

T. DOWNIE & D. BROWN.
FURNACE FRONT AND DOOR.
APPLICATION FILED JULY 9, 1907.

930,360.

Patented Aug. 10, 1909.

4 SHEETS—SHEET 1.

Fig. 1.

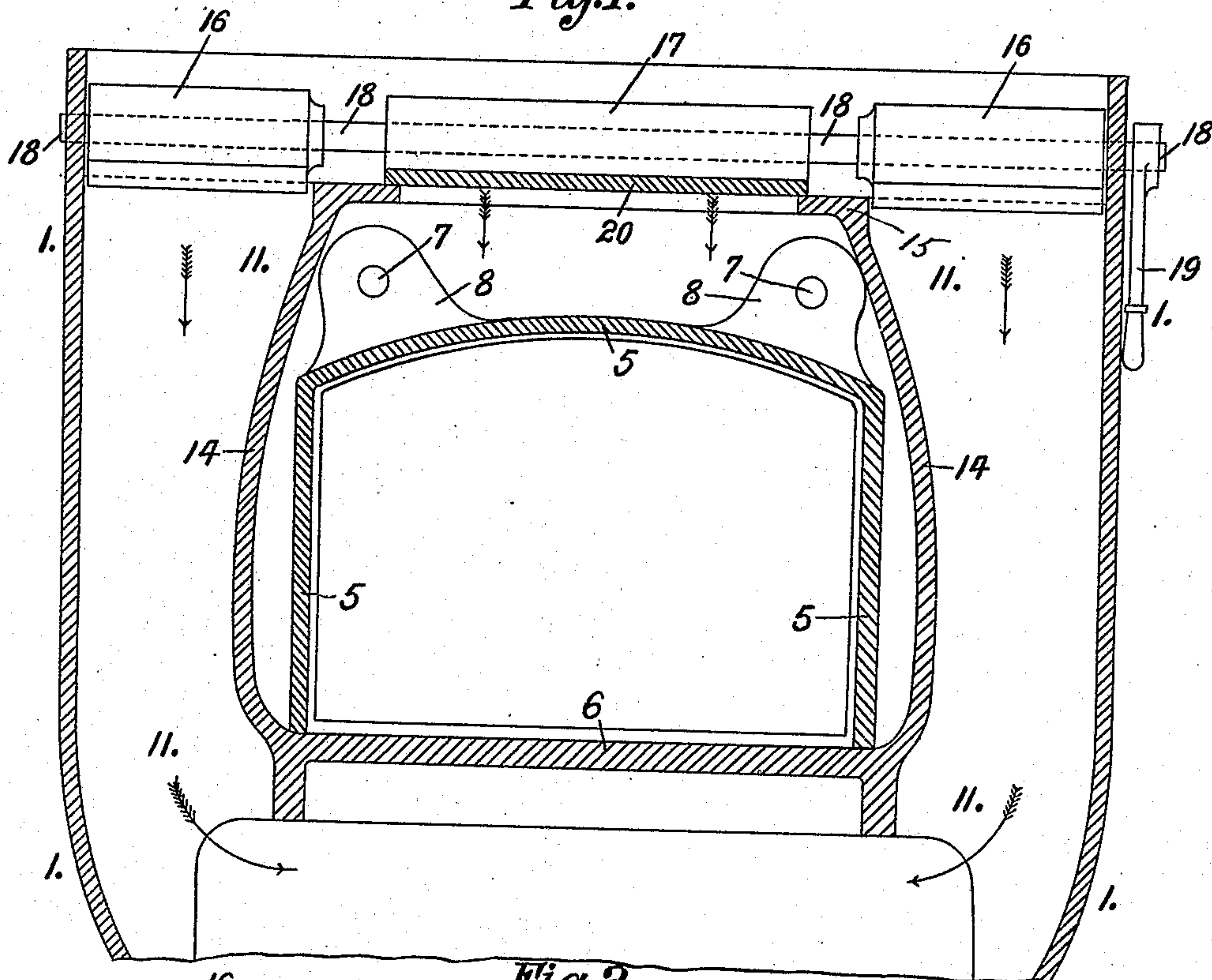
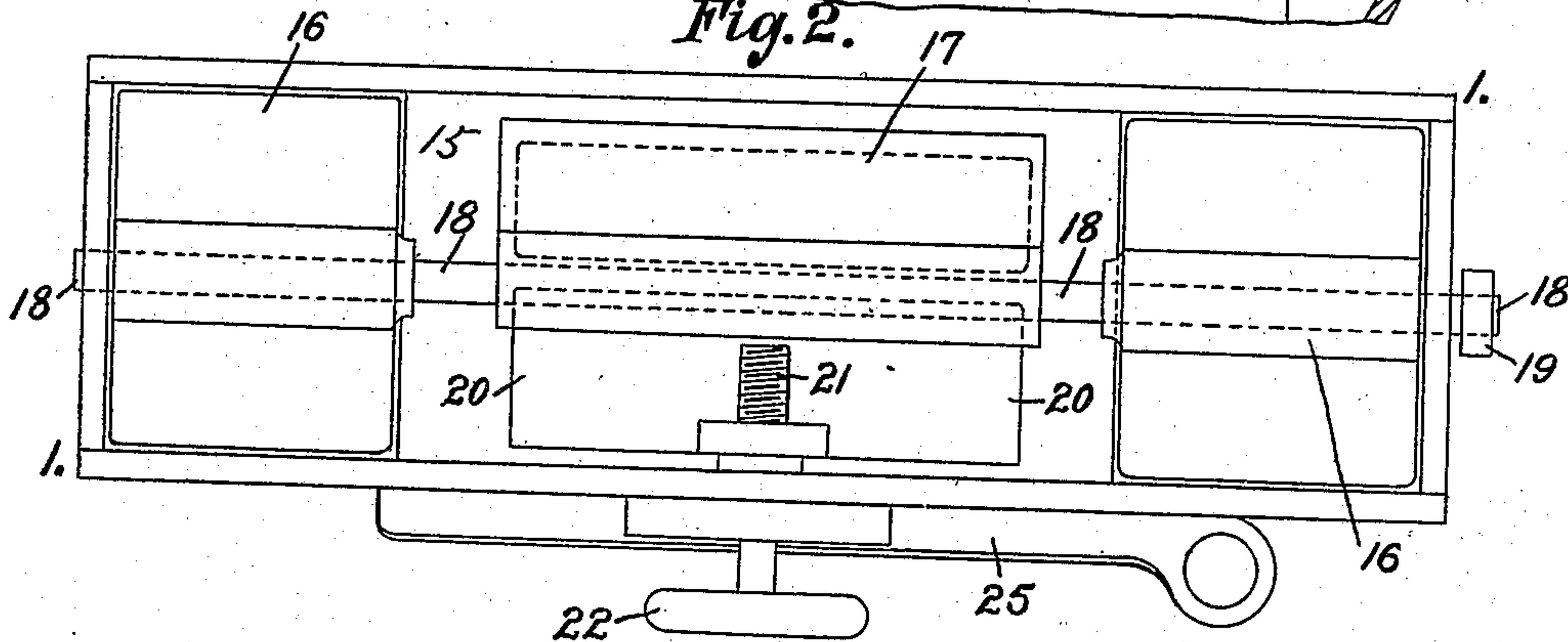


