

No. 619,862.

Patented Feb. 21, 1899.

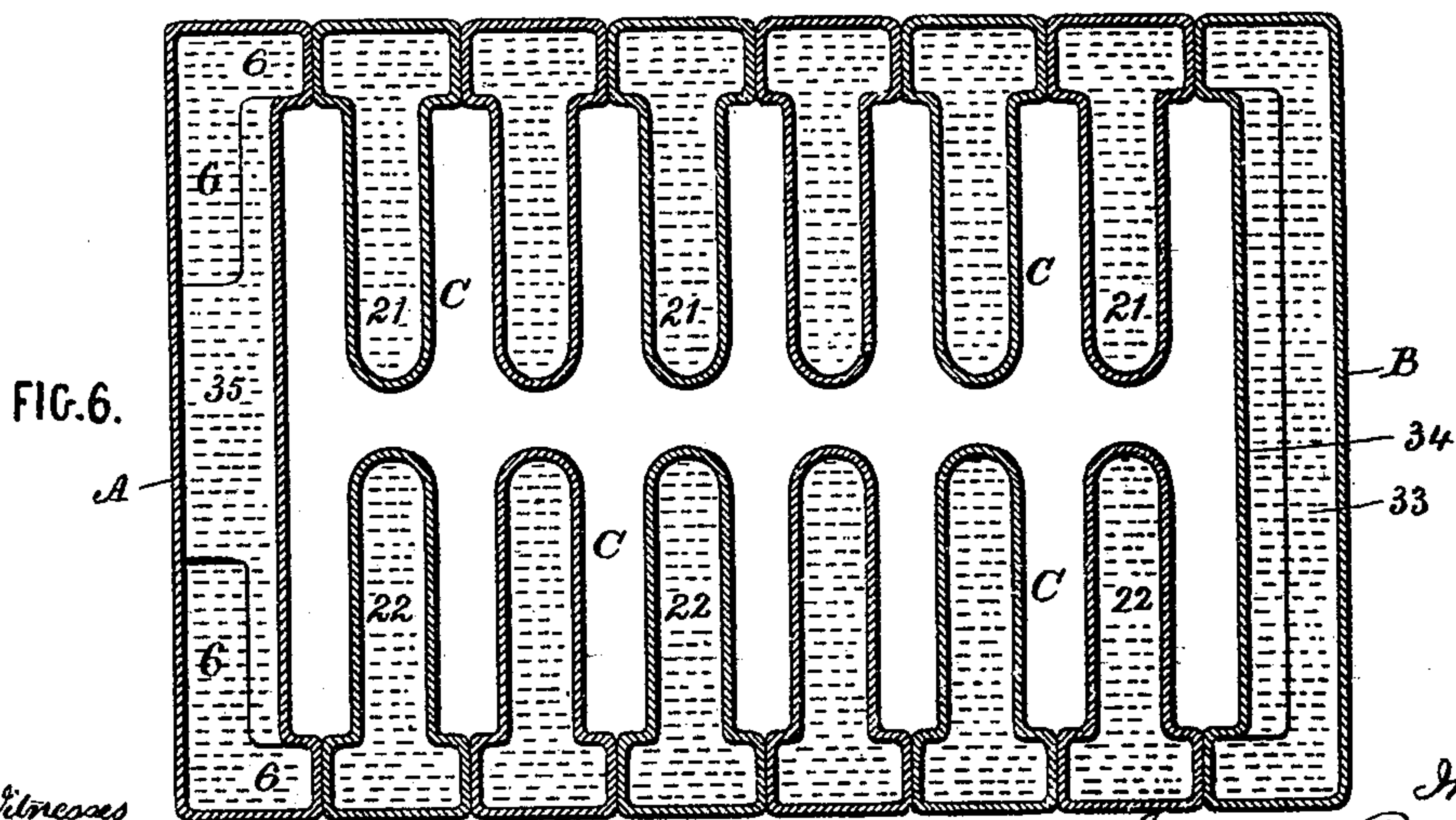
