

No. 667,445.

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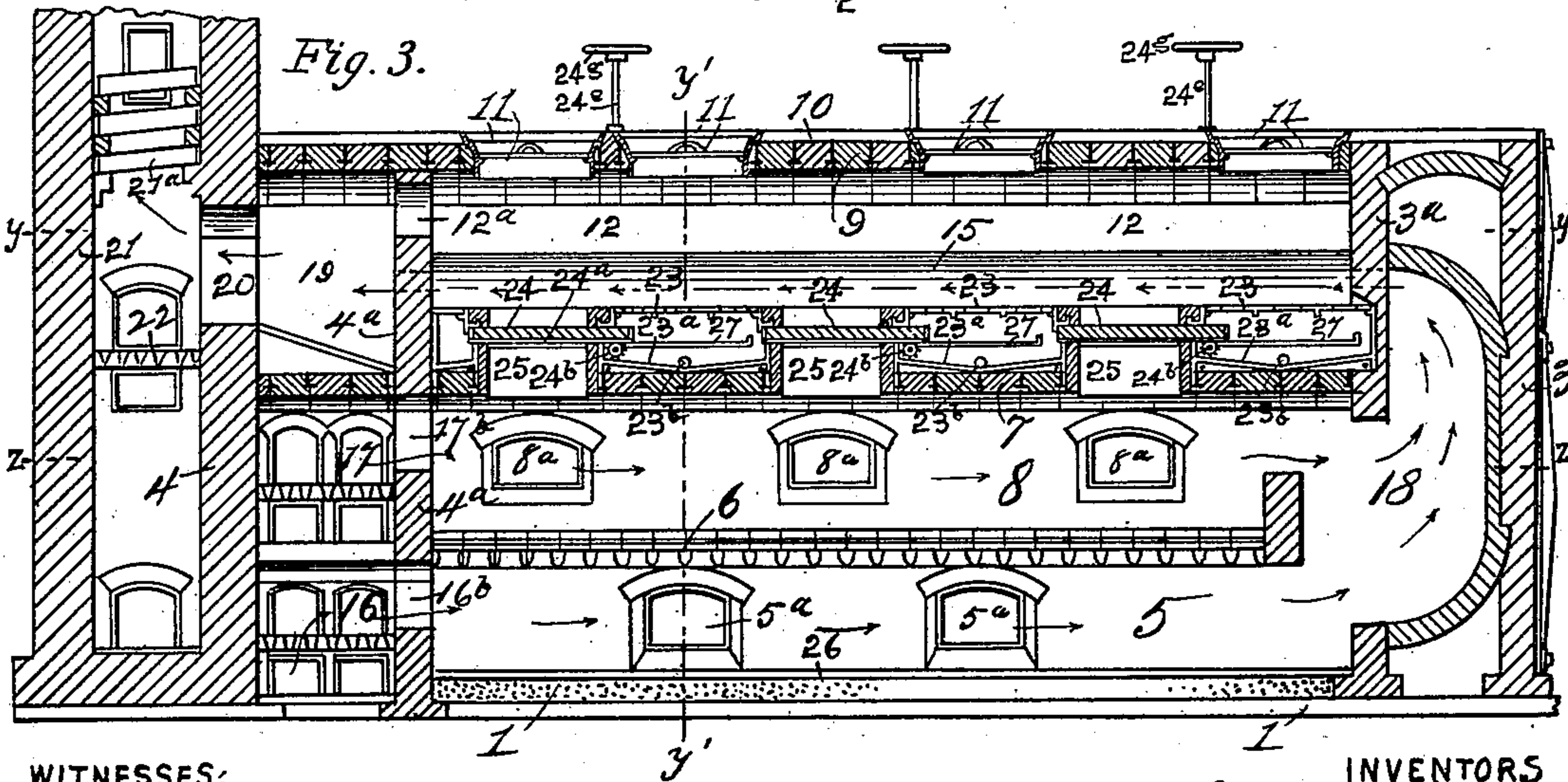
