

(No Model.)

2 Sheets—Sheet 1.

W. McDONALD.  
STEAM BOILER.

No. 406,001.

Patented June 25, 1889.

FIG. 1.

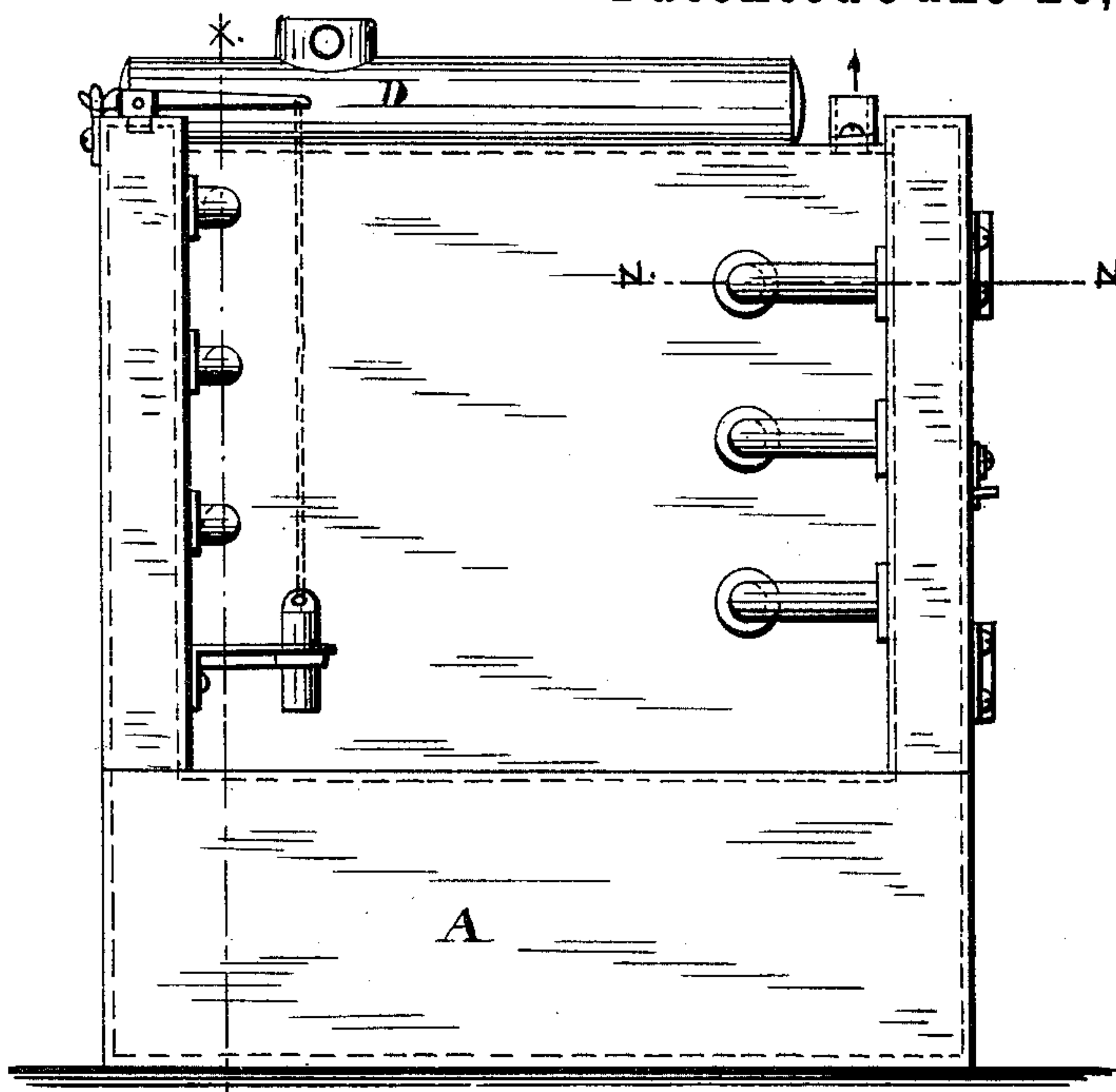
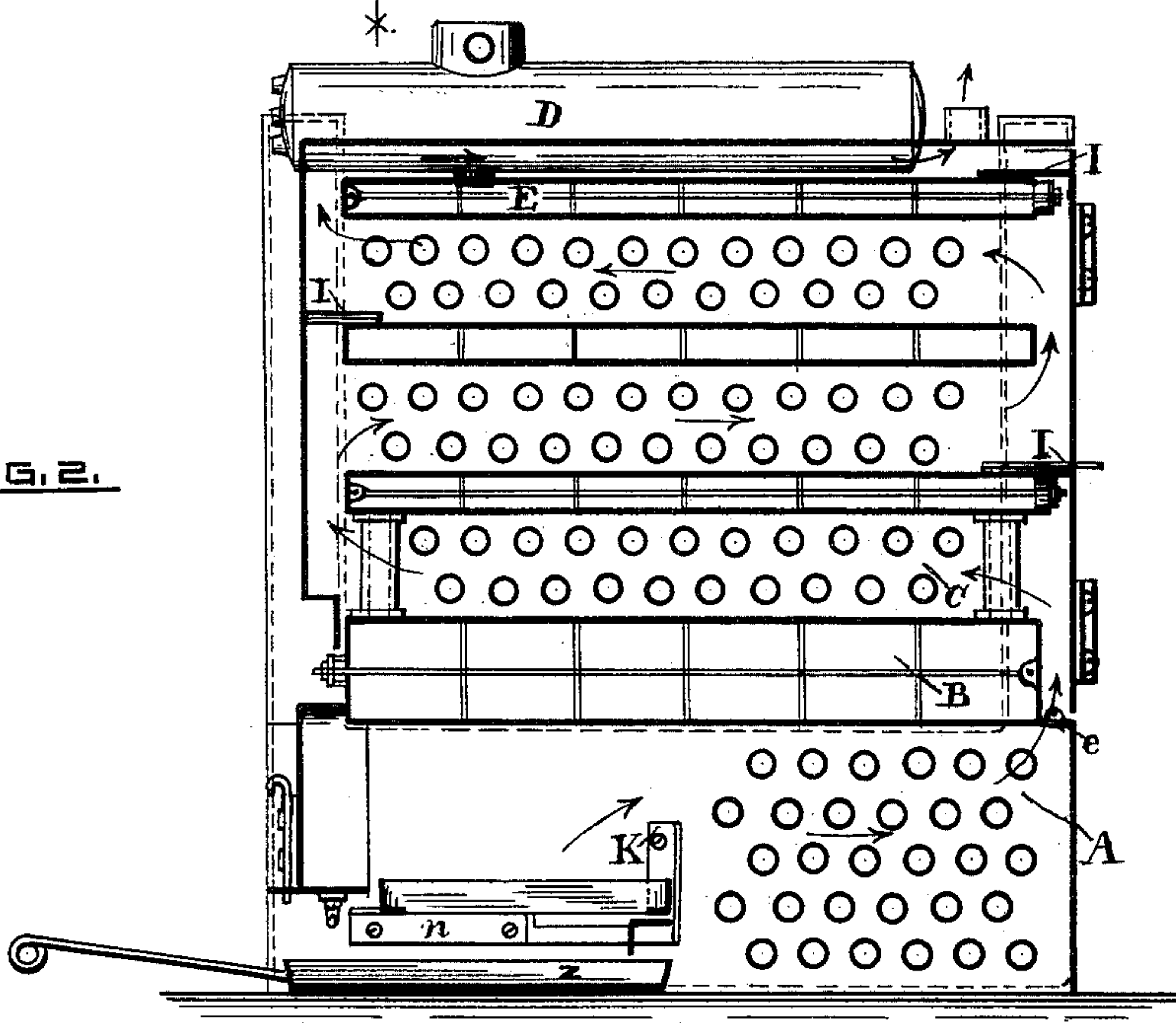


