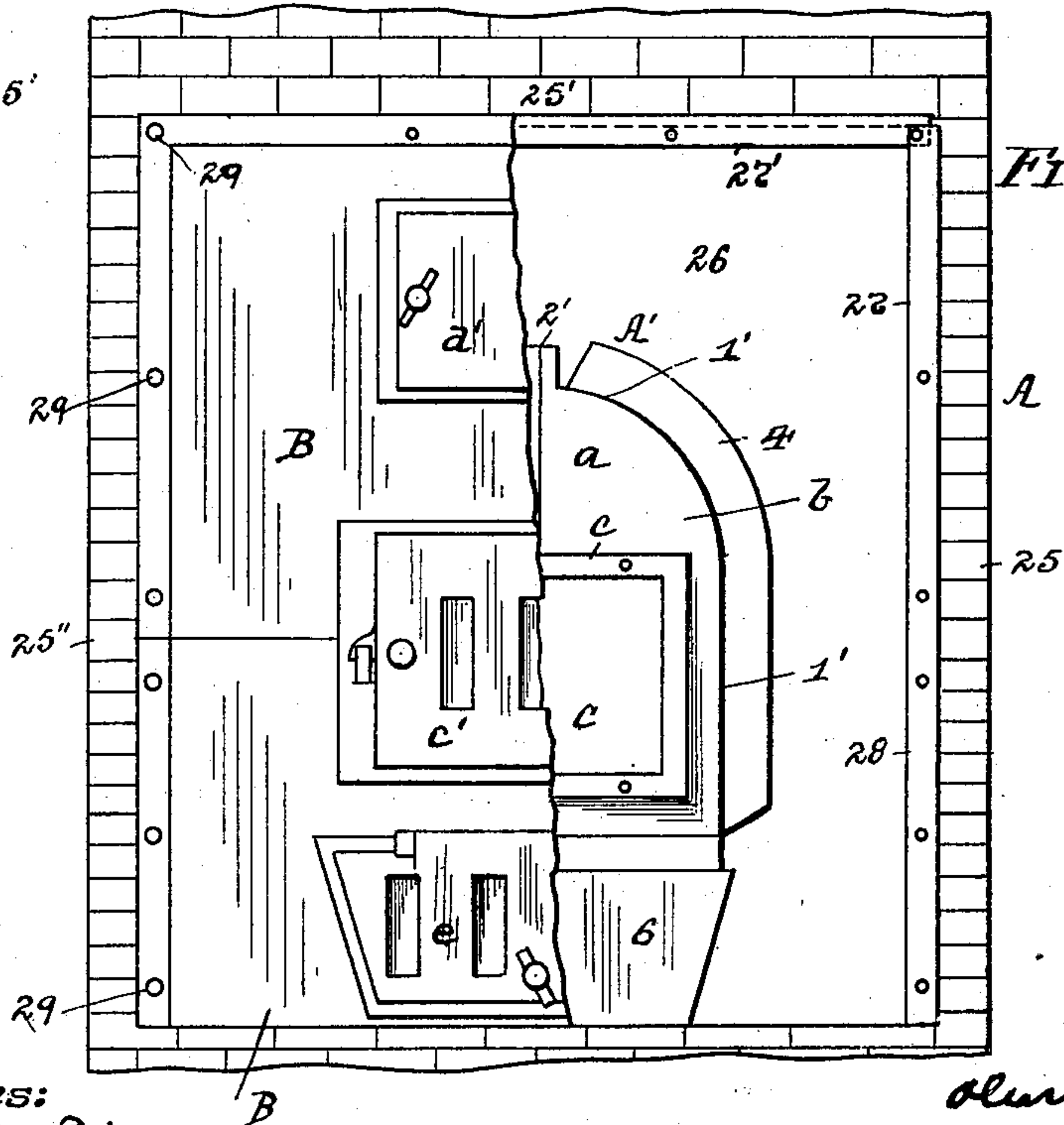


FIG. 2.