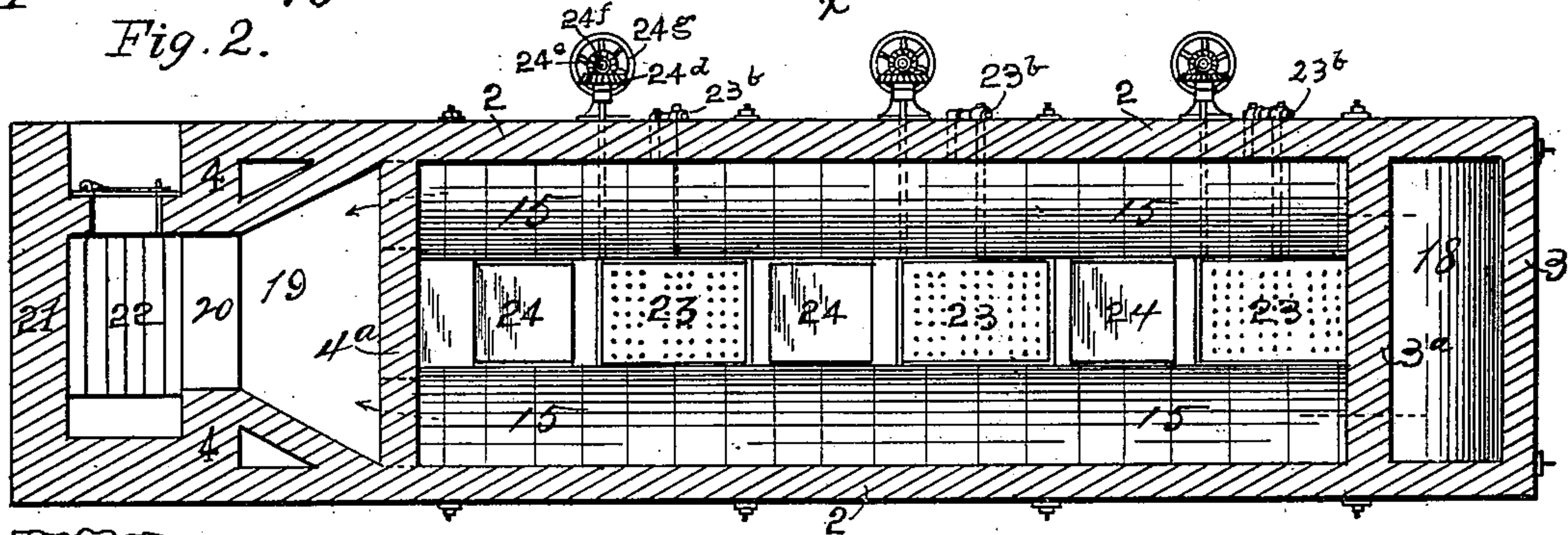
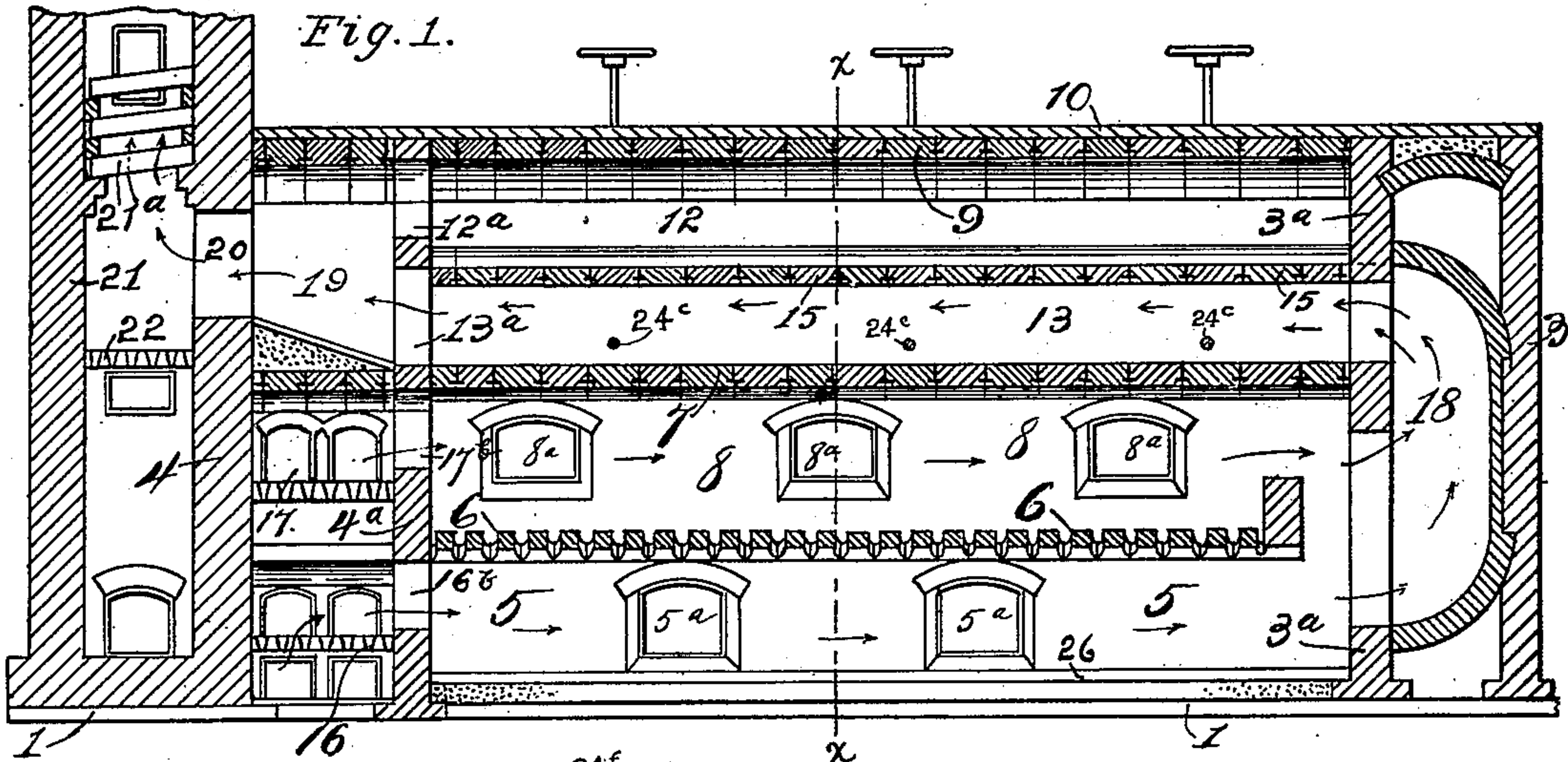
E. J. LITTLE, D. C. SHAW & G. H. BREYMAN.