Fig. 2.



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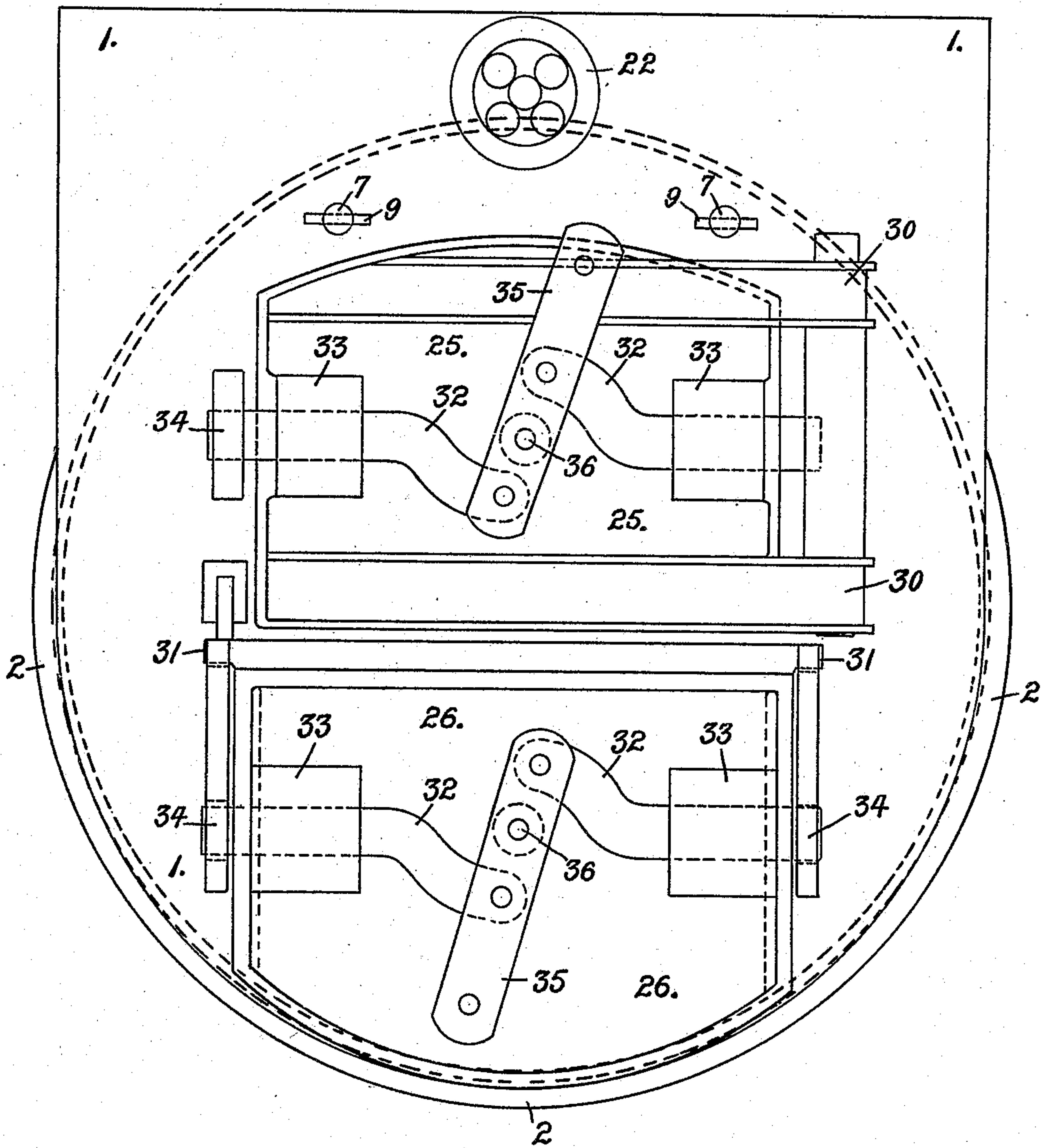
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4 SHEETS—SHEET 2.

Fig. 3.