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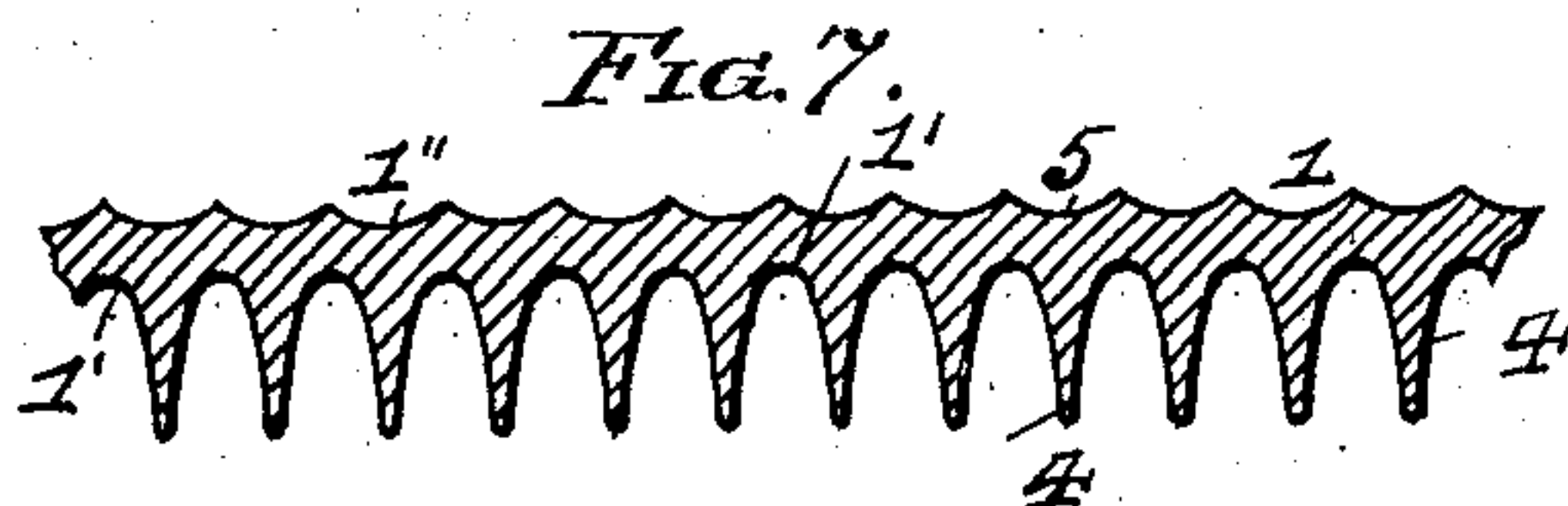
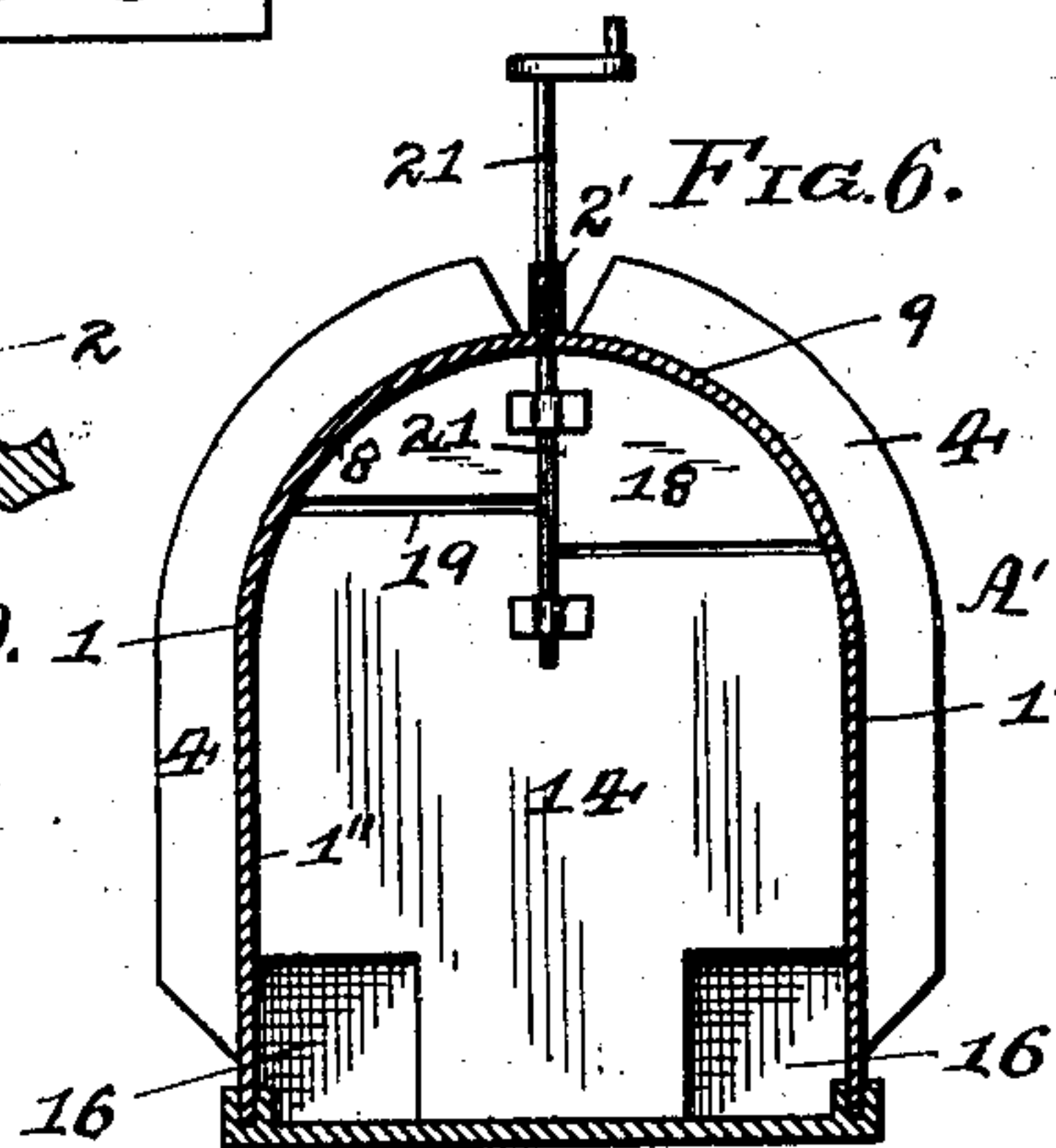