GARBAGE FURNACE OR CREMATORY.

(Application filed June 15, 1899.)

(No Model.)

2 Sheets—Sheet 1.



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2 Sheets—Sheet 2.

Fig. 4.

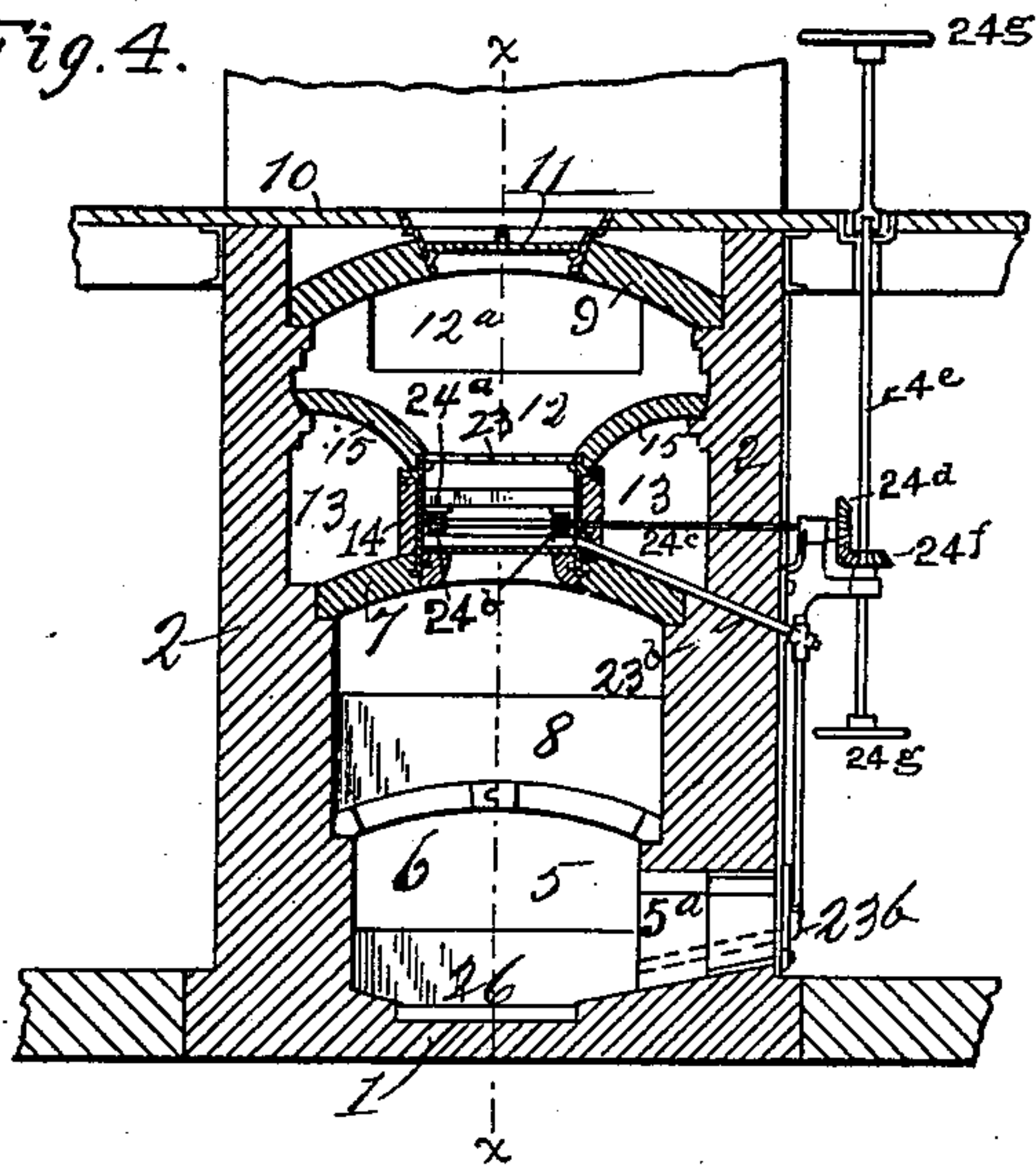


Fig. 5.