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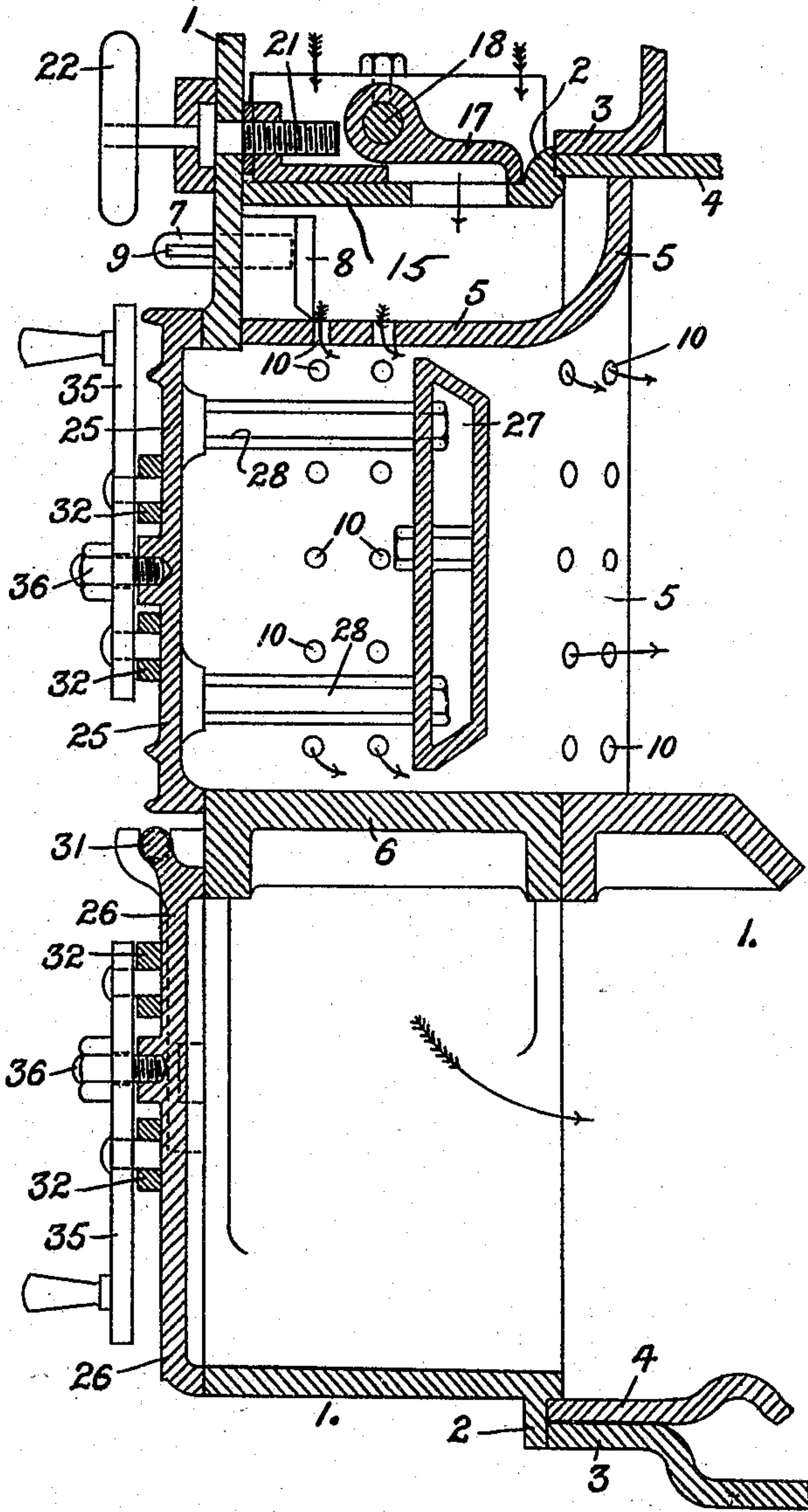
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4 SHEETS—SHEET 3.

Fig. 4.