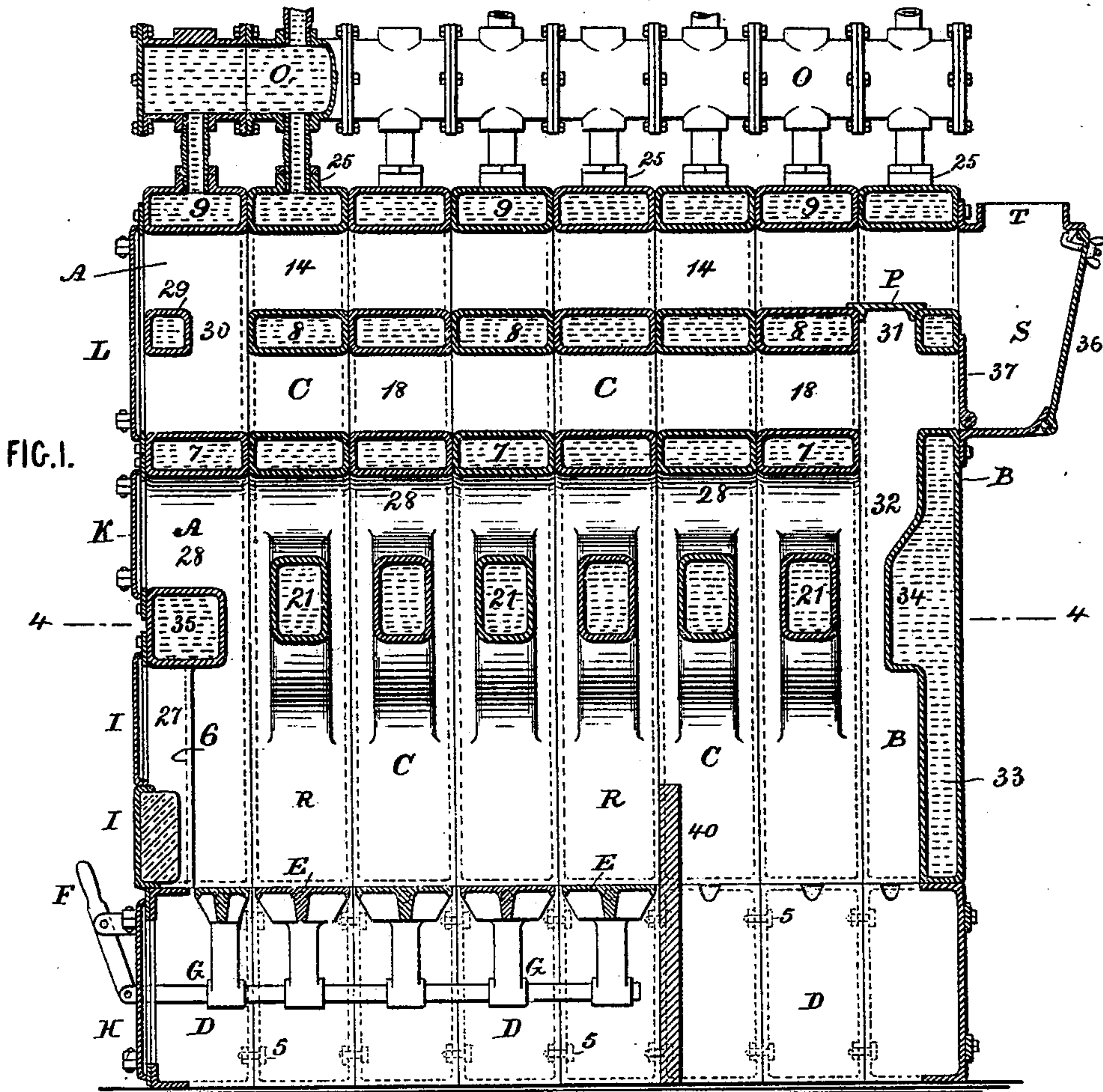
S. BURNS.