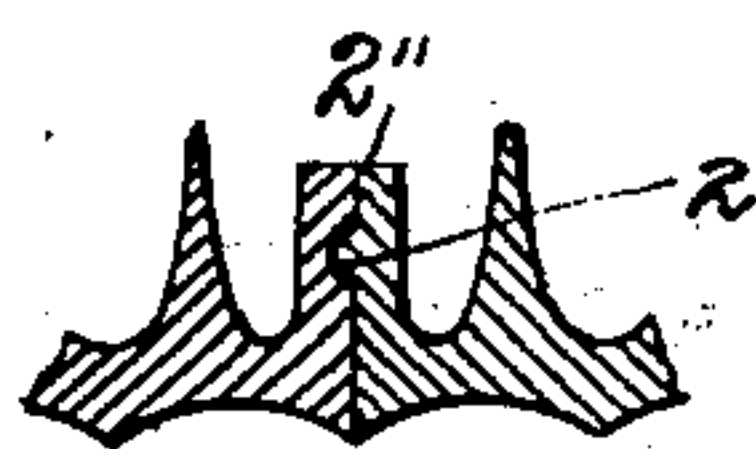
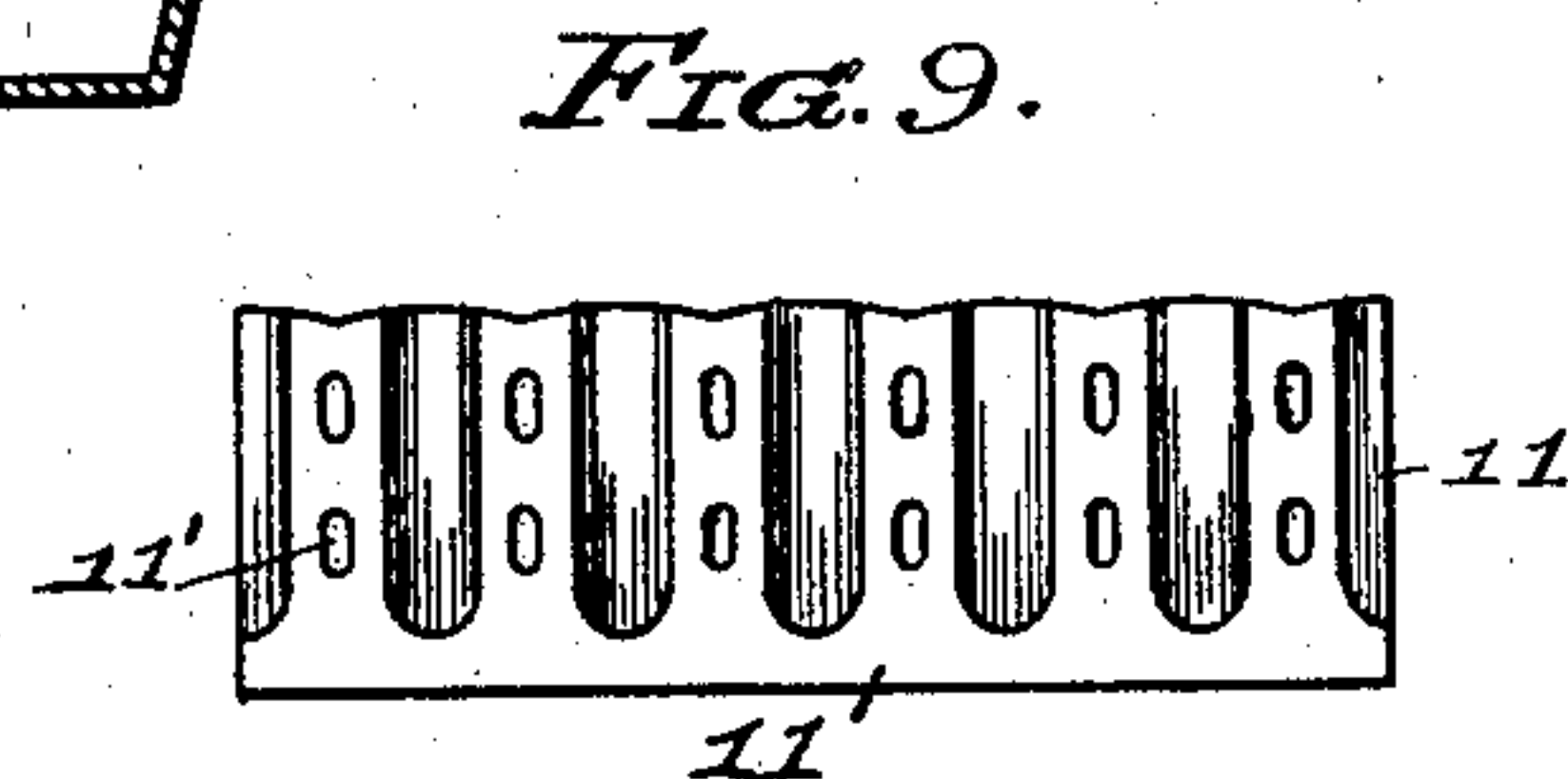
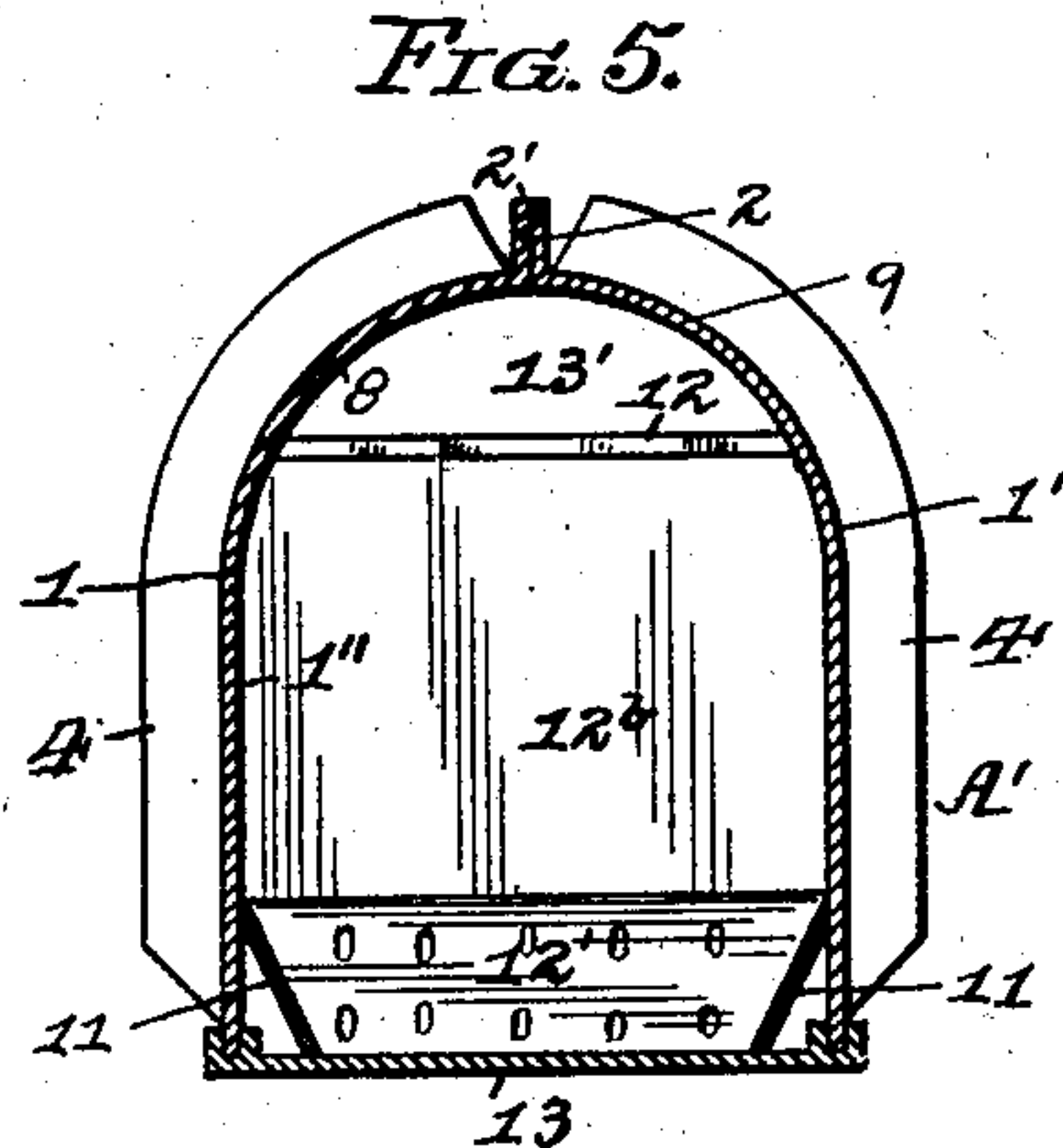
