

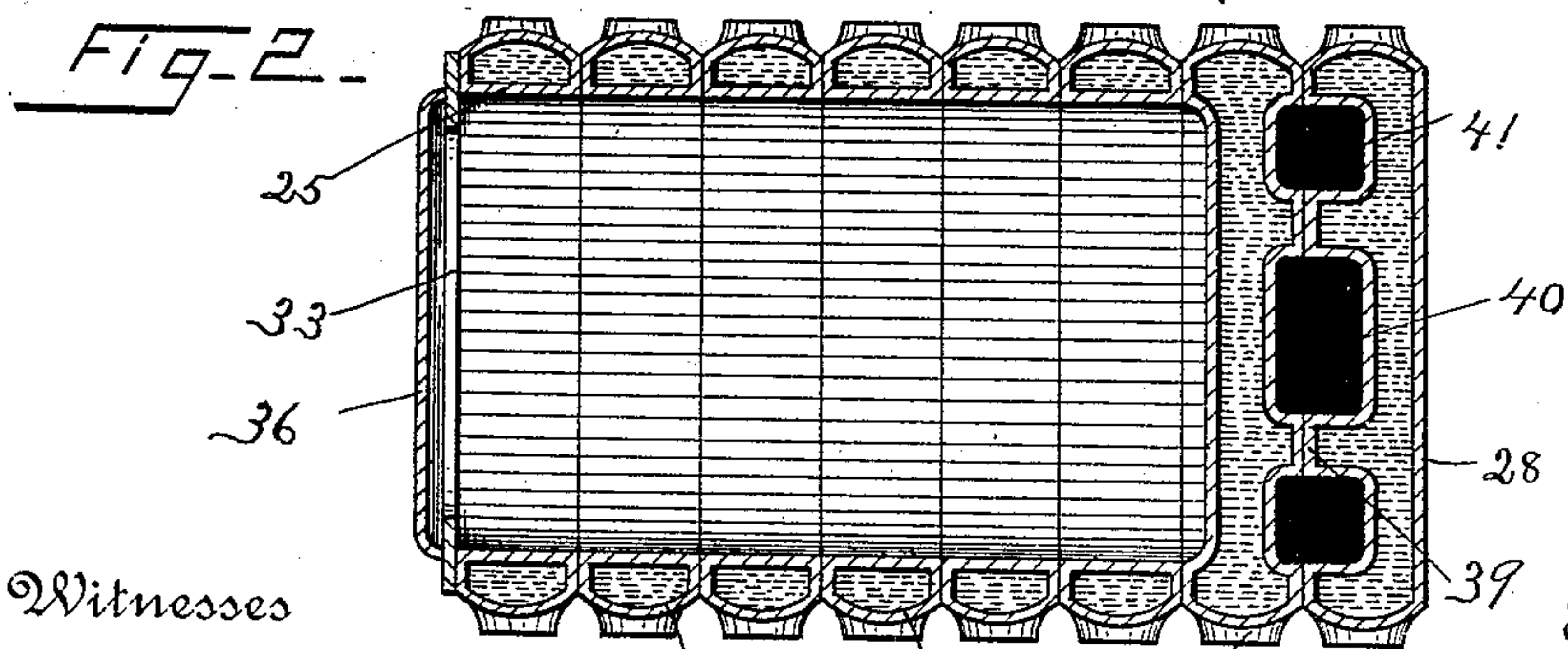
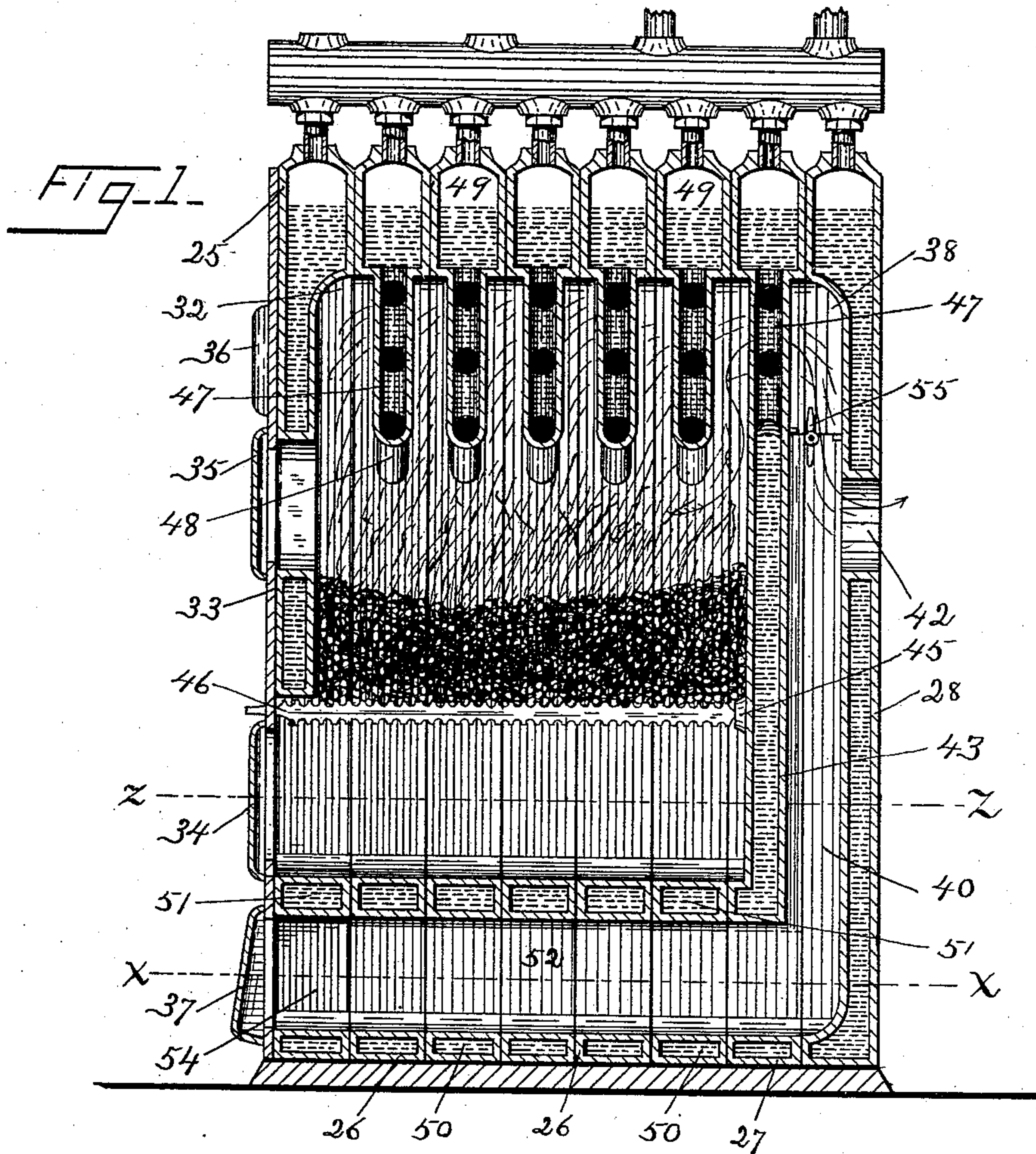
(No Model.)