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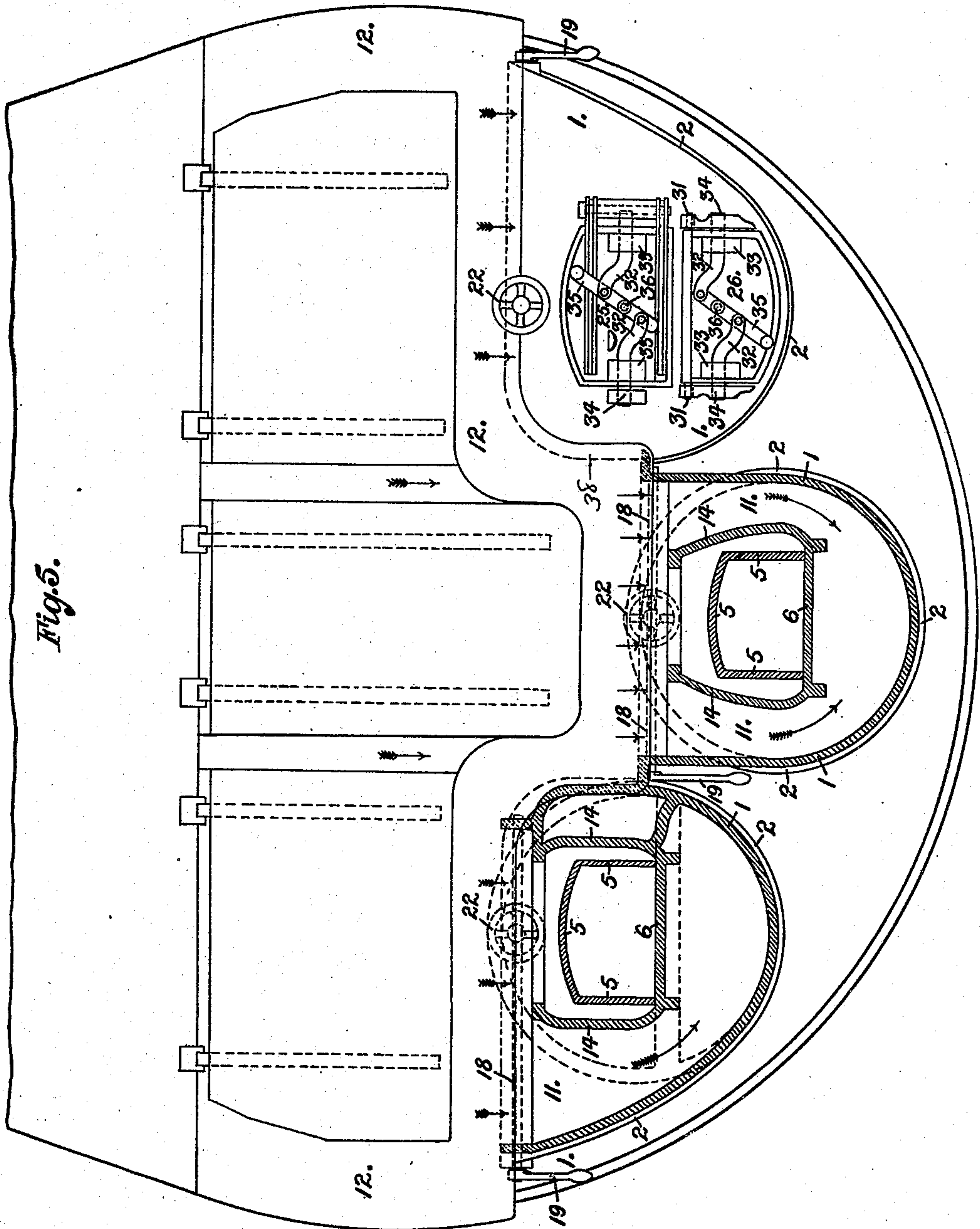
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

THOMAS DOWNIE, OF WALLASEY, AND DAVID BROWN, OF BOOTLE, ENGLAND.

FURNACE FRONT AND DOOR.

No. 930,360.

Specification of Letters Patent.

Patented Aug. 10, 1909.

Application filed July 9, 1907. Serial No. 382,864.

To all whom it may concern:

Be it known that we, THOMAS DOWNIE and DAVID BROWN, subjects of the King of England, residing at Wallasey, in the county of Chester, England, and Bootle, in the county of Lancaster, England, respectively, have invented new and useful Improvements in or Connected with Furnace Fronts and Doors, of which the following is a specification.

This invention has reference to furnace fronts and primarily to the fronts and fittings, used in connection with "internally-fired" steam generator furnaces in which forced draft is employed, namely, those wherein the air is supplied artificially to the ashpit, at a pressure above that of the atmosphere, and preferably in regulated quantities to the space above the fuel on the fire bearers. Types of such steam generators being those known as the "Scotch" or "return tubular" "Lancashire" and "Cornish", and others having similar furnaces.