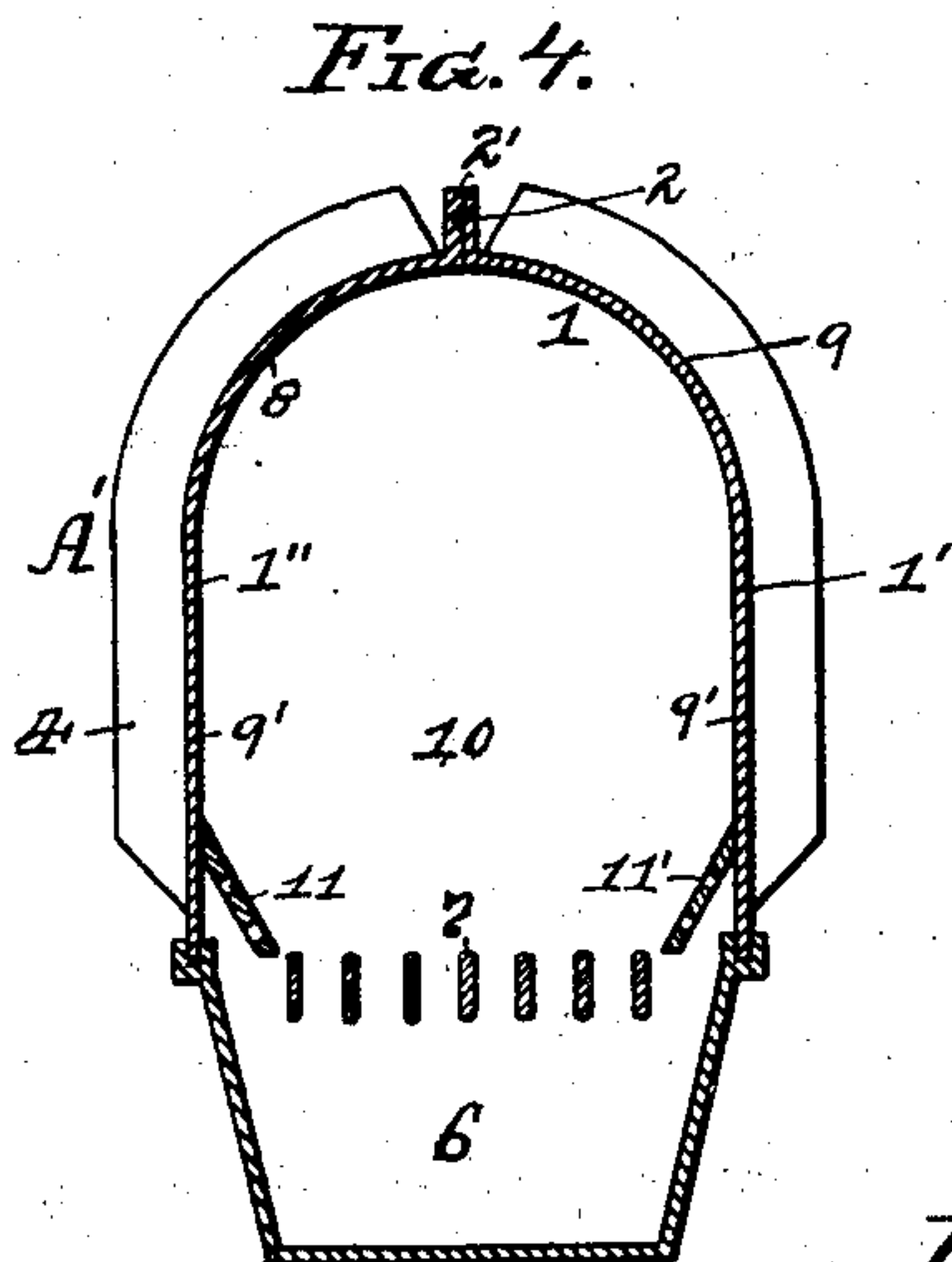
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NO MODEL.