SECTIONAL BOILER FOR WATER AND STEAM HEATING.

(Application filed Apr. 27, 1898.)

(No Model.)

2 Sheets—Sheet 1.



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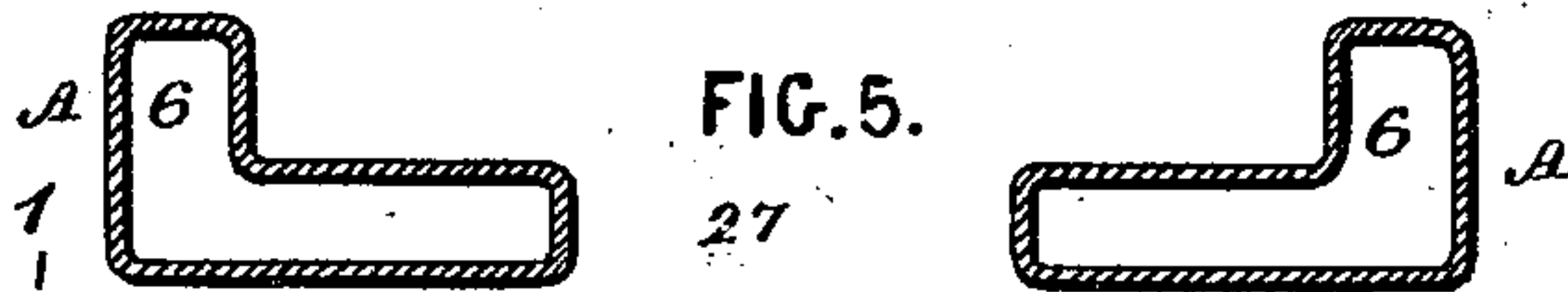
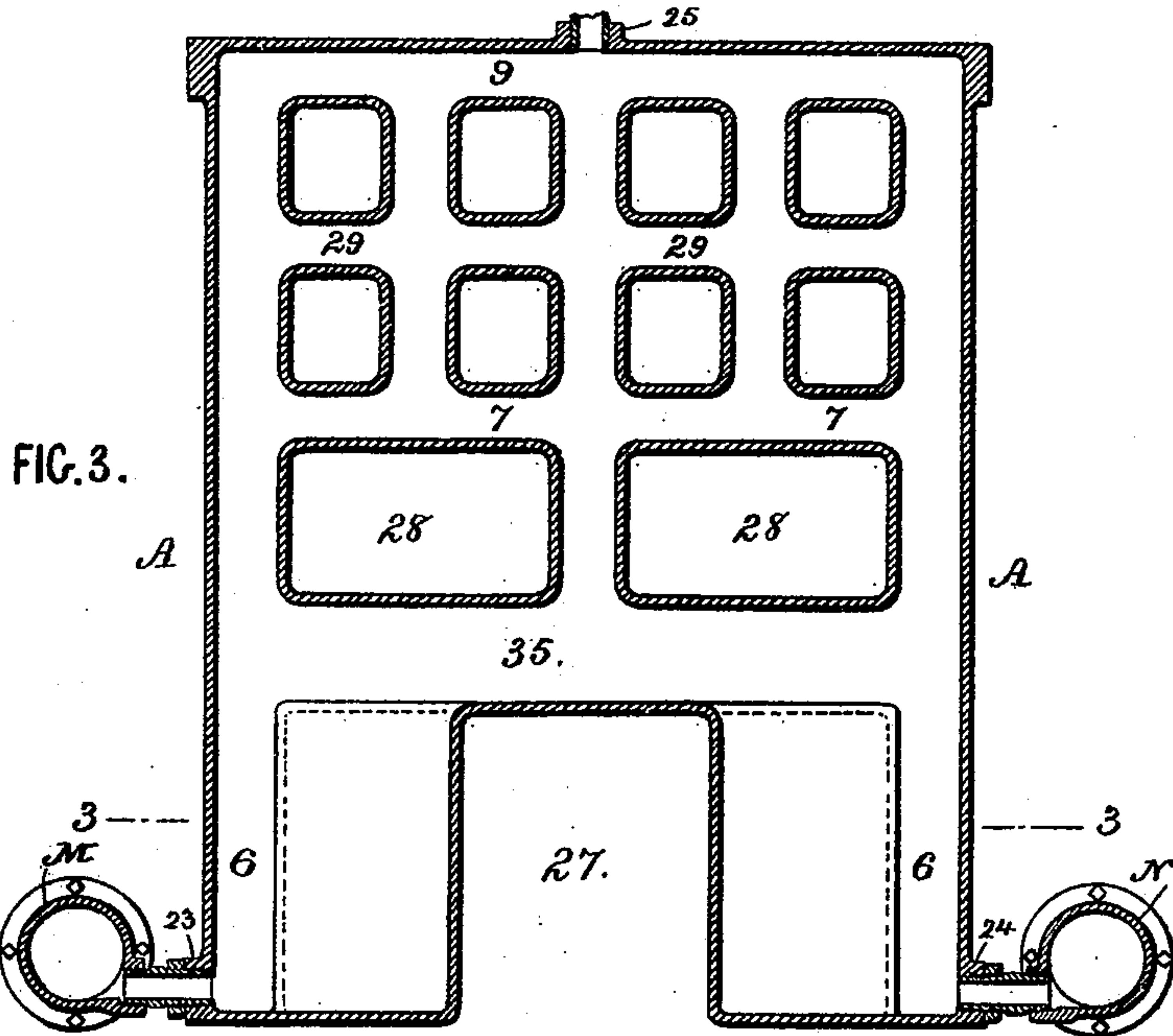


FIG. 2.