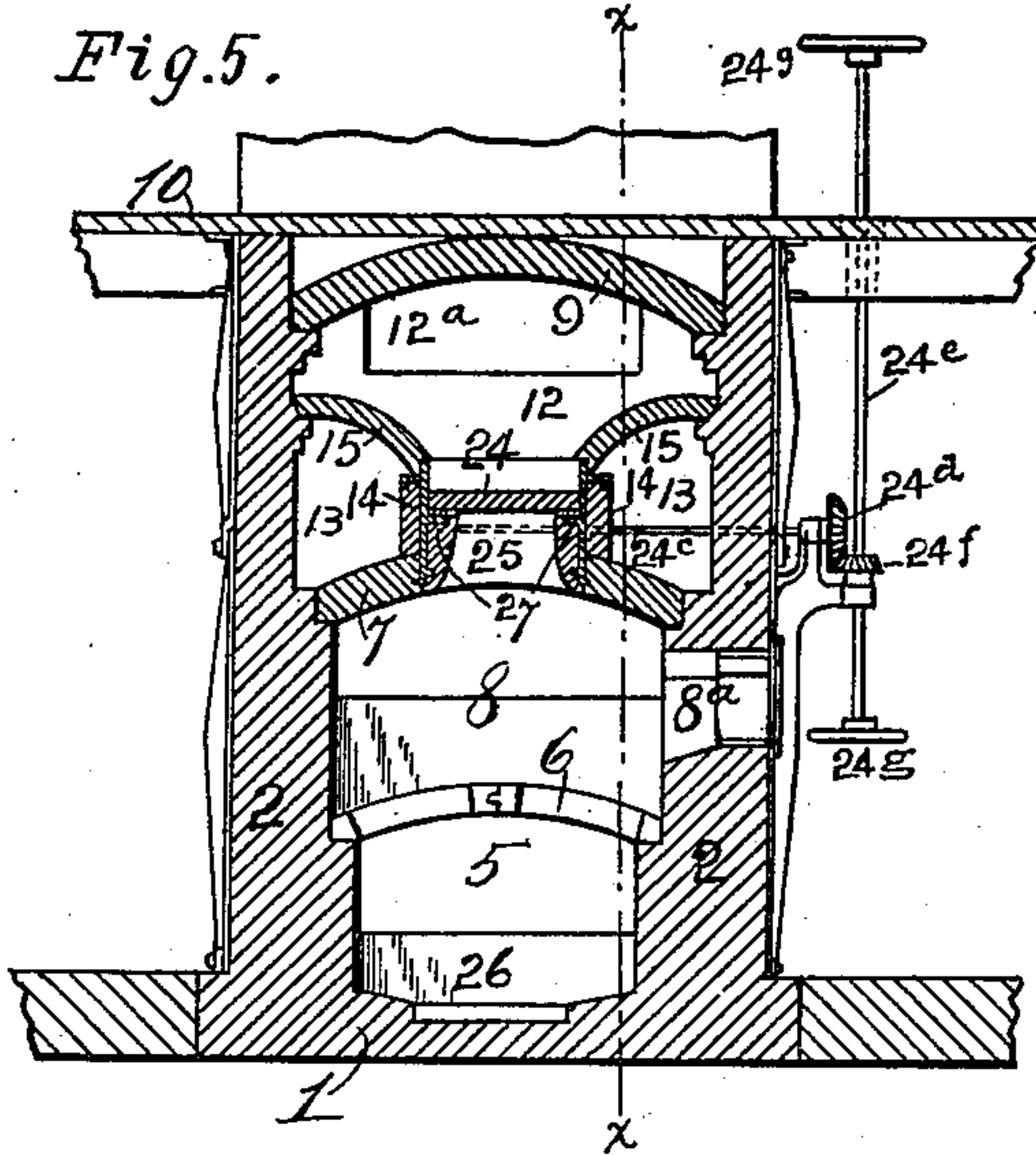


Fig. 6.

