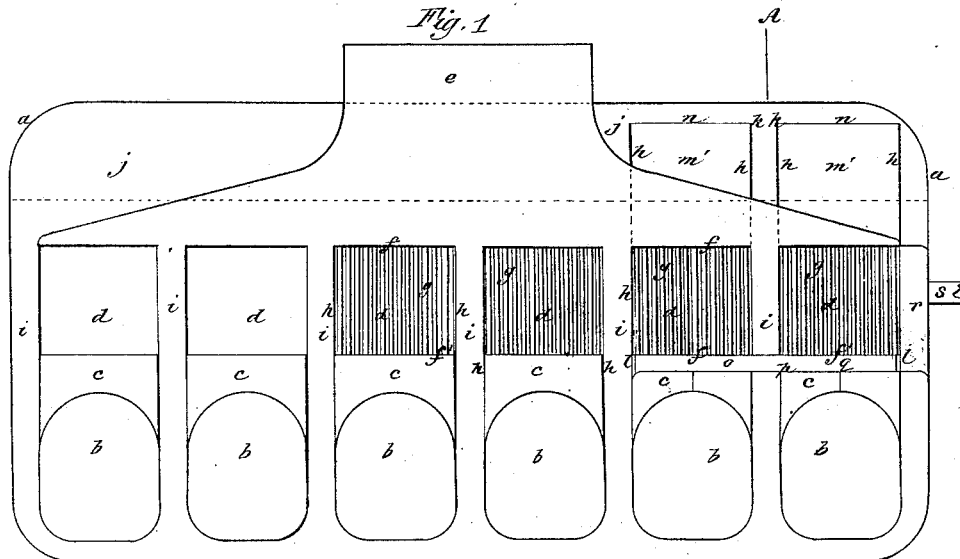
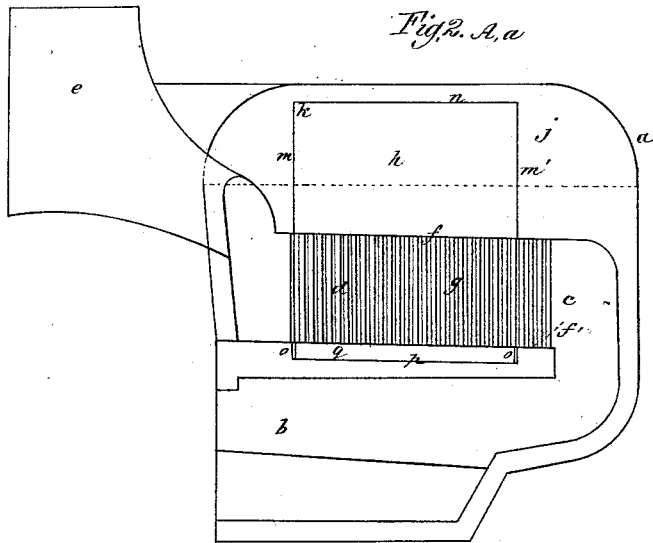


J. E. Neill,

Steam-Boiler Superheater.

N^o 45,739.

Patented Jan. 3, 1865.



Witnesses.

Wm. H. H. H. H.
A. de Lacy.

a Inventor
John E. Brill -

UNITED STATES PATENT OFFICE.

JOHN E. NEILL, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. 45,739, dated January 3, 1865.

To all whom it may concern:

Be it known that I, JOHN E. NEILL, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Steam-Boilers for Superheating Steam; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a longitudinal vertical section of a tubular boiler with my said improvement, and Fig. 2 a cross-section taken at the line A a of Fig. 1.

The same letters indicate like parts in both figures.

The object of my said invention is to facilitate the superheating of steam in the same boiler in which it is generated, and although my said improvement is applicable to the generality of tubular boilers, whether the water to be generated into steam be made to circulate through or around the tubes, I prefer to apply it to what is known as the "Montgomery boiler," and sometimes called the "Martin boiler," and therefore I will describe and represent it as being so applied.

