J. A. Miller,

Steam-Boiler Fire-Box.

No. 50,611. Patented Oct. 24, 1865.

Fig. 1.

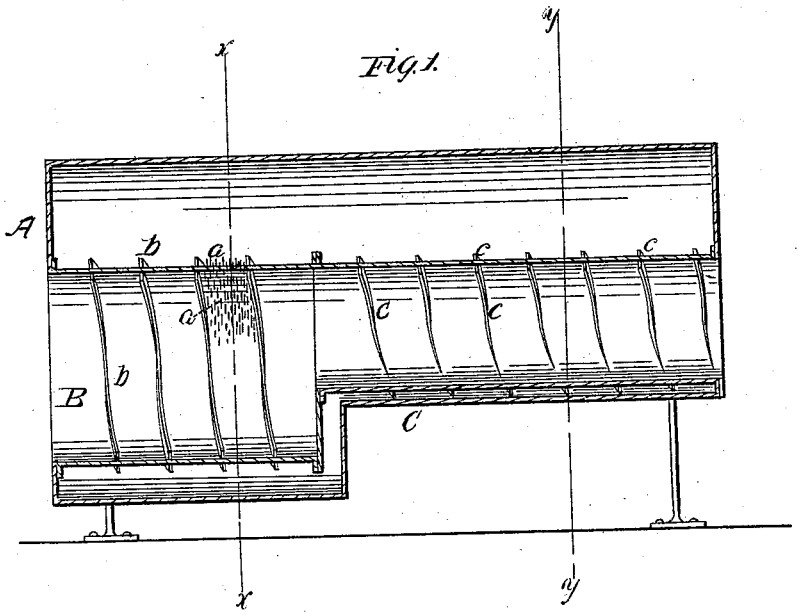


Fig. 2.

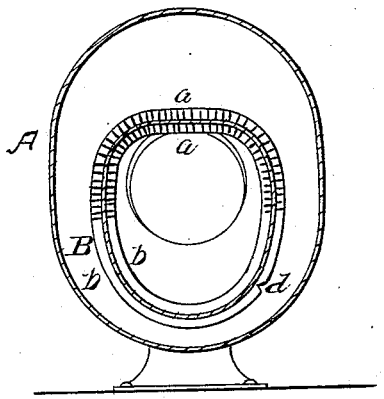
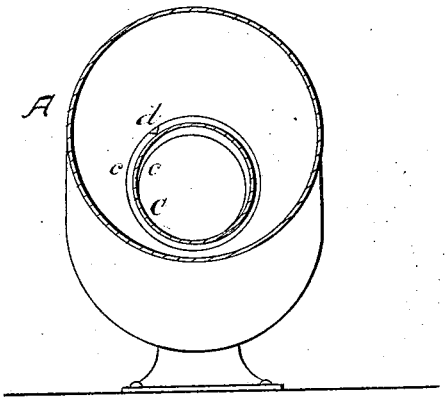


Fig. 3.



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IMPROVEMENT IN CAST-IRON BOILERS.

Specification forming part of Letters Patent No. **50,611**, dated October 24, 1865.

To all whom it may concern:

Be it known that I, J. A. MILLER, of the city, county, and State of New York, have invented a new and useful Improvement in Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a longitudinal vertical central section of this invention. Fig. 2 is a transverse vertical section of the same, the line *x x*, Fig. 1, indicating the plane of section. Fig. 3 is a similar section taken in the plane indicated by the line *y y*, Fig. 1.

Similar letters of reference indicate corresponding parts.

This invention consists in constructing the fire-box of a steam-boiler and also the boiler-flues of cast-iron strengthened by ribs or flanges projecting into the interior of said fire-box or flue, and also into the surrounding water-space. The fire-box is also cast with pins projecting inside and outside, whereby the heat-conducting power of said fire-box is increased; and such pins may or may not be cast on the flue. The ribs or flanges have a spiral or partially-spiral direction around the axis of the flue, and they diminish in the interior of the flue toward the bottom thereof, leaving that part smooth for the purpose of facilitating the removal of soot and ashes.

A represents a steam-boiler, the fire-box B of which is constructed of cast-iron, strengthened by ribs or flanges which project in the surrounding water-space, and also into the interior fire-space of the fire-box. These ribs not only serve to strengthen the fire-box, but they also materially increase the heat-conducting power of the same. The spaces between the flanges or ribs are or may be occupied by a series of pins, *a*, projecting inside and outside, as clearly shown in the drawings. The object of these pins is to increase the heat conducted through the cast-iron plates, and they are cast solid with the same so that they are easily made and the cost of the plates is not much increased. The flue C is also made of cast-iron and provided with ribs or flanges *c*, which project on the inside and outside, the same as those on the fire-box. If desired, the spaces between these flanges may be filled up with heat-conducting pins. The ribs on the fire-box and on the flue extend in a spiral or partially-spiral direction, and those in the interior of the flue diminish toward the bottom thereof, leaving the same smooth, so as to facilitate the removal of dirt, ashes, and soot. Nicks *d*, cast into the ribs at certain intervals, allow them to expand and contract freely by the heat and prevent injury by sudden or unequal expansion.

The advantages of this arrangement are manifold. In the first place, careful experiments of eminent philosophers, such as Peclet, have established the fact that the heat-conducting power of cast-iron in proportion to that of wrought-iron is as sixty-six to thirty-nine, or, in other words, if the heat-conducting power of clay is one, that of wrought-iron is thirty-nine, and that of cast-iron sixty-six. By the ribs and pins the heating-surface of the boiler is materially increased, and the whole available heat can be conveyed into the water in a shorter boiler with less flues than those made of smooth wrought-iron plates, and thus the cost of the boiler and its size are reduced, the latter item being of peculiar value for vessels of war, because it allows of placing the boiler below the water-line.

For ordinary steamships I place a series of egg-shaped flues above the crown-sheet of the fire-box, giving to the water free access to all parts of the external surface of the fire-box and flues. By the spiral form of the ribs the circulation of the water is facilitated and the formation of incrustation is avoided.

It is obvious that these improvements are applicable to locomotive and stationary steam-boilers with the same advantage as for marine boilers, and in all cases a great saving in fuel is effected.

The fire-box and flues are cast with strong flanges on their ends, where they are fastened together, and also to the shell or heads of the boiler, by rivets or screw-bolts; and if the flues or the fire-box are cast of two or more lengths, they can be fastened together in the same manner by placing a ring of boiler-iron between the same and calk, when riveted in the ordinary manner.

I claim as new and desire to secure Letters Patent—

1. The fire-box B, with ribs or flanges *b* projecting inwardly and outwardly therefrom, substantially as set forth.

2. The conducting-pins *a a*, projecting inwardly and outwardly from the shell of the fire box or flue, substantially as set forth.

3. The flue C, with oblique tapering ribs forming a portion thereof, as and for the purposes specified.

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