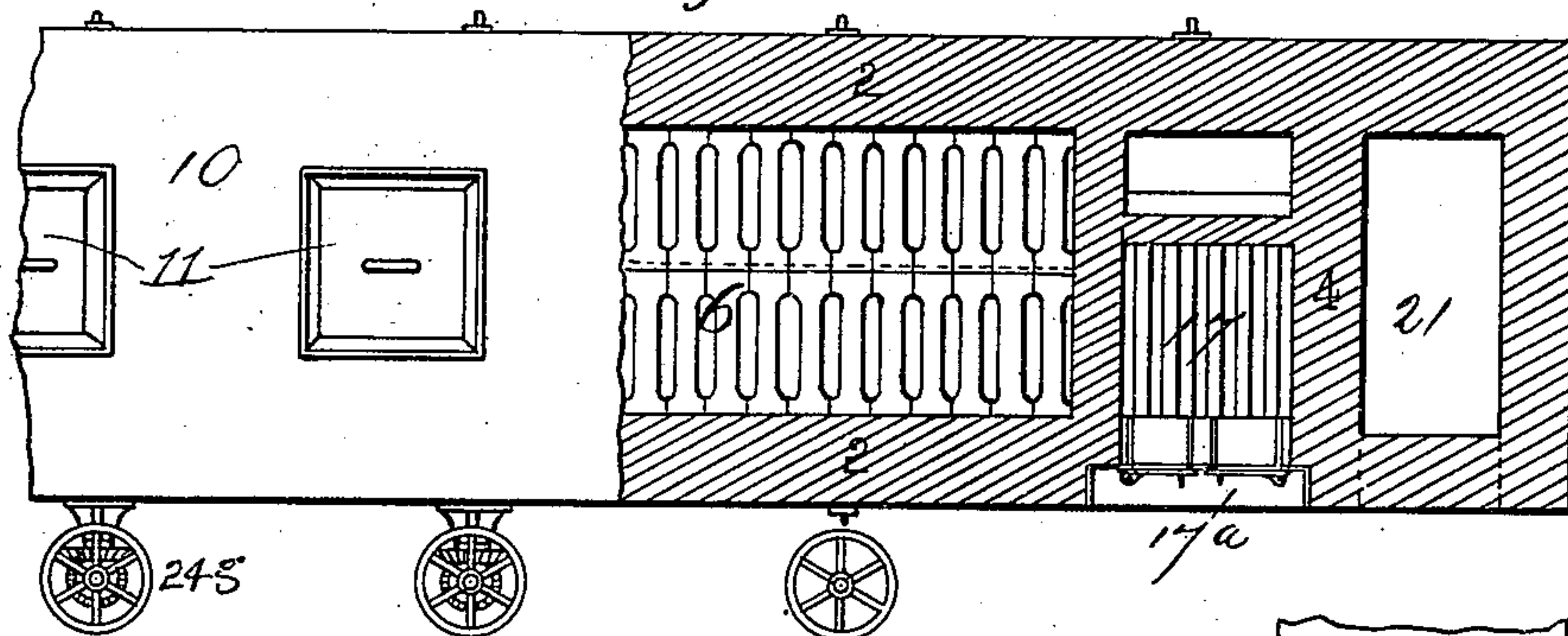
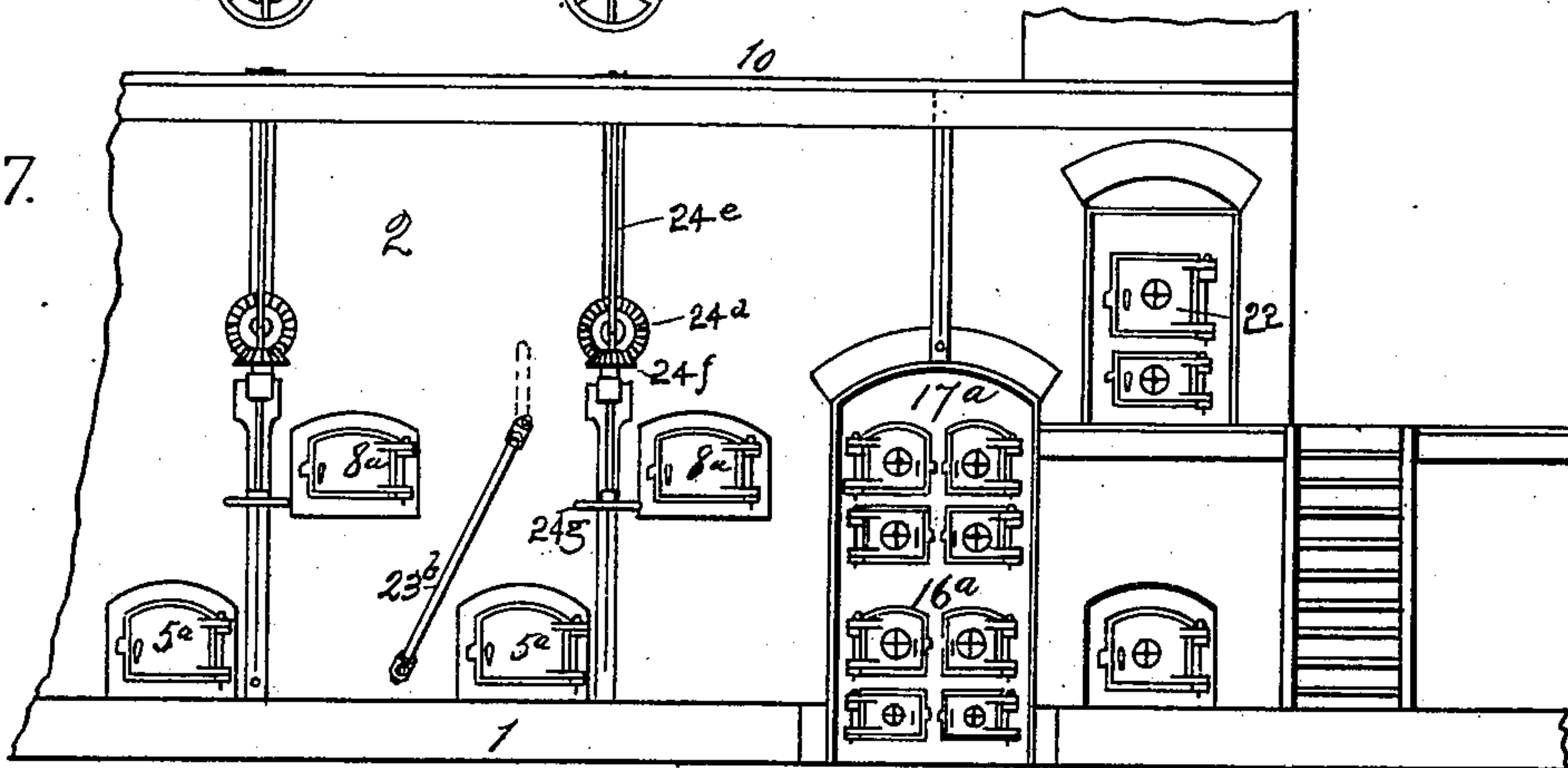


Fig. 7.



