(No Model.)

J. A. MUMFORD.

STEAM BOILER.

No. 368,679. Patented Aug. 23, 1887.

Fig. 1.

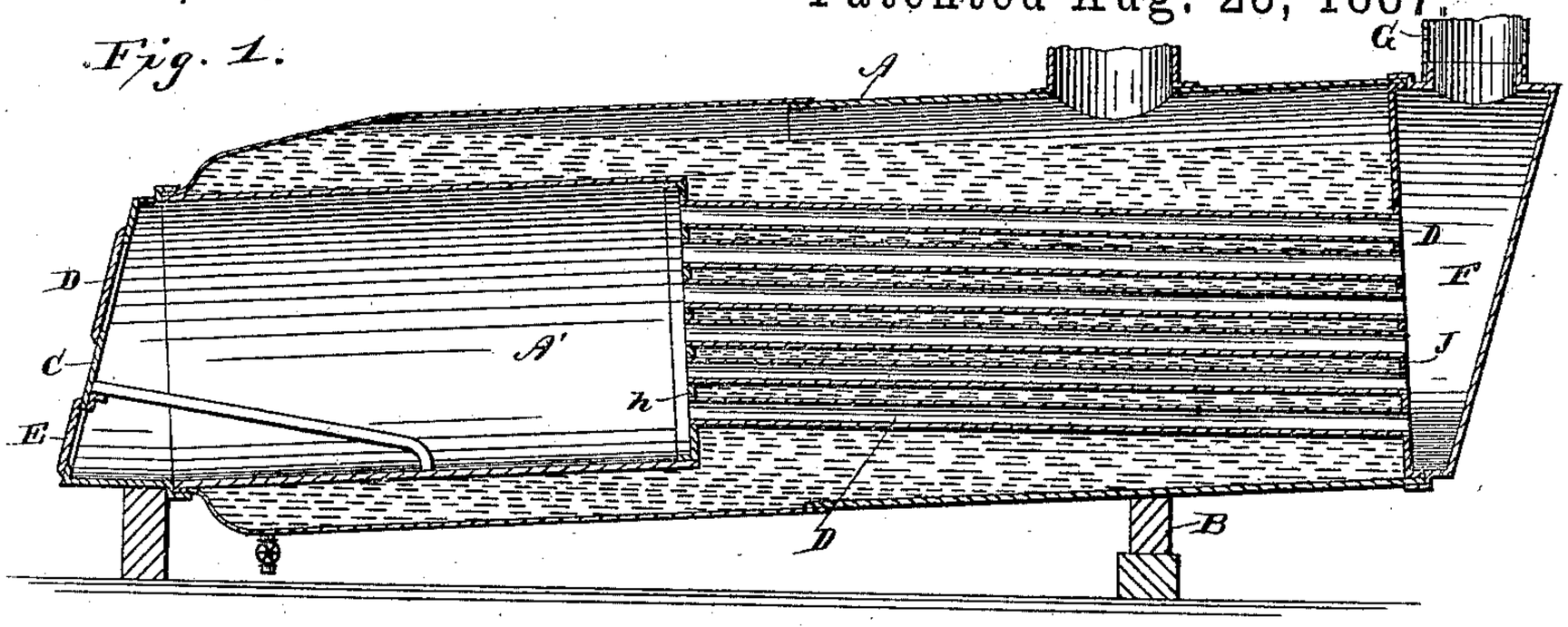


Fig. 2.