FIG. 2.



WITNESSES,

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INVENTOR,

*William McDonald*  
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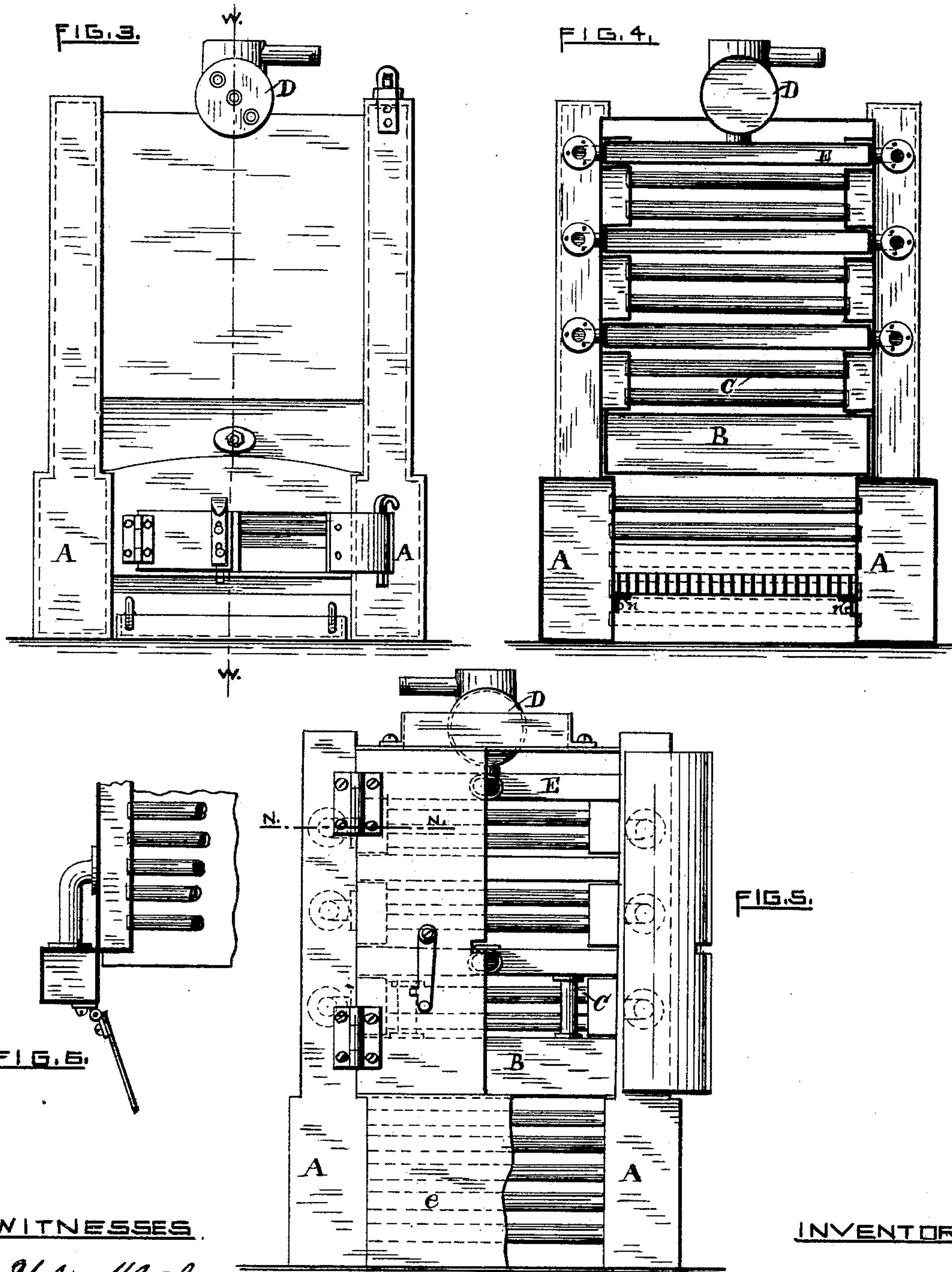
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# UNITED STATES PATENT OFFICE.

WILLIAM McDONALD, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR OF ONE-HALF TO CHARLOTTE M. HACKER, OF SAME PLACE.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 406,001, dated June 25, 1889.

Application filed December 11, 1888. Serial No. 293,281. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM McDONALD, a citizen of the United States, residing at Providence, in the county of Providence, State of Rhode Island, have invented a new and useful Steam-Boiler, of which the following is a specification, reference being had to the accompanying drawings, making a part of the same.

My invention relates to improvements in sectional boilers in which plain sections, in connection with tubular sections, are combined with each other; and the objects of my improvements are, first, to increase the heating-surface of the boiler; second, the utilizing of the heat in the conversion of water into steam, and, third, the saving of fuel. These objects I attain by the combined sections, with their parts arranged similarly, as illustrated in the accompanying drawings, which I now will proceed to describe, in which—

Figure 1 is a vertical side view showing outside connecting-pipes to different parts. Fig. 2 is a vertical sectional side view across from the line W W in Fig. 3, presenting ends of inside boiler-pipes, and showing flues for the passage of heat and smoke. Fig. 3 is a vertical front view as it may appear in use. Fig. 4 is a vertical sectional front view across from the line X X in Fig. 1, showing the furnace and connecting-pipes to the different parts or sections. Fig. 5 is a vertical back view with one door thrown open and a portion of the back plate of the lower section cut away, showing inside boiler-tubes. Fig. 6 is a sectional top view of one end of a tubular section on the lines N N, Figs. 1 and 5.