The object and effect of our invention is generally to improve these furnace fronts and fittings, and also render them simple and inexpensive, while at the same time efficient.

In a furnace front involving the improvements hereunder, the front which is fitted to the boiler or furnace face is a hollow casting or structure adapted to inclose the furnace front, having a suitable door opposite the ashpit, and an inner longitudinal wall, consisting of sides, floor and roof, open at the front, opposite which open part the fire and stoking door comes; and between the two sides, or one side, as the case may be, of this wall or partition, and the outside of the casing, there is a passage, down which the air supplied artificially passes to the space below, and thence into the ashpit, it being supplied from the supply casing or conduits above, which are fitted to the top of this front or fitting. At the top of the hollow front there is a perforated partition, upon which a single valve, or an inter-connected valve made up of parts, operate, one part of which at each end works over and in connection with the opening at the top of the air downtake passages at each side, and one over the center part forming the roof to the fire door space; and these valve parts (which, as stated, are connected together or formed in one) are all in line, and are adapted to be operated by a single operating lever or device, conveniently and suitably placed on the front fitting.

The invention will be further described with the aid of the accompanying drawings which illustrate it; while the novel characteristics comprised under it, are set out in the claiming clauses concluding the specification.

In the drawings, Figure 1 is front elevation showing the furnace front in section; and Fig. 2 is a plan of same. Figs. 3 and 4 are respectively, outside front elevation, and longitudinal sectional elevation of the front. Fig. 5 is a front elevation, partly in section, showing the furnace front fittings applied to a three furnaced steam generator of the "return-multitubular or Scotch" type.

Referring to the drawings, 1 generally designates the cast case forming the hollow front, having a flange 2 fitting against the projecting edges or flanges 3, 4, of the steam generator front plate, furnace flue, respectively. The sides and roof of the inner longitudinal wall, extend between the front of the casing 1, and the furnace, are designated 5; and 6 is the floor of same, the latter forming a part of the casing 1. The part 5 is separate from the casing 1, and is readily removable, and hence easily replaced when burned out, it being fastened to the front plate of the casing by pins 7 cast or fixed in lugs 8 upon it, and through which cotters 9 are passed on the outside of the casing. This internal part 5 is provided with holes 10 through which air is supplied to the furnace above the fuel on the grate.

Between the part and the sides of the casing 1 are passages 11, by which air is led from the casing 12 above the front, down to the space below the floor 6, and thence to the ashpit of the furnace. The inside wall of these passages 11 consists of a plate 14, preferably cast in one with the front casing 1.

15 is the perforated partition, having an aperture at each side, over the passages 11, and one over the space above and surrounding the firing and stoking passage wall 5; in connection with which apertures, valve parts 16 and 17, respectively, are placed, and by means of which the air supplied to the passages 11, and the space around the wall 5, and so by way of the holes 10 to the space above the fuel, can be regulated more or less, or cut off entirely. These valve parts are all in line, and are mounted on a common spindle 18, and operated by a single lever 19 outside the casing 1. The valve parts 16 and 17 are of the flap or "butter-

fly" type; and when the spindle 18 is revolved they—the valve parts—will open apertures they operate in connection with, or close same, as and when required.

5 In connection with the aperture controlled by the valve 17, there is a regulating slide 20, worked to and fro through the threaded spindle 21, worked by a hand wheel 22; on
10 the outside of the front casing 1. By means of this slide, the aperture which it works over, can be more or less opened and closed, and so the volume of air supplied to the gases given off from the fuel on the grate is regulated, viz., made greater or less as may be
15 required. Normally, the valve part 17 will, like the valve parts 16 be fully open, but when the fire door 25, or the ashpit door 26, or both, is or are open for stoking or clearing the fires, or "slicing" the bars, or emptying
20 the ashpit of cinders, or the like, the valve parts 16, 17, are closed, and no air can pass either to below or above the fuel, and so flame and gases will not flow outward from the furnace.