7 Sheets—Sheet 1.

W. C. HIGGINS.
STEAM GENERATOR.

No. 486,467.

Patented Nov. 22, 1892.



Witnesses

George M. Luther.
Allen Tenny.

26

By

his

Attorney

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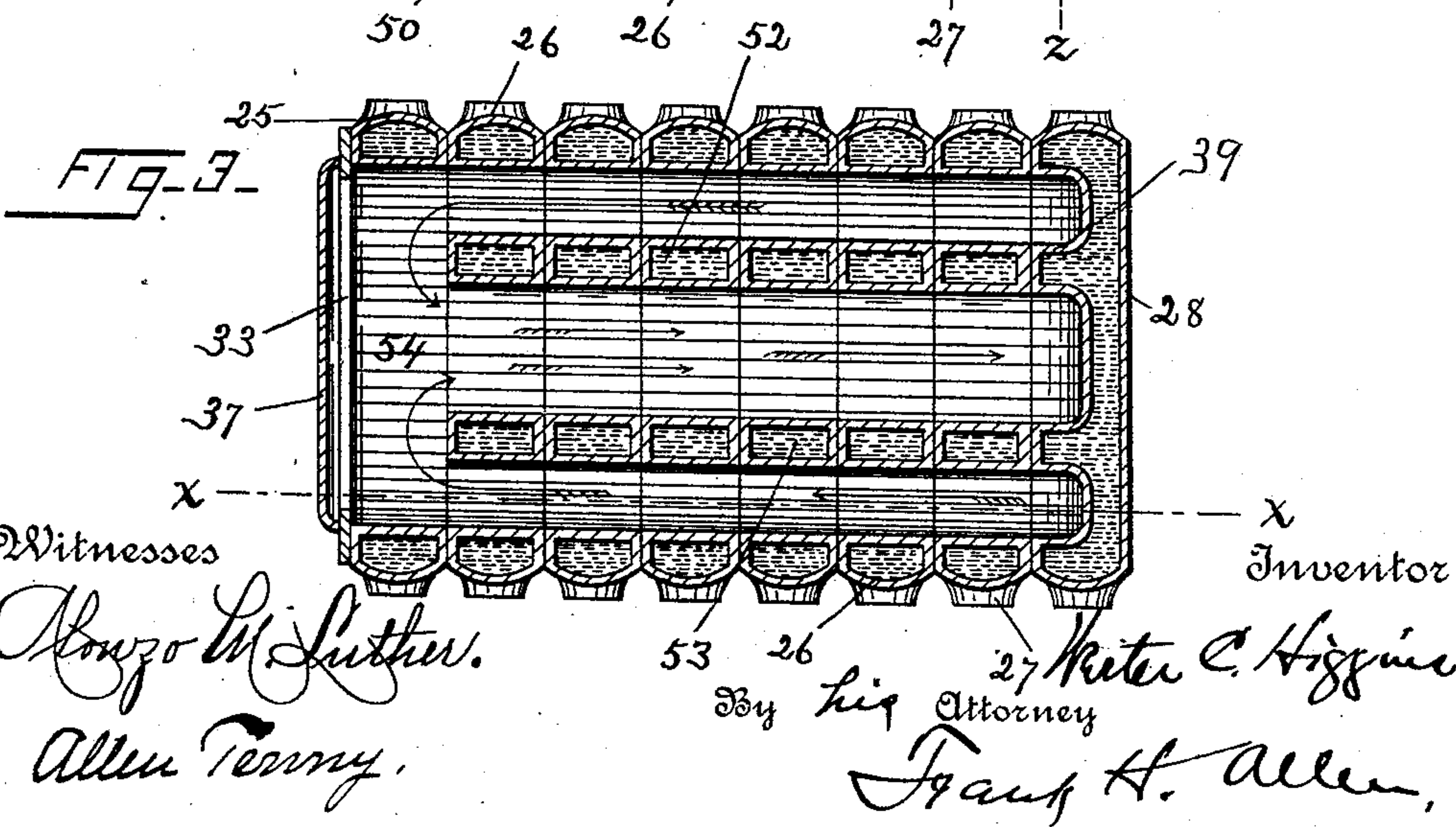
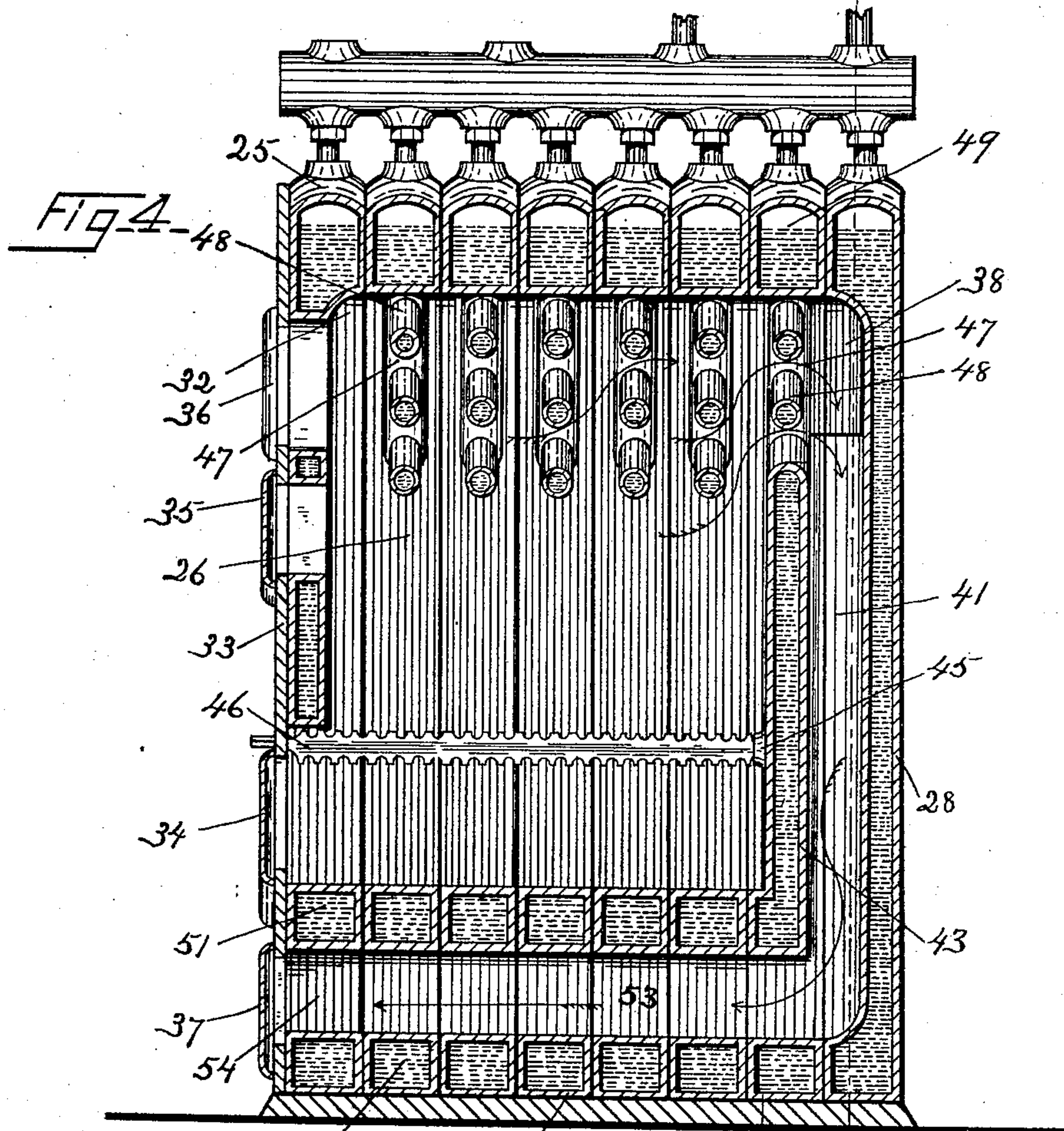
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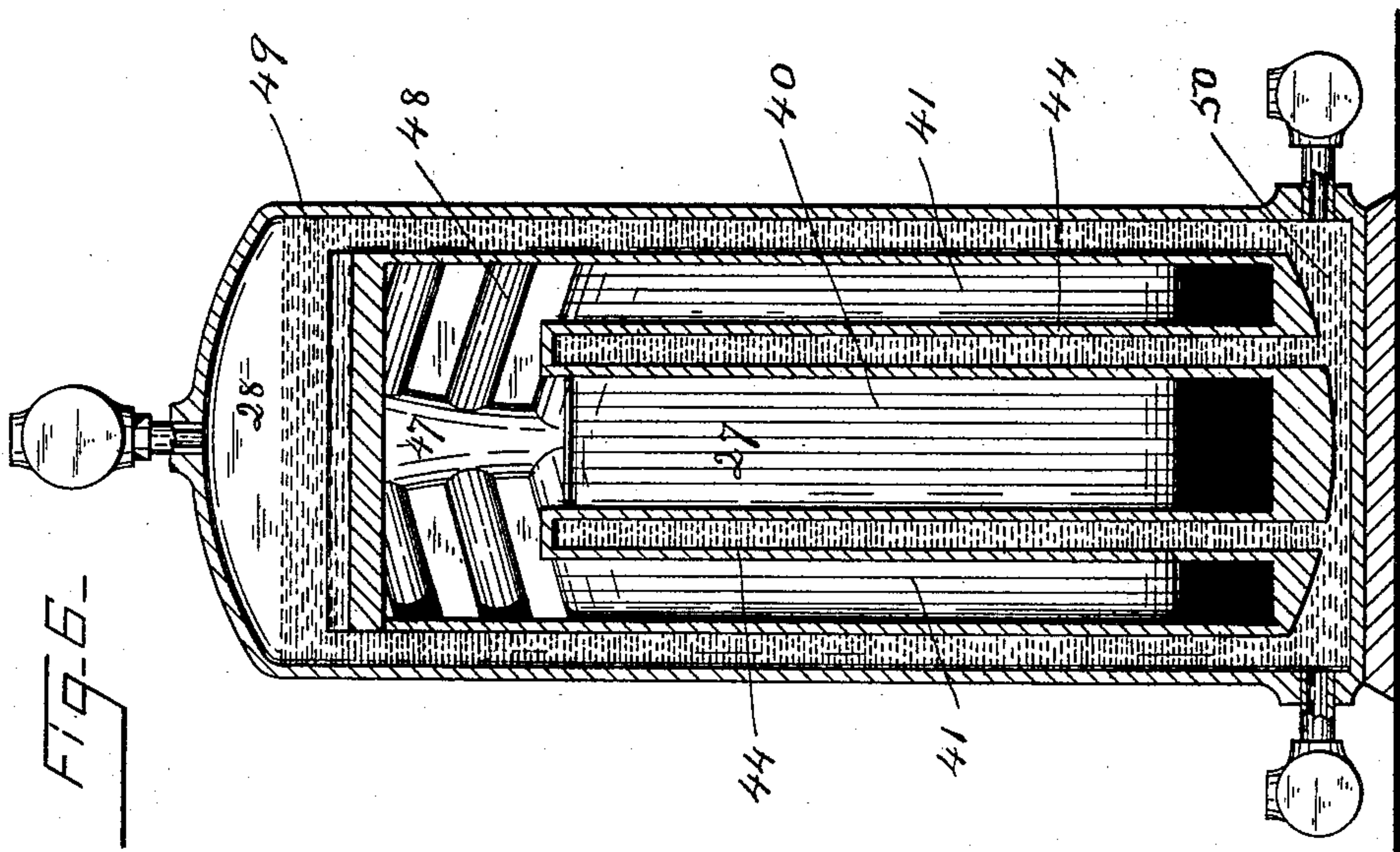