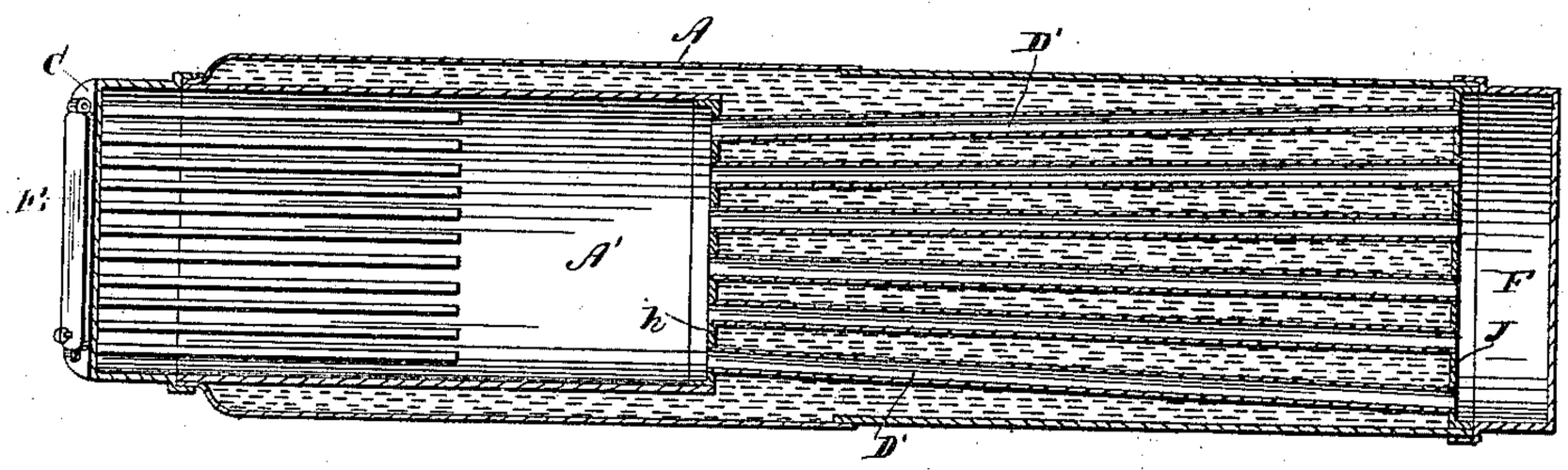
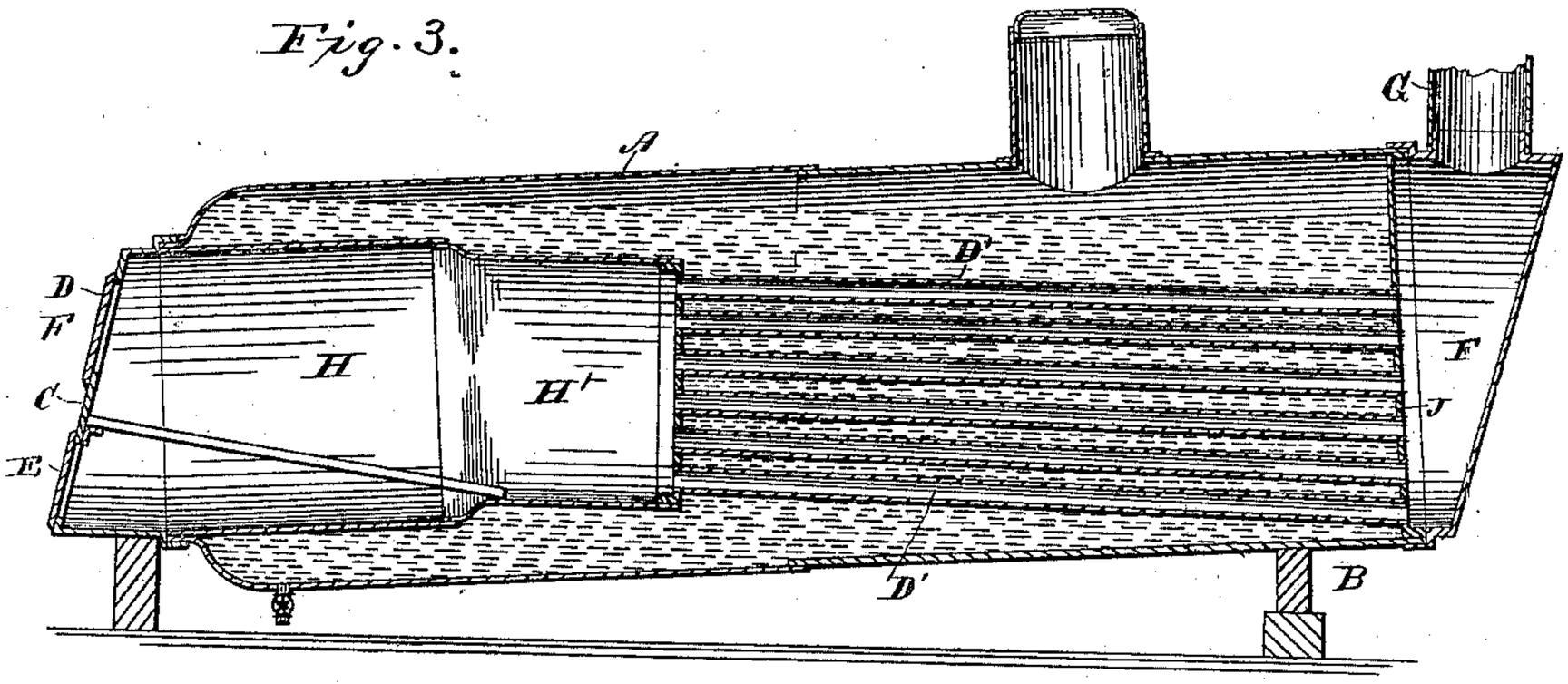