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# UNITED STATES PATENT OFFICE.

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## GARBAGE FURNACE OR CREMATORY.

SPECIFICATION forming part of Letters Patent No. 667,445, dated February 5, 1901.

Application filed June 15, 1899. Serial No. 720,613. (No model.)

*To all whom it may concern:*

Be it known that we, EUGENE J. LITTLE, DANIEL C. SHAW, and GEORGE H. BREYMAN, citizens of the United States, residing at Toledo, Lucas county, Ohio, have invented certain new and useful Improvements in Garbage Furnaces or Crematories, of which the following is a specification.

Our invention relates to that class of incinerating-furnaces which is employed for the reduction of garbage, refuse, dead animals, night-soil, and the like; and one object is to provide a simple, compact, and efficient means for the complete and economical combustion of such substances and for the deodorization of the gases and products of combustion in such manner that the receiving, the storing, and the drying of the garbage shall be entirely sanitary.

The further objects of our invention are to provide means for drying the garbage to be burned, so that the garbage will itself serve as fuel for its own exaporation and reduction, for the rapid evaporation of water and other fluids, and for feeding to the furnaces at such points and in such quantities as may be desired the dried or partly-dried substances to be consumed.

Another object of our invention is to furnish, in connection with the crematory, a drying-chamber which may, whenever desired, be utilized as a combustion-chamber and which will also serve for the sanitary storage of garbage and the like until the same can be conveniently cremated.

A further object of our invention is to provide a construction by which the separate or supplemental furnaces hereinafter referred to may all be fired or stoked from practically the same point, thus minimizing the labor of stoking.

We attain these objects by means of the devices, construction, and arrangement of parts hereinafter described, and shown and illustrated in the accompanying drawings, made part hereof, in which—

Figure 1 is a vertical longitudinal section of our furnace, taken on line  $xx$ , Fig. 5; Fig. 2, a top plan view of the same on line  $yy$ , Fig. 3; Fig. 3, a vertical longitudinal section on line  $xx$ , Fig. 4; Fig. 4, a vertical trans-

verse section on line  $y'y'$ , Fig. 3; Fig. 5, a vertical tranverse section on line  $xx$ , Fig. 1; Fig. 6, a top plan view of a portion of our device, partly in horizontal section, on line  $zz$ , Fig. 3; and Fig. 7, a side elevation of one end of our crematory seen from the point of view opposite that of Figs. 1 and 2.

Like numerals of reference indicate like parts throughout the drawings.

In the drawings, 1 is the base or bed of the furnace; 2 2, the elongated vertical side walls thereof; 3, the front end wall, and 4 the rear end wall. Above the bed or base 1 is a longitudinal flue or passage 5. Above the passage 5 are transversely disposed the bars of the grate 6. Above the grate is the arched roof 7 of the fire-box, which arch springs from and is supported upon the side walls, as illustrated in Figs. 4 and 5. Between the grate 6 and the arch 7 is a longitudinal combustion-chamber 8.

9 is an arch, of fire-brick, springing from and extending between the two side walls, as illustrated in Figs. 4 and 5, there being a considerable distance between the two arches 7 and 9. Above the arch 9 is the upper floor 10 of our crematory, so arranged that carts and wagons may, if desired, be driven thereon and having therein a series of trap-doors 11, which extend through the arch 9. These trap-doors are preferably double to prevent the escape of gases and are of any suitable number. These trap-doors are arranged at convenient intervals along the length of the furnace and are designed to permit the introduction of garbage, &c., into the chamber 12 just beneath the arch 9. Above the arch 7 and supported thereby are two flues 13, one at either side of the furnace and running the length thereof. These flues have for their bottom the arch 7, for their outer sides the side walls 2, for their inner sides upright pieces or walls 14, and for their top the short arches or inclined walls 15, supported by the side walls and the uprights 14 and forming part of the floor or bottom of the chamber 12.