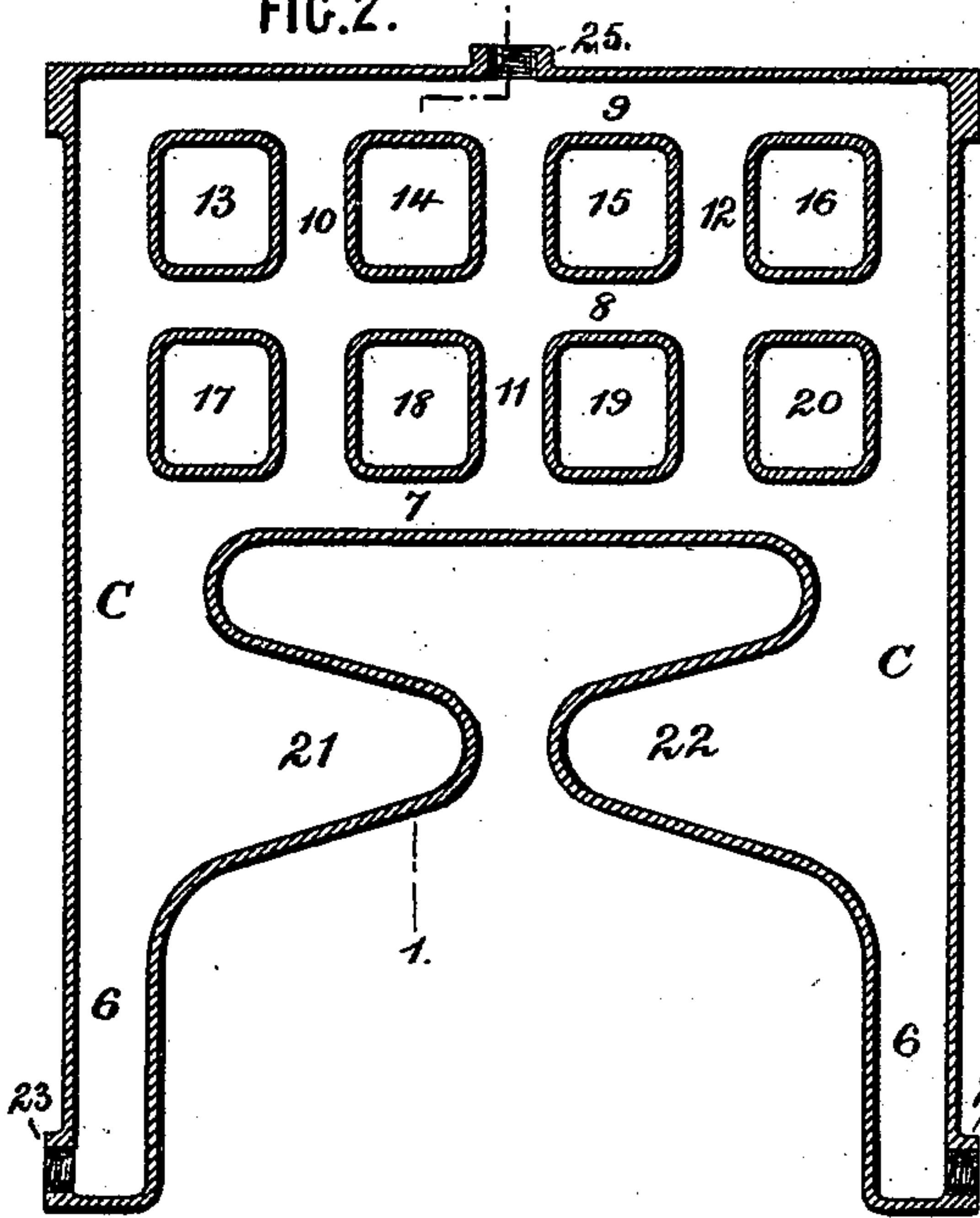