Fig. 3.



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STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 368,679, dated August 23, 1887.

Application filed February 5, 1887. Serial No. 226,682. (No model.) Patented in Canada February 10, 1887, No. 25,962.

To all whom it may concern:

Be it known that I, JOSEPH A. MUMFORD, of Hantsport, Nova Scotia, Canada, have invented certain new and useful Improvements in Steam-Boilers; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

My invention relates to improvements in steam-boilers, more particularly to that class employed for portable agricultural machinery, in which the boiler-shell is inclined and the tubes are either inclined or horizontal, as desired. One form of boiler constructed in substantially this manner is shown in Letters Patent No. 305,460, granted October 5, 1886, and the present invention is designed as an improvement thereon.

In the patent referred to the fire-box is formed tapering, with the smaller end toward the rear or chimney end of the boiler, and this for the purpose of having no portion of the fire-box casing project above the surface of the water in the boiler, and the liability of burning through will thus be diminshed; but the number of tubular flues that can be accommodated in the end is small, and they are somewhat crowded, which is detrimental to the advantageous working of the boiler, while the end of the boiler could of course accommodate a larger number of tubes; and my present invention has for its object to improve boilers of this class in the respect of providing flue-surface proportioned to the amount of water to be converted into steam. In the formation of the fire-box casings shown in my former patent it is not convenient to bend and roll the metal into a cone or tapered shape as into a true cylindrical shape; and it is therefore another object of my present invention to provide an improved fire-box adapted to a boiler such as described, which shall obviate any difficulties in this direction.

In the accompanying drawings, Figure 1 is a vertical longitudinal sectional view of a boiler constructed in accordance with my present invention; Fig. 2, a horizontal longitudinal sectional view of the same; Fig. 3, a modified form of fire box.

Similar letters of reference in the several figures indicate the same parts.

A represents a shell of a boiler constructed, as ordinarily, of a cylindrical shape, supported in inclined position on a bed by means of a block, B, secured at its rear end, as shown, or adapted to be secured in any suitable manner to suitable supporting-wheels, so as to maintain it in inclined position. The front is furnished with the casting or casing C, inclined as shown, forming the front of the fire-box or furnace and provided with two doors, D and E, the former for the insertion of fuel and the latter for the removal of ashes. The rear end is provided with the casing F, forming a smoke-box, to which the stack G is connected, as shown.

The furnace or fire-box to which a portion of my present invention relates (lettered A′ in the drawings) is constructed of one or more metallic cylinders secured to the end of the main casing, either by bending the casing inward and riveting it or the inner casing may be drawn out and the two secured by transverse rivets in any suitable manner, as may be most convenient. The diameter of this cylinder is of course less than that of the main casing, and it is provided, as ordinarily, with the sheet *h* at the rear end, to which the ends of the flues D′ are secured in any well-known or preferred manner, their rear ends being secured to the sheet J at the rear of the boiler, as will be readily understood.

As one of the objects of my invention is to prevent the ends of the fire-box or the tubes becoming dry, the former extends some distance within the main shell or casing and the latter extends from the sheet *h* rearward, the upper ones being substantially horizontal, or, at most, but very little inclined, so that the level of the water will always be above both the tubes and the fire-box. The fire-box, being of cylindrical shape, can be more readily constructed than if it were tapering, as an ordinary rectangular shell of metal can be rolled up into shape and the edges secured by riveting or welding, requiring no special cutting or fitting.