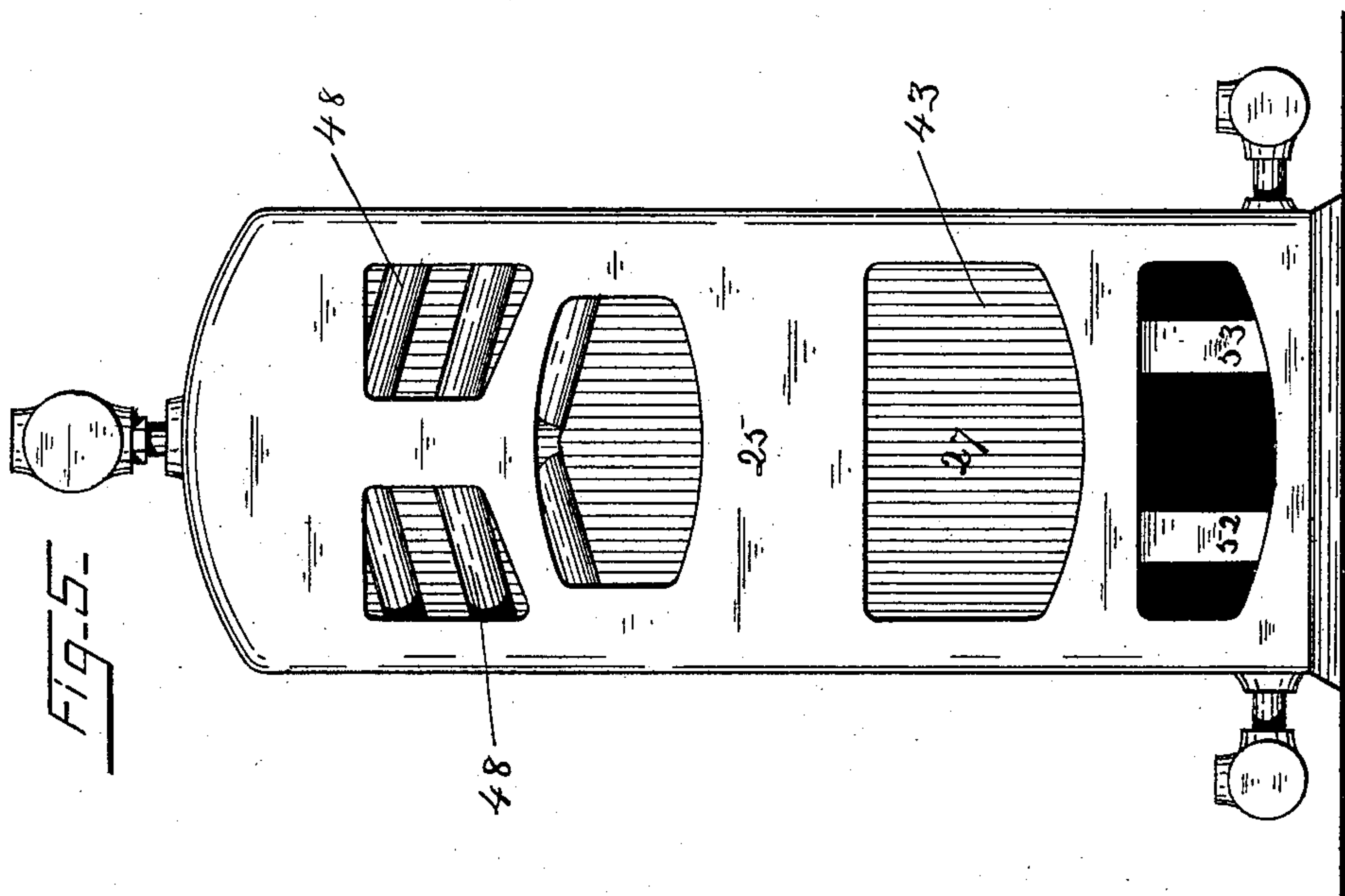
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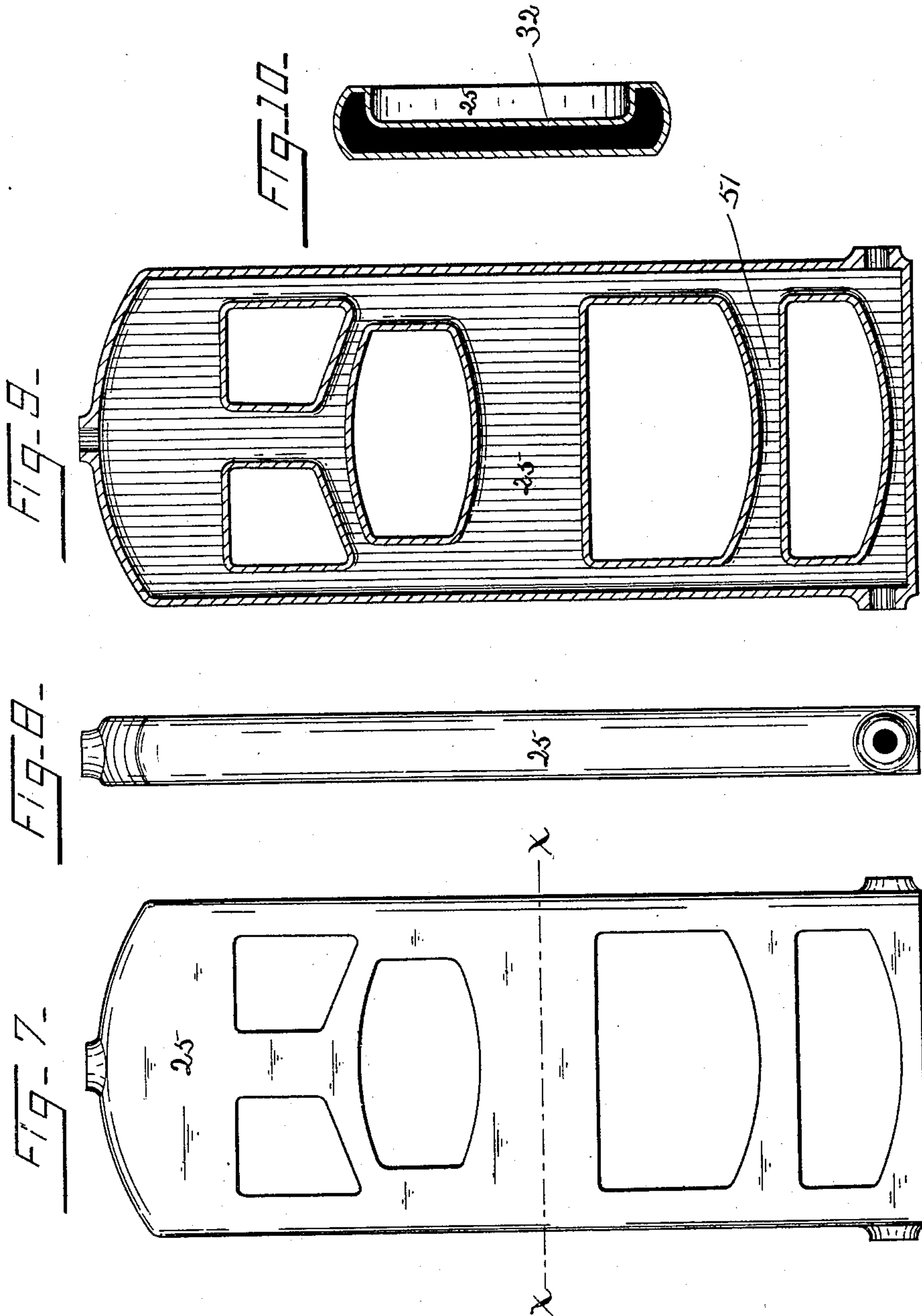
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FIG-12-