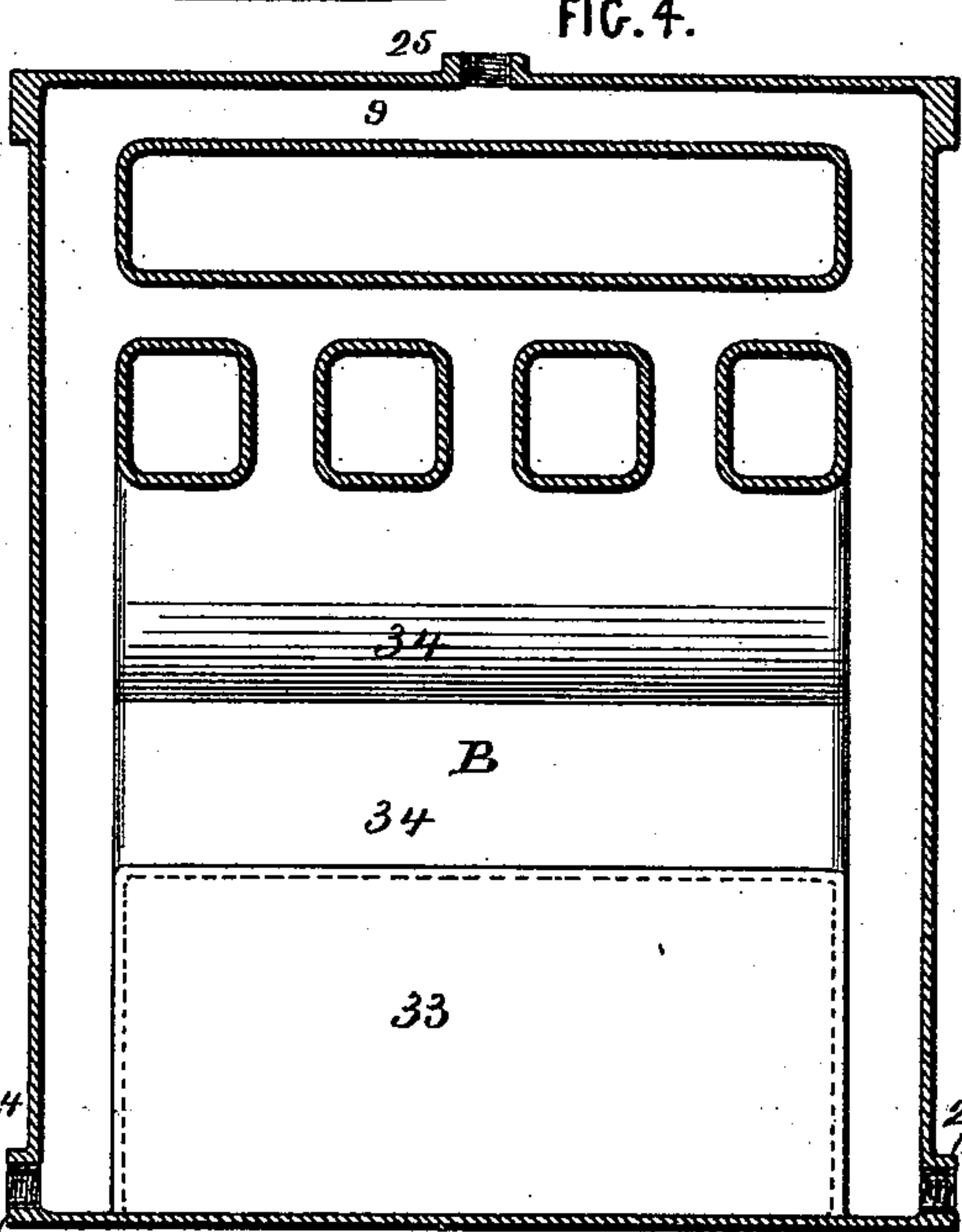