While I have described the flues as being substantially horizontal, I do not necessarily confine all of them to this position, as it is only

essential that those nearest the surface of the water be so. When employing the fire-box shown in Fig. 1, I secure the proper number in the head therein, placing them as close together as may be found convenient, or to produce the best results, and then separate them somewhat horizontally as the rear or chimney end of the boiler is approached, as shown in Fig. 2, the ends being secured to the rear sheet, so that a greater quantity of water can circulate between them and be converted into steam. With this arrangement of flues I obtain all the advantages of a fire-box having an end large enough for the accommodation of enough flues to fill the rear sheet and yet secure all the flues to the end of the box and distribute them throughout the rear sheet, so as to heat the maximum amount of water. While this arrangement can be applied to horizontal boilers, it is especially applicable to boilers of the inclined type, as shown, as the space for the water gradually decreases as the rear end is approached and the lower flues can be inclined at the same angle as the boiler-bottom when desirable, thus spreading them horizontally, and at the same time inclining them toward the furnace end of the boiler, utilizing the greatest number of them.

In Fig. 3 I have shown a fire-box composed of two sections, the outer one, H, being substantially parallel with the outer shell and the inner one, H′, smaller and connected to the end of the first-mentioned section, so as to form a substantially horizontal section, extending parallel with the water-line and wholly submerged, and it is to the end of this section H′ that the ends of the flues are secured in any suitable manner. The shoulder formed in the end of the inner section may serve also as a convenient point for resting the grate-bars upon. It will thus be seen that any number of sections may be employed, making the fire-box extend quite a distance into the boiler, if desired, and this without the liability of exposing a portion above the surface of the water.

Making the sections of the fire-box smaller as the rear end of the boiler is approached is desirable when it is not convenient to incline the lower tubes, as shown in Fig. 1, though the latter may be spread laterally to any degree desired.

In the construction shown in Fig. 1 it is necessary, in order to guard against some evils, that the upper side of the fire-box be at a greater distance from the boiler casing or shell than the lower, in order to allow of the lowering of the water-line.

The usual grate-bars are of course inserted in the fire-box, and are preferably secured at their outer ends to the front casting with the ends resting upon the bottom or on any suitable support, and, if desired, a suitable blow-off cock may be inserted at the lowest point of the boiler below the fire-box.

If the rear end of the fire-box to which the flues are attached should be far above the rear end of the boiler, the tubes below the first row, say, could be inclined downward, as well as flared horizontally, so that they would present the appearance of springing from the fire-box head, as will be readily understood.

Various modifications of my boiler can be made without departing from the spirit of my invention, and I therefore do not desire to be confined to the exact construction herein shown.

I claim as my invention—

1. In a steam-boiler, the combination, with the main casing, of a fire-box therein, two flue-sheets substantially parallel, one of them forming the end of the fire-box, and the tubular flues located entirely below the water-line secured to the two sheets, the ends of the flues in the sheet nearest the rear or stack end of the boiler being separated farther apart than those at the fire-box end, substantially as described.

2. In a steam-boiler, the combination, with the main casing, of a fire-box therein, the two flue-sheets substantially parallel, and the tubular flues located entirely below the water-line and secured to the two sheets, the ends of the flues secured in the sheet at the rear or stack end of the boiler being separated farther laterally than those at the fire-box end, substantially as described.

3. In a steam-boiler, the combination, with the main casing, of the fire-box therein, the two substantially-parallel flue-sheets, one of them forming the end of the fire-box, and the series of tubular flues secured therein, the upper ones of which are horizontal, the ends of the flues secured in the rear or stack end of the boiler being located farther apart laterally than those at the fire-box end, substantially as described.

4. In a boiler, the combination, with the inclined main casing, of a fire-box composed of a plurality of cylindrical sections gradually decreasing in size toward the rear of the boiler and the flues connected therewith, substantially as described.

5. The combination, with the main boiler-shell, of a fire-box composed of a plurality of cylindrical sections gradually decreasing in size toward the rear, the last section to which the flues are connected being substantially horizontal, as set forth.

6. The combination, with the inclined main boiler-shell, of a fire-box composed of a plurality of cylindrical sections gradually decreasing in size toward the rear, and the substantially-horizontal flues connected therewith, substantially as described.

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