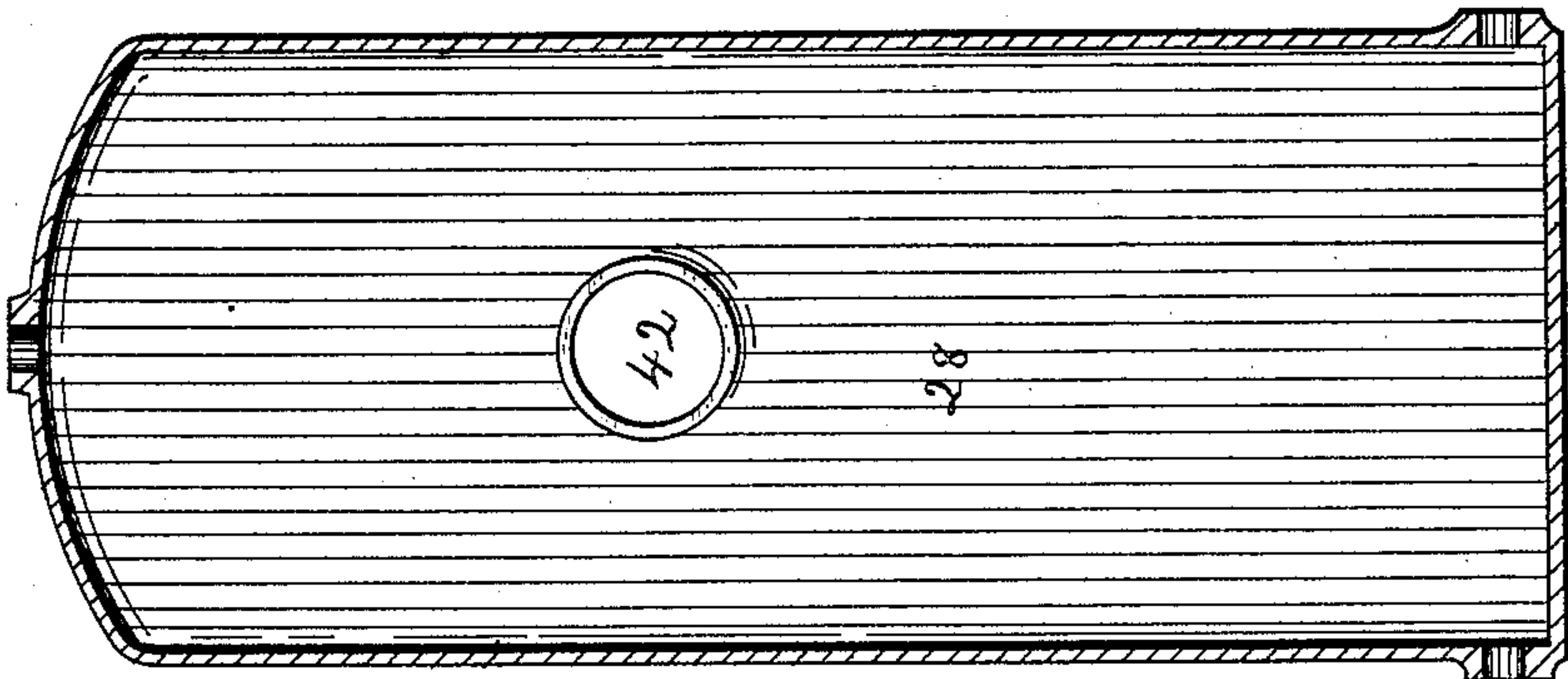
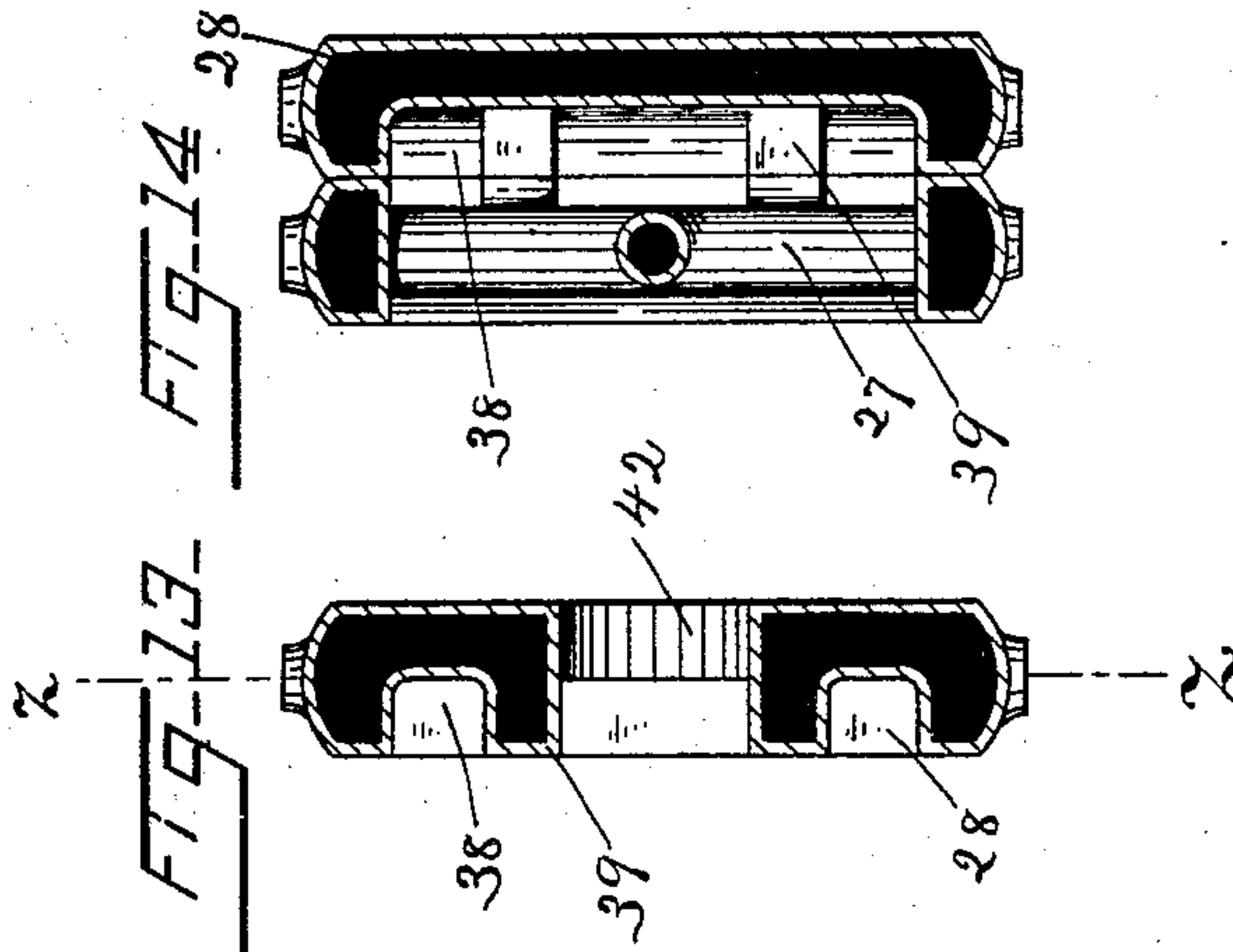
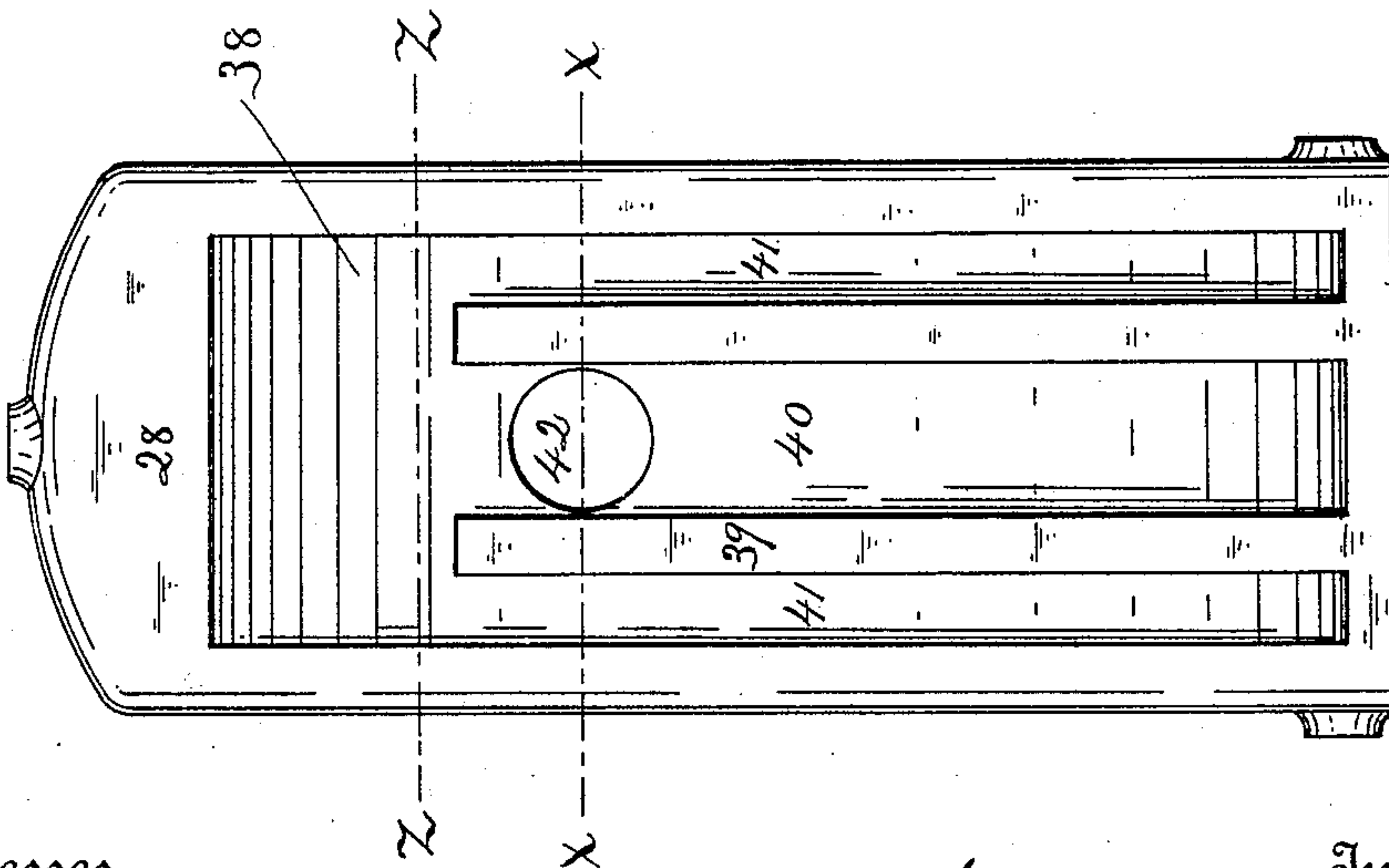