2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

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WARM-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 742,146, dated October 27, 1903.

Application filed January 13, 1902. Serial No. 89,437. (No model.)

To all whom it may concern:

Be it known that I, OLIVER L. BADGER, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Warm-Air Furnaces; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to warm-air furnaces, and has special reference to that class of furnaces such as are used for heating school-houses, churches, court-houses, and other like large public buildings.

The main object of my invention is to do away with the back breeching in these horizontal furnaces and to cheapen and simplify the cost and construction of these furnaces, as well as provide such a furnace which will generate large quantities of warm air; and a further object of my invention is to form such a furnace which will more effectually convey the heat produced by the combustion of the fuel to the exterior of the furnace, and thereby more effectually utilize the fuel consumed.

My invention consists, generally stated, in the novel arrangement, construction, and combination of parts, as hereinafter more specifically set forth and described, and particularly pointed out in the claims.

To enable others skilled in the art to which my invention appertains to construct and use my improved warm-air furnace, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a longitudinal central section of my improved warm-air furnace. Fig. 2 is a front or face view of the same and showing a portion of the front wall removed. Fig. 3 is a cross-section of the furnace through the plates for supporting the front wall. Fig. 4 is a cross-section of the furnace through the ash-pan. Fig. 5 is a like view in front of the forward baffle-plate. Fig. 6 is a like view showing another form of draft-space in the rear baffle-plate. Fig. 7 is a cross-section of a portion of one of the plates used in forming the side walls of the furnace. Fig. 8 is a like view of another form of such plate. Fig. 9

is a view showing a portion of the lining.

Fig. 10 is a view of the joint for the plates.