4<sup>a</sup> is a cross-wall near the end wall 4, and between these two walls are supplemental furnaces 16 and 17, which may be fed through furnace-doors 16<sup>a</sup> and 17<sup>a</sup> in the side wall. From the fire-box of furnace 16 leads an ap-



erture 16<sup>b</sup> into passage 5 beneath the grate-bars 6. From the fire-box of the furnace 17 leads an opening 17<sup>b</sup> into the chamber 8 above the grate-bars 6. It will be seen that the flame and hot gases from furnace 16 pass beneath the grate-bars and that from the furnace 17 they pass above the grate-bars longitudinally the length of the furnace. At the forward end of the grate 6 the two passages 5 and 8 unite in a common passage 18, which leads upwardly between the end wall 3 and the adjacent cross-wall 3<sup>a</sup> into the open ends of the flues 13, which at their front end are open and connected directly with the passage 18. Inclosed by end wall 4, cross-wall 4<sup>a</sup>, arch 7, and arch 9 is a chamber 19, into which lead the two flues 13 through openings 13<sup>a</sup> in the cross-wall. There is also an opening 12<sup>a</sup> through said cross-wall between the chamber 12 and chamber 19. From the chamber 19 leads an opening, flue, or conduit 20 into the stack or chimney 21.

In the stack below the opening 20 is a furnace 22, and above the opening the shaft is provided with a series of fire bricks or bars 21<sup>a</sup> or pieces of some refractory material, this arrangement being designed for the combustion or conversion and deodorizing of gases in their final passage from the furnace.

Between the two flues 13 is a floor for the drying-chamber 12, consisting of alternate perforated plates 23 and horizontally-sliding doors 24. A series of openings 25 communicate between the drying-chamber 12 and the combustion-chamber 8, and in these passages the doors 24 are arranged. Beneath the trap-doors 24 are fixed horizontal bars 27, which serve as supports and guides and ways for the doors. These bars extend into the space beneath the perforated plates 23. The sliding doors 24 are provided with rack-bars 24<sup>a</sup>, engaged by pinion 24<sup>b</sup> on horizontal shaft 24<sup>c</sup>, passing through the side walls and provided at its outer end with a beveled gear-wheel 24<sup>d</sup>. A vertical shaft 24<sup>e</sup>, suitably journaled, has a beveled gear-wheel 24<sup>f</sup> engaging the wheel 24<sup>d</sup>. The shaft 24<sup>e</sup> has at top and bottom hand-wheels 24<sup>g</sup>, which are within convenient reach of the operator upon either the upper or lower floor.

Each of the perforated plates 23 is disposed beneath one of the trap-doors 11 in the floor 10. Beneath the perforated plates are suitable troughs or vessels 23<sup>a</sup>, from which lead drain-pipes 23<sup>b</sup> downwardly, emptying into a reservoir 26, formed at the bottom of chamber or passage 5 by the sides and cross-walls and the base.

In the side walls are doors 5<sup>a</sup> and 8<sup>a</sup> on a level with the passages or chambers 5 and 8, respectively, by means of which these chambers are accessible whenever necessary.

The operation of our device is as follows: The material to be cremated is thrown through doors 11 into the chamber 12, the water and fluids draining through the perforated plates into the receptacles 23<sup>a</sup>, and thence through

pipes 23<sup>b</sup> to reservoirs 26 at the bottom of the chamber 5. Fires are built in furnaces 16 and 17. The flame and hot gases from these furnaces pass both over and under the bars 6, meeting in the passage 18, thence dividing and passing through the flues 13 into chamber 19, and thence out through aperture 20 into the smoke-stack. The walls of the flues become very hot, and the garbage resting thereon soon becomes dry and fit for fuel. Now the operator by means of the hand-wheel 24<sup>g</sup> and its connected gearing causes the door 24 to slide upon the guides or ways 27 beneath the perforated plates 23, allowing the garbage to fall through the opening 25 down onto the bars 6, where it becomes fuel and is rapidly consumed. Unless the garbage contains an excess of fluids the stoking of the furnaces 16 and 17 may after the furnace becomes thoroughly heated be discontinued, as the garbage will evaporate and dry so rapidly as to furnish sufficient fuel for its own incineration. The heat from the furnace rapidly evaporates the accumulated water in the bottom of the chamber 5, and it passes off as superheated steam and is consumed or converted with the other gases. Gases generated in the chamber 12 by the drying process pass directly into the chamber 19 through opening 12<sup>a</sup>, and thence into the stack through the reheating or deodorizing furnace 21 22. Sanitary storage is also thus secured.

Under some circumstances and conditions it will be found desirable to confine the fire in the chamber 8 to a limited portion of the grating 6 or to dispense with the use of the return-flues 13 or to apply flame directly to the contents of the drying-chamber. In either case either of the doors 24 may be left open, when immediately the flame and gases, following the shortest path, will pass through the open door into the drying-chamber and thence on into the stack. Thus the drying-chamber may, if required, be also utilized as a combustion-chamber.

In smaller crematories the furnace 17 may be dispensed with, and the flame and gases from the single furnace 16 may be caused to traverse both the combustion and evaporating chambers.

Having described our invention, what we claim, and desire to secure by Letters Patent, is—

1. A garbage-furnace comprising an elongated chamber formed by side walls, end walls, and a top and bottom, an elongated grating in said chamber, an arch above the grating whereby there are formed within the inclosing walls three passages to wit: the bottom one beneath the grating, the middle one between the grating and said arch, and the upper one between said arch and the top, a furnace connected with said bottom passage at its inlet, a furnace connected with said middle passage at its inlet, return-flues in said top passage, connections between the outlet ends of said bottom and middle pas-



sages and the inlet ends of said return-flues, doors in the top leading into the upper passage, and doors between the upper and middle passages.