Similar letters of reference indicate corresponding parts in the several views of the drawings.

The first section is constructed with two elongated tanks A A, Fig. 4, which are held at a suitable distance apart by a back plate e, and a number of boiler-tubes at their inside rear ends, (shown in Fig. 5,) and also by a central cross-piece K, Fig. 2, which cross-piece forms the back of the fire-place or furnace, and divides the furnace from the rear tubular portion or flame-chamber. If necessary to add more strength to the lower section, iron plates extending across may be riveted to the bottom of tanks A A, and in

holding the width of the boiler. The flame-chamber is provided with an ash-pan or dust-collector Z, Fig. 2, which is made to slide underneath the lower row of tubes, and may be withdrawn at any time to be emptied. The supports n n for the grate-bars are attached to the inner sides of tanks A A at the furnace end. (Shown in Figs. 4 and 2.) Square pipes are connected at the top of said tanks A A, one at each end. These pipes stand perpendicular and extend to the height of the boiler, as illustrated in the drawings, the top end of one being represented in section, Fig. 6. Said pipes are for the purpose of making outside connections to the number of boiler-sections, similar to those I have illustrated in Fig. 1. It is not necessary, however, to have these perpendicular square pipes, as independent connecting-pipes from one section to another, either from the outside or within the flue or smoke-passage, may be used with an equal advantage for a continuous flow of the water through the several sections.

The second or plain section B is similar as a flat elongated square-ended tank, and of the proper length and width to span over the fire-place and flame-chamber resting upon the tanks A A of the lower or first section, as in Fig. 4, and its position lengthwise being adjusted a sufficient distance at its rear end forward from the back plate e of the flame-chamber, Fig. 2, by which arrangement the top of the fire-place and flame-chamber are formed, leaving a flue or smoke-passage in the rear. (Shown by arrows in Fig. 2.)

The third or tubular section C is constructed with two narrow elongated tanks a suitable distance apart, having inside boiler-tubes connecting said tanks their entire length. An upper side sectional end view of one is represented in Fig. 6.

The several other sections (illustrated in the drawings above the ones herein described) are similar in their construction, with the exception of the upper plain tank-section E, which has a round boiler D connected to its upper side. Said boiler D is provided with a dome or steam-chamber, from which the steam may be taken when in use, and to the front end the gage-cocks are attached the ordinary way. In its construction with section E it is arranged forward thereon within a cov-



ering-plate, forming a smoke-passage underneath and an exit-flue in the rear.

To make a continuous circuit throughout the number of sections, extension-plates I I I are riveted to opposite top ends of the several plain tank-sections, said plates, as applied, resting against a front casing or covering plate of the boiler and closed doors of the rear end, Fig. 2. The same result may be attained by arranging the several plain tank-sections in a zigzag position forward and rearward in relation to each other, their extended ends resting against the front and rear covering plates or doors in a similar manner, as before described.

It may be plainly seen that by an alternate tank and tubular section connected similarly to those herein described, and arranged with covering plates or doors, as shown in Figs. 3 and 5, and section, Fig. 2, the heat-passage may be so constructed as to circulate the heat from the fire at the furnace, through the flame-chamber, around the tubes, then upward through the rear flue, and continue in the direction of the arrows before taking its exit at the rear of boiler D.

In my improved boiler consisting of tubular and plain tank-sections, one above the

other, a greater amount of heating-surface is attained. The fire being directly underneath and the natural tendency of heat to ascend, the heat passing from one section to the other will be utilized by the rearward and forward continuous circulating passages of the boiler before being allowed to escape therefrom, whereby a less amount of fuel would be required for the generating of steam.

I am aware that prior to my invention sectional boilers have been made. I therefore do not claim a sectional boiler, broadly; but

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

In a sectional boiler, the combination of tubular sections and plain tank-sections, one above another, with their pipe-connections, and covering plates or doors so arranged at the ends of the sections in forming rearward and forward passages for the circulation of heat, substantially as described and illustrated in the drawings, and for the purpose specified.

WILLIAM McDONALD.

Witnesses:

WILTON H. SPENCER,  
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