FIG-11



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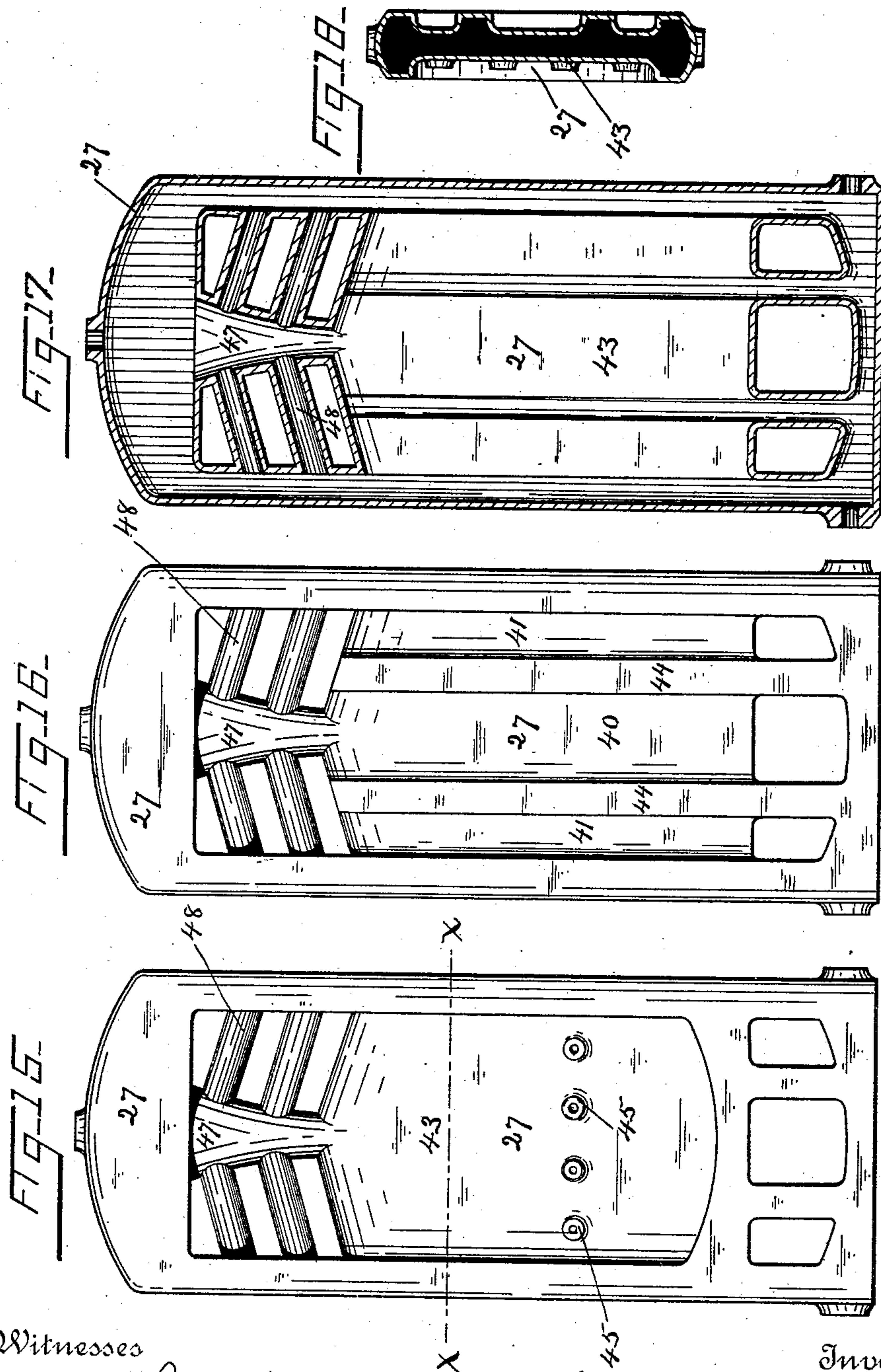
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W. C. HIGGINS.
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Patented Nov. 22, 1892.