5 2. In a garbage-furnace, a casing, horizontal partitions dividing the casing into an upper drying-chamber, a lower evaporating-chamber and an intermediate combustion-chamber, said drying-chamber being normally closed to the direct action of the products of combustion from the combustion-chamber, and means extending through the drying-chamber and communicating with the combustion and evaporating chambers for  
10 conducting the vapors and products of combustion through the drying-chamber.

3. In a garbage-furnace, the casing, horizontal partitions dividing the casing into an upper drying-chamber, a lower evaporating-chamber, and an intermediate combustion-chamber, said drying-chamber being normally closed to the direct action of the products of combustion from the combustion-chamber, means extending through the drying-chamber and communicating with the combustion and evaporating chambers for conducting the vapors and products of combustion through the drying-chamber, a furnace at the inlet end of the combustion-chamber, a furnace at the inlet end of the evaporating-chamber, and a furnace for reheating said products of combustion and said vapors after their passage through the drying-chamber.

35 4. In a garbage-furnace, three horizontal, parallel passages disposed one above another, means for heating the two lower passages at their inlet ends, return-flues in the upper passage, connections between the return-flues and the outlet ends of the two lower passages, a floor for the upper passage consisting in part of foraminous plates and trap-doors, means for conveying liquids from beneath said foraminous sections to the bottom chamber or passage, means for actuating said trap-doors, and doors in the upper chamber or passage adapted for the reception of the substances to be burned.

5 5. In a garbage-furnace, a combustion-chamber, a drying-chamber above the combustion-chamber, a floor for said latter chamber consisting in part of foraminous sections and horizontally-sliding doors, a chamber beneath each of said foraminous plates for fluids, guides or ways in said latter chamber for said sliding doors, and means for sliding said doors horizontally into and out of said latter chamber.

6. In a garbage-furnace, a rectangular base or floor, elongated parallel side walls, end walls, cross-walls near each end, one of said cross-walls being provided near its bottom with a furnace-opening, above this opening another furnace-opening, above the latter opening two flue-openings 13<sup>a</sup> and above the latter openings another opening 12<sup>a</sup>, the other cross-wall being provided with an opening op-

posite the furnace-openings in the opposing cross-wall and two flue-openings opposite the flue-openings 13<sup>a</sup> in the opposing cross-wall 70 combined with a horizontal grate disposed between the two side walls and an arch above said side walls, whereby the inclosure is divided into three horizontal parallel chambers disposed in the same vertical plane. 75

7. In a garbage-furnace, three passages or chambers disposed one above another, a floor for the upper passage or chamber composed in part of foraminous sections, receptacles beneath said sections for fluids, and conduits 80 connecting said receptacles with the lower passage or chamber.

8. In a garbage-furnace, a combustion-chamber, a drying-chamber above the combustion-chamber, a floor for said latter chamber consisting in part of alternate foraminous plates and trap-doors, and a series of doors in the top of said drying-chamber disposed directly above said foraminous plates. 85

9. In a garbage-furnace, two side walls, a combustion-chamber between said two walls, a drying-chamber above the combustion-chamber, an arch resting upon said side walls and separating said two chambers, two flues in said drying-chamber, said flues consisting 95 respectively of a side wall, an arch, an upright 14 resting upon said arch, and a short arch 15 supported by said upright and said side walls.

10. In a garbage-furnace, a casing, horizontal partitions dividing the casing into an upper drying-chamber, a lower evaporating-chamber and an intermediate combustion-chamber, said drying-chamber being normally closed to the direct action of the products of combustion from the combustion-chamber, means extending through the drying-chamber and communicating with the combustion and evaporating chambers for conducting the vapors and products of combustion through 100 the drying-chamber, a furnace at the inlet end of the combustion-chamber, another furnace at the inlet end of the evaporating-chamber, said two furnaces being one above another, a stack or chimney adjacent to said two furnaces, a reheating-furnace in said stack or chimney, and doors for said three furnaces in substantially the same plane and adjacent to each other. 105

11. In a garbage-furnace, a combustion-chamber, a drying-chamber above the combustion-chamber, flues connected with the combustion-chamber and leading through the drying-chamber, a stack or chimney connected with said flues and said drying-chamber, 115 and doors between the combustion and drying chambers, whereby, when said doors or either of them are open, the flame from the combustion-chamber will traverse the drying-chamber, and whereby the contents of the drying-chamber may be caused to fall into the combustion-chamber. 120

12. In a garbage-furnace, the casing, horizontal partitions which divide the casing into



an upper drying-chamber, a lower evaporating-chamber and an intermediate combustion-chamber, said drying-chamber being normally closed to the direct action of the products of combustion from the combustion-chamber, flues connected with the combustion-chamber and the evaporating-chamber and leading through the drying-chamber, a stack or chimney connected with said flues, and a reheating-furnace in said stack or chim-

ney disposed in the path of the products of combustion and the vapors from said three chambers.

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