FIG. 4.



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UNITED STATES PATENT OFFICE.

SAMUEL BURNS, OF JERSEY CITY, NEW JERSEY.

SECTIONAL BOILER FOR WATER AND STEAM HEATING.

SPECIFICATION forming part of Letters Patent No. 619,862, dated February 21, 1899.

Application filed April 27, 1898. Serial No. 678,935. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL BURNS, a citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented an Improvement in Sectional Boilers for Water and Steam Heating, of which the following is a specification.

Numerous boilers have been made of cast-iron in sections put together and in which the return circulation is to the lower parts of the legs and the heated water passes off from the top of each section, and in boilers of this character openings have been provided in the sections for the products of combustion to pass from one end toward the other of the range of sections.

The present invention relates to the peculiarities in the details of construction of the sections, as hereinafter described in detail, the front section being provided with an opening for a fire-door and with other openings for cleaning the flues, the rear section also having openings for the escape of the products of combustion to a flue-chimney, if desired, and also passages for the products of combustion that pass along the fire-chamber and return through the upper flues, and these end sections are constructed so that the connection can be made to the escape-flue at either the back or the front of the boiler, and the intermediate sections are made with reference to exposing a large extent of surface to the action of the products of combustion and to the free circulation of the water through such sections, and also to the formation of flue-passages through the upper portions of the sections for the products of combustion as they pass from one end of the fire-chamber to the escape-flue.

In the drawings, Figure 1 is a longitudinal section at about the line 1 1 of Fig. 2. Fig. 2 is a vertical section through one of the intermediate sections. Fig. 3 is a vertical section through the front boiler-section. Fig. 4 is a similar section through the rear boiler-section. Fig. 5 is a horizontal section at the line 3 3 of Fig. 2, and Fig. 6 is a horizontal section at the line 4 4 of Fig. 1.

The front section A and the rear section B

are at any desired distance apart, and the intermediate sections C C are similar and fill the space between the front and the back sections, and these intermediate sections C may be more or less in number. The boiler can be enlarged or contracted, as may be necessary, by adding or removing the intermediate sections and bringing the rear section nearer to or farther from the front section, and these sections are supported by ash-pit sections D, that are preferably of the same width as the other sections, so as to be set together and secured by bolts 5, and they support the lower ends or legs of the sections A, B, and C, and they are preferably in the form of boxes open at one side, so that the number of these ash-pit sections can correspond to the number of legs of the boiler-sections, and I have illustrated grate-bars at E, which are supported by the sections D and can be moved by the lever F and connections G, so as to shake the grate; but these parts may be of any desired character and do not need further description, and there are provided a suitable ash-pit door at H, a fire-door at I, and flue-doors K and L, which close the flue-openings in the front section, as hereinafter described.

The intermediate sections C are made with the hollow side or leg portions 6 and the cross connecting-tubes 7 8 9, and these legs and the cross connecting-tubes are of uniform width, so that the surfaces of the sections C C can set closely together at these portions, and in placing the sections together and making a tight furnace it is only necessary to apply a packing or adhesive material, such as asbestos cement, between one section and the next around the outer edges and wherever necessary at the flues, and the cross connecting-tubes 7 8 9 are united by the vertical tubes 10 11 12, so as to form flues 13 14 15 16 17 18 19 20. Below the cross connecting-tubes 7 there are inwardly-projecting water-chambers 21 22, that have inclined upper and lower surfaces, and they are not as wide as the sections C. Hence there is opportunity for the products of combustion to ascend freely between these water-chambers 21 22, and the water in these chambers 21 22 has an opportunity to circulate freely through them, and

at the same time such chambers absorb the heat from the fire, and they also protect the cross connecting-tubes 7 from the intense heat in the fire-chamber, and by making these
 5 water-chambers 21 and 22 in approximately the shape represented they are free to expand and contract under changes of temperature without the risk of the cast-iron cracking or the water-legs 6 6 being displaced by such con-
 10 traction or expansion.

The sections C C, as well as the sections A and B, have upon them bosses or hubs 23 24 25, which are to be bored and screw-threaded for the reception of the connecting water
 15 pipes or tubes. Usually it is advantageous to provide the connecting water-pipes M and N at the sides of the furnace with thimbles or connections to the bosses 23 and the water-pipes O above the furnace with screw-threaded
 20 thimbles connecting to the bosses 25, or the hot water may pass off through pipes connected with the hubs or bosses 24, and I remark that the pipes M, N, and O are preferably made in short sections bolted together, the
 25 lengths of such sections corresponding to the width of each boiler-section, and these tube-sections forming the return water-pipes and the pipes for the passage of the hot water are advantageously bolted together, as illustrated
 30 in Fig. 1. These water-pipes, however, may be of any desired character.