Like characters herein indicate like parts in each of the figures of the drawings.

As illustrated in Fig. 1 of the drawings, the body A' of my improved warm-air furnace A is formed of a series of plates 1, which are joined together at their side edges 2' and top edges 2'' by means of the ordinary tongue-and-groove joint 2, which can, if desired, be held together by a series of bolts passing through the same. These plates 1 are provided on their exterior faces 1' with a series of wide flanges 4, which project out at right angles from the exterior faces 1', while the interior faces 1'' of said plates 1 are preferably corrugated, as shown at 5 in Fig. 7. The forward plate a is provided with the front plate b, formed as part thereof, on which is formed the fuel-chute c, which extends through the front plate B of the furnace, so as to form the space b' around the same, and is provided with the fuel-door c' thereon. A manhole d is formed in the front wall B, which can be covered by the door d', as shown in Fig. 1, and a draft-door e is placed on the wall B below the fuel-opening c, which covers the end of the opening e', leading to the ash-pan 6, formed below the plates 1, which rests upon the front wall E and within which pan 6 is the grate 7. The plates 1 are curved inwardly, as at 8, to form the arched top 9 over the fire-box 10, which is above the grate 7, and corrugated lining-plates 11, having perforations 11' therein, lead from the sides 9' of the plates 1 at an incline down to the grate 7. In the rear of the fire-box 10 is the extension 10', formed of like plates joined together and provided with flanges, as the body A', and having the deflecting or front baffle plate 12 therein, which extends up from the dead-plates 13, forming the bottom to the plates 1 in the rear of the ash-pan 6 and has the draft-space 13' formed above the same. Lining-plates 12', having perforations 12'' therein, also lead from the front of the baffle-plate 12 at an incline down to the dead-plates 13, and vertical lining-plates 12^b extend up from the plates 12' in

front of the baffle-plate 12, so as to form a space 13" between the same to protect said baffle-plate 12 from the heat. A rear deflecting or baffle plate 14 is formed back of the front baffle-plate 12, which acts to form the space 15 between these plates 12 and 14, and leading from this space 15 is the draft space or spaces 16, as shown in Fig. 6, formed under the rear baffle-plate 14. A clean-out door 17 is formed in the dead-plates 13 opposite the space 16, and a damper 18 is secured in the space 19 on top of the rear baffle-plate 14, which is operated by means of a damper-rod 20, passing through the front plate B and connected by a bent rod 21 on the damper 18. In the rear of the rear damper-plate 14 is the space 22, formed by said plate 14 and the rear wall 23 on the rear plate *a'* of the side plates 1, and from the upper end of this wall 23 a smoke-flue 24 leads through the wall or casing 25 to the stack or chimney. The wall or casing 25, generally formed of brick, surrounds the furnace A, so as to form the chamber 26 for the accumulation of warm air radiated from the furnace A, and from this chamber 26 hot-air pipes lead through the wall or casing 25 to the different rooms or apartments to be heated. The front plate B, carrying the doors *c'*, *d'*, and *e*, is supported independently of the furnace-body A' and is connected by bolts 29 to a metal frame 27, formed of a lintel or plate 27', secured under the top wall 25' of the casing 25, and posts or plates 28, extending down and secured to the side walls 25" of the casing 25, while the fuel-chute *c* is provided with the fuel-door frame C, rigidly bolted by the bolts C' thereto, and the ash-pan door-frame D, rigidly bolted by bolts D' thereto, so that said plate B can be easily and quickly removed when desired.

The use and operation of my improved warm-air furnace are as follows: The fuel is fed into the fire-box 10 through the fuel-chute *c* onto the grate 7, and fire being applied to such fuel in the fire-box 10 will enable the products of combustion to pass therefrom through the said fire-box 10 and strike the front baffle-plate 12, after which these products will pass through the draft-space 13' over the plate 12, down through the space 15, through the draft-space 16, under the rear baffle-plate 14, up through the space 22, and out through the smoke-flue 24 to the chimney or stack. The waste heat and products of combustion generated by the fuel in the fire-box 10 in thus passing through the said fire-box to the stack or chimney will come in contact with the body A' of the furnace A formed by the side plates 1 and in striking the interior faces 1" of said plates 1 will heat these plates so that the heat therefrom will be radiated through them and the flanges 4 on the exterior faces 1' thereof and cause hot air to be generated thereby, which will accumulate in the chamber 26, formed by the furnace A and casing 25, so that the same can be car-

ried off therefrom by hot-air pipes communicating with such chamber 26 and leading to the different rooms or apartments in the building to be heated.

By the arrangement of baffle-plates 12 and 14 at the rear of the furnace A the heat is brought more effectually into contact with the side walls or plates 1 of the furnace-body A', while a number of such baffle-plates can be used, if desired, so that more heat is radiated by said body portion A, and the flanges 4 are also more effectually heated, which adds very materially to the heat-radiating surface of the furnace. In the use of the inclined lining-plates 11 the mass of coked fuel can be shoved over against the sides 9' of the plates 1 from the grate 7 and new fuel added to this coked fuel over the grate 7, so that the heat will strike all points on the interior faces 1" of the plates 1, and these inclined lining-plates will tend to throw the ashes away from the side walls, as well as admit air through the perforations 11' in the same to the fuel in the fire-box 10 at a higher point than the grate 7.