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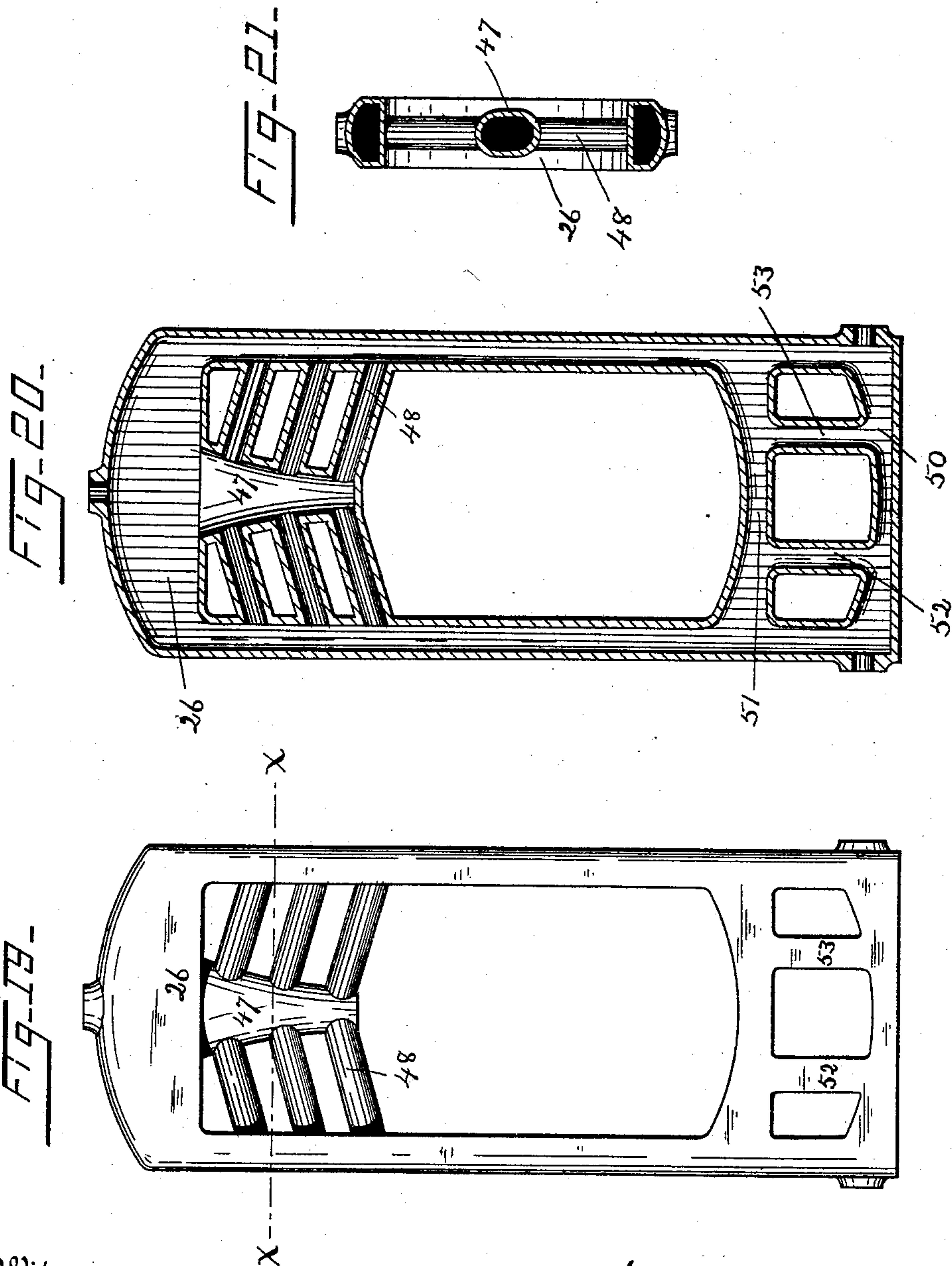
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7 Sheets—Sheet 7.

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UNITED STATES PATENT OFFICE.

WERTER C. HIGGINS, OF NORWICH, CONNECTICUT.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 486,467, dated November 22, 1892.

Application filed July 5, 1892. Serial No. 439,050. (No model.)

To all whom it may concern:

Be it known that I, WERTER C. HIGGINS, a citizen of the United States, residing at Norwich, New London county, Connecticut, have
5 invented certain new and useful Improvements in Steam-Generators, which improvements are fully set forth and described in the following specification, reference being made to the accompanying seven sheets of drawings.

10 My invention is in generators of the sectional type, and has for its object the improvement of the draft-flues, to the end that the caloric products of combustion may be most completely utilized.

15 On the 9th day of February, 1892, Letters Patent No. 468,423 were granted to me for other improvements in this class of generators, to which patent reference is now made for perspective views and a detailed description of such generators. In my said earlier
20 patent the ash-pit is shown as located upon the floor in a box-section, upon which the generator proper is mounted, and a return-draft flue is provided in the upper portion of
25 the generator immediately over the fire-pot.

By reason of experiment and greater experience I have found it desirable for purposes of economy to make radical changes in the draft system of my generator and have
30 therefore produced the system illustrated in the annexed drawings, in which—

Figure 1 is a central vertical sectional view, cut from front to rear, of a generator embodying my present improvements; and Figs. 2 and
35 3 are cross-sectional views of such a generator on lines xx and zz , respectively, of Fig. 1. Fig. 4 is a vertical sectional view similar to Fig. 1, but taken on line xx of Fig. 3. Fig. 5 is a front view of the generator with the
40 front plate that supports the several doors removed; and Fig. 6 is a vertical cross-sectional view of the generator, taken on line zz of Fig. 4, looking toward the front. Figs. 7 and 8 are respectively front and edge views of said
45 front section detached. Fig. 9 is a vertical sectional view of the same, and Fig. 10 a cross-section on line xx of Fig. 7. In Fig. 11 is shown the inner face of the rear section of the generator, and in Fig. 12 a vertical
50 sectional view of the same on line zz of

Fig. 13, which latter view is a cross-sectional view on line xx of Fig. 11. Fig. 14 shows in cross-section on line zz of Fig. 11 the rearmost section and the one next adjoining it. Figs. 15 and 16 are respectively front
55 and rear face views of the generator-section next to the rear, forming the back-plate of the fire-pot; and Fig. 17 is a vertical sectional view of the same. Fig. 18 is a cross-section of said section on line xx of Fig. 15. 60
In Figs. 19 and 20 what I term my "intermediate" section is shown in front elevation and central vertical section, and in Fig. 21 I have shown a cross-section of said intermediate section on line xx of Fig. 19. 65

In generators of this class the front and rear sections and the section next adjoining the rear are as a rule the same in all sizes, the heating or steaming capacity of the generator being varied by providing more or less of the
70 intermediate sections, Fig. 19, as the case may require.