The end or front section A is provided with an opening 27 for the fire-door I and with upper openings 28 for the flue-doors K, and it
 35 is also advantageous to make the front section A with openings corresponding to the openings 13 14 15 16 17 18 19 20 of the intermediate sections, and these openings are to be closed by one or more doors L, and this
 40 front section A has a cross-pipe 7, corresponding to the cross-pipe 7 in the intermediate sections C, but in place of having another cross-pipe corresponding to the connecting-tube 8 of the intermediate sections the con-
 45 necting-tube 29 is narrower, so as to leave a flue 30 between the lower range of flues 17 18 19 20 and the upper range of flues 13 14 15 16. Hence when the products of combustion pass along through the lower range of flues such
 50 products of combustion can pass up through the flue 30 and return toward the rear through the upper set of flues, and at the rear end the boiler-section B is made with a flue 31, similar to the flue 30, for connecting the upper
 55 and lower ranges of flues, so that a baffle-plate P may be introduced above the flue 31 to close the same when the products of combustion pass from the rear end to the front and return, as illustrated in Fig. 1; but this
 60 baffle-plate is to be omitted when the products of combustion pass away at the front end.

In order to allow the products of combustion to pass up from the fire-chamber R to the lower range of flues, the rear boiler-section B is made with a flue at 32, across and

below the lower tier of flue-openings 17 to 20, so that the products of combustion pass freely from the fire-chamber to the flues, and it is advantageous to make the rear boiler-section B with a water-chamber 33 at the back of the
 70 fire-chamber R and extending across from one water-leg to the other water-leg, and by making a projection 34 in the rear boiler-section corresponding approximately to half of the water-chambers 21 22 the openings be-
 75 tween the water-chambers 21 22 of the intermediate sections and the rear section will be approximately similar to the openings between one intermediate section and the next, and in the front section A a similar projection
 80 35 is formed, but below the openings 28.

When the boiler-sections are set together in the manner shown in Fig. 1 and the products of combustion pass off at the rear, it is advantageous to provide a smoke-box S, with
 85 a door at 36 for cleaning the flues and with a damper 37, that when open allows a direct draft to the flue or chimney at T, and when this damper 37 is closed the products of combustion travel along the lower range of flues
 90 and return by the flue 30 in the upper range of flues and pass out into the smoke-box.

The boiler-sections constructed as aforesaid are not liable to crack by contraction in casting or by the action of the fire when in
 95 use, and any section that may be injured can be easily disconnected and removed and another substituted, and the furnace as a whole can be enlarged by the addition of intermediate sections whenever required.
 100

If the fire-chamber is to be limited to three or more of the boiler-sections, the same may be stopped off by a cross plate or wall forming a bridge-wall, and the ash-pit may be
 105 similarly shut off, the same being illustrated at 40, Fig. 1. The fire-door I may be made in upper and lower sections, as shown, the lower section being lined with fire-brick, so that it may ordinarily remain closed and support the fuel.
 110

I claim as my invention—

1. The heating-boiler having front and rear sections and intermediate sections, the intermediate sections having water-chambers 21,
 115 22, that are narrower than the thickness of the section and project from opposite sides toward each other and into the fire-chamber without coming into contact, and having inclined upper and lower surfaces, there being cross connecting water-tubes in the upper
 120 part of each section and flue-openings, substantially as set forth.

2. The heating-boiler having end sections and intermediate sections with the water-chambers 21, 22, the front end section hav-
 125 ing a fire-door opening and openings above to the upper flues of the boiler-sections and doors covering the same, and a cross connecting water-tube 7, and a narrower cross connecting water-tube 29, and an adjacent
 130

flue 30 to allow the products of combustion to pass from the lower to the upper ranges of flues, substantially as set forth.

5 3. The heating-boiler having front and rear sections and intermediate sections, the rear section having a water-chamber at the back end of the fire-chamber and a flue-opening at 32, between the fire-chamber and the lower range of flues in the intermediate sections

and a flue 31 between the upper and lower 10 range of flues that can be used for a direct draft, substantially as set forth.

Signed by me this 15th day of March, 1898.

SAMUEL BURNS.

Witnesses:

GEO. T. PINCKNEY,
S. T. HAVILAND.