In Fig. 7 the plates 1 are shown as having their interior faces 1" corrugated, as at 5, and in Fig. 8 such plates are shown with a straight interior face 30, while, if desired, the dead-plates 13 can be removed from the extension 10' and the baffle-plates 12 and 14 moved forward, so that the front baffle-plate 12 occupies a position directly at the rear of the ash-pan 6 and grate 7. These and other various modifications in the construction and design of the various parts may be resorted to without departing from the spirit of the invention or sacrificing any of its advantages.

It will thus be seen that my improved warm-air furnace provides a simpler construction than the ordinary class of these furnaces and has less joints for the space occupied or size of furnace and amount of radiating-surface. It will also be evident that it provides more radiating-surface for the same grate-surface and size of furnace than the ordinary furnace of this kind, as well as better draft on account of the air moving through the furnace with less friction, and a greater temperature will be obtained to the radiating-surface on the rear portion of said furnace on account of the air being allowed to impinge against the sides in passing through the furnace. There is also less liability of cracking joints by expansion and contraction on account of the front being separate and bolted to posts instead of to body portion of furnace, as in ordinary cases, and such furnace can be easily repaired, since the front can be taken down independent of the body of furnace and casing and room obtained to repair sides without tearing the whole casing and furnace to pieces.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A furnace-body composed of a series of sections, an extension on said body beyond

the fire-box therein, a vertical front baffle-plate within said extension having a draft-opening through the same, and a vertical rear baffle-plate within said extension having draft-spaces at the sides thereof.

2. A furnace-body composed of a series of sections, an extension on said body beyond the fire-box therein, a vertical front baffle-plate within said extension having a draft-space beyond the top thereof, and a vertical rear baffle-plate within said extension having draft-spaces at the sides thereof.

3. A furnace-body composed of a series of sections, an extension on said body beyond the fire-box therein, a vertical front baffle-plate within said extension having a draft-space beyond the top thereof, a vertical rear baffle-plate within said extension having draft-spaces at the sides thereof, and a damper engaging with and opening in the top of the rear baffle-plate.

4. A furnace-body composed of a series of sections, each having one or more flanges extending out from the exterior face thereof, an extension on said body beyond the fire-box therein, a vertical front baffle-plate within said extension having a draft-space beyond the same, and a vertical rear baffle-plate within said extension having draft-spaces at the sides thereof.

5. A furnace-body composed of a series of sections each having one or more flanges extending out from the exterior face thereof, an extension on said body beyond the fire-box, a vertical front baffle-plate within said extension having a draft-space beyond the top thereof, and a vertical rear baffle-plate within said extension having draft-spaces at the sides thereof.

6. A furnace-body composed of a series of sections, each having one or more flanges extending out from the exterior face thereof, an extension on said body beyond the fire-box therein, a vertical front baffle-plate within said extension having a draft-space beyond the top thereof, a vertical rear baffle-plate within said extension having draft-spaces at the sides thereof, and a damper engaging with and opening in the top of the rear baffle-plate.

7. A furnace-body composed of a series of sections, each having one or more flanges extending out from the exterior face thereof, an extension on said body beyond the fire-box therein composed of a series of sections, each having one or more flanges extending out from the exterior face thereof, a vertical front baffle-plate within said extension having a draft-space beyond the same, and a vertical rear baffle-plate within said extension having draft-spaces at the sides thereof.

8. A furnace-body composed of a series of sections, each having one or more flanges extending out from the exterior face thereof, an extension on said body beyond the fire-box therein composed of a series of sections, each having one or more flanges extending out

from the exterior face thereof, a vertical front baffle-plate within said extension having a draft-space beyond the top thereof, and a vertical rear baffle-plate within said extension having draft-spaces at the sides thereof.

9. A furnace-body composed of a series of sections, each having one or more flanges extending out from the exterior face thereof, an extension on said body beyond the fire-box therein composed of a series of sections each having one or more flanges extending out from the exterior face thereof, a vertical front baffle-plate within said extension having a draft-space beyond the top thereof, a vertical rear baffle-plate within said extension having draft-spaces at the sides thereof, and a damper engaging with and opening in the top of the rear baffle-plate.

10. The combination of a furnace-body composed of a series of sections, a casing around said body, a metal frame on said casing, and a front-wall plate adapted to be detachably supported by said frame and independently of the body of the furnace.

11. The combination of a furnace-body composed of a series of sections, a casing around said body, plates on said casing, and a front-wall plate adapted to be detachably secured to said plates and be supported independently of the body of the furnace.

12. The combination of a furnace-body composed of a series of sections, a casing around said body and provided with an opening therein, a metal frame fitting around the said opening, and a front-wall plate adapted to fit over said opening and be supported by said frame independently of the furnace-body.