In the annexed drawings, 25 denotes the front section; 26, the intermediate sections; 27, the section next adjoining the rear section, and 28 the rearmost section. Each and
75 all of these several sections are in a large degree hollow to provide liberal water-space, and said space is connected throughout the entire series of sections by manifold couplings and pipes 29, 30, and 31 in the manner
80 usual in this class of generators, thus providing a most perfect system of water connection. The front section 25 is formed with properly-disposed openings for feeder, ash-pit, and
85 flue-cleaning doors and is preferably recessed on its inner face, as at 32, Figs. 4 and 10, to increase somewhat the capacity of the fire-pot. Upon the outer face of the front section 25 is bolted a plate or shield 33, having
90 hinged thereto an ash-pit door 34, a feeder-door 35, through which the fire-pot may be reached, and doors 36 37, by means of which the various draft-flues may be readily reached for cleaning. 95

The rearmost section 28 may be formed as a simple plate upon its outer face, but the inner face I preferably recess throughout the greater portion of its length, as at 38, and within this recess, extending nearly to the 100

upper end thereof, are two projecting walls 39, also hollow to provide the water-space and serving to cut the recess 38 into three vertical chambers or flues 40 41, the central one of which is by preference somewhat wider than the side flues for a reason that will be apparent, as I shall proceed to describe the complete draft system. The rear walls of section 28 are formed with an opening 42, leading outward from the central chamber 40 and providing an outlet for smoke, &c. Section 27 is formed with a cross-wall 43, extending upward to a point about level with the tops of chambers 40 and 41, (see Figs. 1 and 4,) and upon the rear face of said section are vertical walls or ribs 44, coincident in position and size with those of the rear section already described. The cross-wall 43 of section 27 serves a double purpose. Its inner or front face provides a substantial back for the fire-pot of the generator, while its rear face forms one wall of my improved draft-flues, as I shall explain presently. The inner face of said cross-wall is formed at proper points with projecting bosses 45 to receive the rear ends of the grate-sections 46, which latter may be of any approved construction. Each of the intermediate sections 26 is formed with an opening extending well upward, and in the upper portion thereof is centrally located a pendent water-section 47 of the form of an inverted truncated cone, which is connected by pipe 48 with the water-space in the sides of section 26, as best illustrated by Figs. 19 and 20 of the drawings. The form and arrangement of these water connections are such as to insure an unobstructed flow of water upward as said water becomes heated and seeks to rise, and attention may also be called here to the fact that the lower walls of all the doors and flues of my generator are purposely formed with an upward pitch to allow the freest possible escape of the heated water as it attempts to pass upward. Section 27 may, if desired, be provided with one or more cones 47 and lateral pipes 48 in the space immediately above the cross-wall 43. I have here shown two such connections; but they may be omitted altogether, if desired, or a greater or less number provided. The extreme upper portion of each of the described sections is formed with a water-chamber 49, and the extreme lower end is similarly formed with water spaces or chambers 50.

When the several generator-sections are assembled and the grate is in place, the described opening in the sections 26 is cut by said grate into two compartments, the upper one of which forms the fire-pot and the lower one the ash-pit of my generator. (See Figs. 1 and 4.)

Beneath the floor of the ash-pit the several intermediate sections, as well as the front section 25, are chambered to form water-spaces 51, that extend entirely across the generator. Between these water-chambers 51

and the chambers 50 at the extreme lower portions of the intermediate sections two intervening hollow walls 52 53 extend from front to rear, forming three horizontal flue-spaces that lead at their rear ends into the described vertical flues 40 and 41. At their front ends said horizontal flues lead into a chamber 54, extending across the lower portion of the front section 25, as best understood by reference to Fig. 3 of the drawings.

At the entrance to the upper end of the central flue 40 is hung a damper 55, which may be opened or closed by means of an operating-handle of any convenient form located outside the generator. When this damper is open, as in Fig. 1, the products of combustion find a direct and easy exit downward through the central flue 40 and outward through the smoke-opening 42. When, however, said damper is closed—as, for example, after the fire is well started—the products of combustion, as they come in contact with said damper, are checked and deflected to the right and left hand and of necessity pass downward through the side flues 41, and are guided toward the front of the generator through the side horizontal flues until they enter the cross-chamber 54 of the front section 25. Said products then pass around into the central horizontal flue and finally are directed to the rear of the generator, whence they readily pass upward through the central vertical flue 40 and outward through the smoke-opening 42, the course of the draft being indicated by arrows in Figs. 1 to 4.

The described system of draft-flues has marked advantages over that of my earlier patent, which latter discharged the products of combustion from the rear of the fire-pot immediately into flues leading to the front of the generator, whence they found a direct exit into the smoke-pipe, thus conducting said products of combustion only through the hottest portions of the water (at the top of the generator) where least wanted.

In this present invention the water at the top and sides of the generator receives direct heat from the capacious fire-pot, and as the products of combustion pass therefrom down the flues 40 and are gradually exhausted of caloric said products are brought into effective contact with the cooler waters at the bottom of the generator, thus utilizing said products most economically and exhausting therefrom all or nearly all of their available caloric parts before the residue of said products pass off through the smoke-opening.

Another advantage may be noted in my present generator in the fact that the ash-pit is formed integral with the several boiler-sections instead of separate therefrom, as in my earlier form, thus effecting a saving of time and expense in assembling the generator.

Having described my invention, I claim—
1. A sectional heater provided with a series of vertical draft-flues communicating with

each other at top and bottom, one of which is provided with an exit and the bridge-wall is above said exit, and a damper between the top of the wall and the exit, substantially as set forth.

2. A sectional heater provided with a series of vertical and horizontal draft-flues communicating with each other at the top and at the front of the heater, the horizontal flues being on the same plane and one of the vertical flues being provided with an exit, and a damper between said exit and the fire-pot, substantially as set forth.

3. In a sectional generator, in combination, front, rear, and intermediate sections, and a section adjacent to the rear section having a cross-wall, as set forth, vertical draft-flues between said cross-wall and rear section, a system of draft-flues leading to and connecting with each other at the front of the generator, and a damper at the entrance to one of said

vertical flues, all being substantially as herein described.

4. In a generator, in combination, front and rear sections and a multiple of intermediate sections, the rearmost of which is provided with a cross-wall forming a flue-chamber between said wall and rear section, which chamber is divided by vertical partitions into three flues, the middle one of which has a smoke-outlet, as set forth, each of the intermediate sections being formed with horizontal flues corresponding in number and position with the said vertical flues and the front section being formed with a transverse chamber into which the several horizontal flues lead, all being substantially as described, and for the purpose specified.

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