25 The fire door 25 has a hollow protecting plate or device 27 connected with it, carried from it by the bars or bolts 28; and some of the air supplied to the space above the fuel enters the stoking passage behind it—the
30 device 27 by some of the holes 10—while the other portion of such air, passes to the furnace by other holes 10 within the device. At this latter part, the walls 5, are curved upward, and extend up to the inside of the
35 furnace 4, and so close the space around these walls on the inside.

In the construction shown, the fire door 25 is mounted on a hinge 30 at one side, upon which it swings when opened and closed;
40 and the ashpit door 26 is carried upon horizontal hinges 31, upon which it swings up and down in opening and closing. Both these doors are fastened by locking bars 32, passing through lugs 33 on them, and en-
45 gaging with lugs or bosses 34 on the front of the casing 1; the locking bars 32 being operated by hand actuated levers 35 hinged at 36 to the doors, to which their inner ends are connected, above and below the hinges 36.

50 The ends of the locking bars 32 may be inclined—or the apertures in the lugs 33 may be inclined, or both may be inclined—in order that, in shooting them into the lugs, the doors will be pressed firmly onto, and rendered air tight with, the faces of the front of
55 the casing in connection with.

Air will be supplied to the front casing 1 from the casing 12, to which it will be supplied, and in which it may be heated, in any
60 well known way; and the upper part of the casing 1 will fit in, and up against, the bottom plate 38—shown in dotted lines in Fig. 5—of this casing 12.

In steam generators having wing furnaces,
65 as is the case shown in Fig. 5, all the air to

the ashpits passes by a single passage 11, on the outside of the front casings 1; in which case there will be only one valve part 16; this valve part, and the aperture it works in connection with, being of relative large size
70 as to offer the full area necessary to conduct all the air required, freely; the passage 11 itself being also of the necessary area, which is provided by carrying the side plate of the casing 1 outward, in the form shown. The
75 space between the inside wall 14, and the outside wall of the casing 1, opposite it, is in these wing furnace fronts closed off, as shown. In other respects than these, the wing furnace fronts are the same as the fronts
80 above described.

It will be seen, by this invention, as applied to a steam generator with a plurality of furnaces, such as in the Scotch type, the air casing 12 stops at a point or level above
85 the front fittings over the ends of the furnaces, and they—the furnace fronts—leave all the front plate of the steam generator below the casing 12 uncovered including the usual manholes, cocks, and other usual fit-
90 tings, so that these can be seen, got at, and manipulated as desired, thereby rendering it unnecessary to remove the furnace fronts, when it is desired to get at these fittings of
95 the steam generator front or end plate.

What is claimed is:—

1. A furnace front comprising a casing, two interior vertical walls in the upper part of said casing extending from front to rear, and a horizontal wall connecting the lower
100 ends of said walls, said interior walls dividing the case into outer and inner chambers, controllable means for admitting air to said chambers, and vertical and horizontal walls
105 formed in one piece removably secured to the casing and fitting in the inner chamber and forming a fuel opening, said removable walls being perforated.

2. A hollow furnace front comprising a casing, having interior vertical walls 14 and
110 a horizontal wall 6 connecting the bottoms of said vertical walls, said interior walls extending from front to rear and dividing the casing into inner and outer chambers, controllable means for admitting air to the said cham-
115 bers, and vertical and horizontal walls extending from front to rear of the front and located in the interior chamber and forming a fuel opening therein.

3. A furnace having a hollow front pro-
120 vided with vertical division walls 14, and the horizontal walls 6 connecting the bottoms of the walls 14, said front having a fuel opening therein formed by the bottom plate 6 and the top and side plates 5, said plates 5 being
125 inclosed within the walls 14, the top of said front having openings therein communicating with the three spaces formed by the walls 14; valves 16 controlling the openings which
130 communicate with the spaces formed be-

5 between the walls 14 and outer walls of the front, a valve 17 controlling the opening communicating with the space between the walls 14, a spindle common to said valves, and a sliding valve 20 operating in connection with the opening controlled by the valve 17 and located below said valve.

In testimony whereof we have signed our

names to this specification in the presence of two subscribing witnesses.

THOMAS DOWNIE.
DAVID BROWN.

Witnesses:

SOMERVILLE GOODALL,
GUY OKE.