13. The combination of a furnace-body composed of a series of sections, a casing around said body and provided with an opening therein, plates around said opening, and a front-wall plate adapted to fit over said opening and be secured to said plates so as to be supported independently of the furnace-body.

14. The combination of a furnace-body formed of a series of sections, the front section of which being provided with a projecting portion on the front wall thereof to form a fuel-opening, and a front-wall plate adapted to fit around said projecting portion and be supported independently of the furnace-body, said front-wall plate and front-section wall being adapted to form an air-space between them.

15. The combination of a furnace-body formed of a series of sections, the front section of which being provided with a projecting portion on the front wall thereof to form a fuel-opening, a casing around said body, and a front-wall plate adapted to fit around said projecting portion and be supported by said casing independently of the said body, said front-wall plate and front-section wall being adapted to form an air-space between them within the casing.

16. The combination of a furnace, formed of a series of sections, the front section of which being provided with a projecting portion on the front wall thereof to form a fuel-
 5 opening, a casing around said body, plates on said casing, and a front-wall plate adapted to fit around said projecting portion and be secured to said plates so as to be independent of said body, said front-wall plate and front-
 10 section wall being adapted to form an air-space between them within the casing.

17. The combination of a furnace-body formed of a series of sections, the front section of which being provided with a projecting portion on the front wall thereof to form a fuel-
 15 opening, a casing around said body and provided with an opening therein, and a front-wall plate adapted to fit around said projecting portion and over said casing-opening, said
 20 front-wall plate being supported by said casing independently of the furnace-body and form an air-space between said plate and the front-section wall within said casing.

18. The combination of a furnace-body
 25 formed of a series of sections, the front section of which being provided with a projecting portion on the front wall thereof to form a fuel-opening, a casing around said body and provided with an opening therein, plates around
 30 said opening in the casing, and a front-wall plate adapted to fit around said projecting portion and over said casing-opening, said front-wall plate being secured to said plates so as to be supported independently of the
 35 furnace-body and being adapted to form an air-space between said plate and front-section wall within said casing.

19. A furnace-body composed of a series of sections having flanges extending out from
 40 the exterior surface thereof, an extension composed of a series of sections on said body beyond the fire-box and provided with flanges extending out from the exterior surface thereof, baffle-plates within said extension, and a
 45 perforated lining extending up in front of the front baffle-plate.

20. A furnace-body composed of a series of sections having flanges extending out from the exterior surface thereof, an extension com-
 50 posed of a series of sections on said body beyond the fire-box therein and provided with flanges extending out from the exterior surface thereof, baffle-plates within said extension, and a perforated inclined lining extending up to and in front of the front baffle-plate.
 55

21. A furnace-body composed of a series of sections having flanges extending out from the exterior surface thereof, an extension composed of a series of sections on said body be-
 60 yond the fire-box therein and provided with flanges extending out from the exterior surface thereof, baffle-plates within said extension, and a perforated lining extending up in

front of the front baffle-plate and adapted to form a space between the same. 65

22. A furnace-body composed of a series of sections having flanges extending out from the exterior surface thereof, an extension composed of a series of sections on said body be-
 70 yond the fire-box therein and provided with flanges extending out from the exterior surface thereof, baffle-plates within said extension, a perforated inclined lining extending to and in front of the front baffle-plate, and a lining above said inclined lining extending
 75 up in front of the front baffle-plate and adapted to form a space between said lining and plate.

23. A furnace-body composed of a series of sections, each having one or more flanges ex-
 80 tending out from the exterior face thereof, an extension composed of a series of sections on said body beyond the fire-box therein and provided with flanges extending out from the exterior surface thereof, baffle-plates within
 85 said extension, and a perforated lining extending up in front of the front baffle-plate.

24. A furnace-body composed of a series of sections, each having one or more flanges ex-
 90 tending out from the exterior face thereof, an extension composed of a series of sections on said body beyond the fire-box therein and provided with flanges extending out from the exterior surface thereof, baffle-plates within
 95 said extension, and a perforated inclined lining extending up to and in front of the front baffle-plate.

25. A furnace-body composed of a series of sections each having one or more flanges ex-
 100 tending out from the exterior face thereof, an extension composed of a series of sections on said body beyond the fire-box therein and provided with flanges extending out from the exterior surface thereof, baffle-plates within
 105 said extension, and a perforated lining extending up in front of the front baffle-plate and adapted to form a space between the same.

26. A furnace-body composed of a series of sections, each having one or more flanges ex-
 110 tending out from the exterior face thereof, an extension composed of a series of sections on said body beyond the fire-box therein and provided with flanges extending out from the exterior surface thereof, baffle-plates within
 115 said extension, a perforated inclined lining extending to and in front of the front baffle-plate, and a lining above said inclined lining extending up in front of the front baffle-plate and adapted to form a space between said lin-
 120 ing and plate.

In testimony whereof I, the said OLIVER L. BADGER, have hereunto set my hand.

OLIVER L. BADGER.

Witnesses:

J. L. TREFALLER, Jr.,

J. N. COOKE.