In the accompanying drawings, *a* represents the outer shell of the boiler, and *b* a series of furnaces, communicating at the rear end by a series of flues, *c*, with the inside of what are called the "tube-boxes" *d*, the said tube-boxes being flue-spaces, through which the products of combustion from the furnaces circulate on their way to the chimney *e*. The tube-boxes consist of a top and bottom tube-sheet, *f f'*, in which are secured the ends of a series of vertical water-tubes, *g*, and two vertical sheets, *h h*, which form the outsides of the said flue or tube boxes and the insides of the vertical water-spaces *i i*, that connect the lower and upper portions of the body of the boiler. The heated products of combustion, in passing through the flue-spaces or tube-boxes, act on the outer surface of the series of vertical tubes, and thereby heat the water contained in them, and by rarefaction induce the water to rise in them and to descend in the surrounding water-spaces *i i*. In this way a rapid circulation of the water is induced through the tubes, the steam evolved rising into the steam-chamber *j* above.

For the purpose of superheating the steam

generated in such a boiler, I take one, two, or a greater number of the said tube-boxes, depending on the capacity of the boiler. In the example given in the accompanying drawings I have taken two and extend the outer side sheets or plates, *h h*, of each tube-box above the water-line of the boiler and nearly up to the roof of the boiler, as at *k k*, and I also extend two outer ones down below the bottom tube-sheet, *f'*, a short distance, as shown at *l l*; and I secure to the upper tube-sheet, *f*, other vertical plates, *m m* and *m' m'*, the two, *m m*, at the front edges of the tube sheets, and the other two, *m' m'*, within a short distance of the rear end, and unite these by water-tight joints with the ends of the side sheets or plates, *h h*, to form boxes or steam-chambers *n n*, extending some distance above the water-line of the boiler; and I apply two corresponding plates, *o*, to the bottom tube-sheets, *f' f'*, and secure them to the before-named outside plates, *l l*, and to these I secure a bottom plate, *p*. In this way I form two steam-chambers, *n n*, above the tubes *g*, and open at top to receive steam from the steam-chamber of the boiler and to supply it to the upper ends of the said tubes *g*, and one, *q*, at the bottom to receive the steam after it has been superheated by passing through the said tubes. The bottom chamber, *q*, must be provided with suitable means for carrying off the superheated steam to the place where it is to be used, which may be done by extending the upper tube-sheet, *f*, and the bottom plate, *p*, of the bottom steam-chamber, *q*, to the side of the shell of the boiler, and adding two end plates to form a steam-passageway, *r*, communicating with the steam-chamber *q*, and provided with a suitable nozzle, *s*, passing through the shell of the boiler, to which a steam-pipe may be secured. The usual water-space, *i*, is left between the two tube-boxes communicating at the ends with the water in the boiler. I do not extend the steam-chambers *n n* and *q* to the rear end of the tube-boxes; but I prefer, as represented, to leave some of the tubes at the rear end as water-tubes, for the reason that these, being nearest to the furnaces, are exposed to very high heat, and are protected against injury from such high heat by the circulation of water through them.

It will be obvious from the foregoing that any portion of the water-tubes of such a

boiler can be transformed into superheating-tubes by the application of my said invention; and it will be equally obvious to engineers that my said invention is applicable to other tubular boilers, whether the tubes be horizontal, vertical, or inclined, and whether the tubes of such boilers be arranged as flue-tubes or water-tubes. If they be water-tubes, the box applied at one end must be in communication with the steam-chamber of the boiler, and the box at the other end must be provided with suitable means for the discharge of the superheated steam; and if they be flue-tubes, then that portion of the flue-tubes of the boiler selected for the purpose must be incased, so that steam from the steam-chamber of the boiler shall pass around the said tubes, to be superheated, and then be conducted off to the place where it is to be used.

The proportion of the tubes of a boiler which are to be taken for this purpose will depend upon the extent to which it may be desired to superheat steam and upon what proportion of the steam generated in the boiler may be required to be superheated, and therefore this must be left wholly to the judgment of the constructor.

I do not wish to be understood as making claim, broadly, in this application to the plac-

ing of a superheating apparatus within a tube box or boxes or within the flue space or spaces of a steam-boiler, having made that the subject of another application of prior date to this, and now pending.

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

1. Incasing a portion of the tubes of a tubular steam-boiler, substantially as herein described, so that such casing shall extend on one side to the steam-chamber of the boiler, to receive steam generated in the boiler and conduct it to the tubes so incased, to be thereby superheated, and on the other side communicate with the outside of the boiler, to carry off the steam after it has been superheated, substantially as described.

2. Combining with superheating-tubes, or the equivalents thereof, a water tube or tubes, or the equivalent thereof, for the protection of the tubes or flues of a superheater against the intense heat of the products of combustion by causing such products to act first on surfaces protected by water, substantially as herein described.

JOHN E. NEILL.

Witnesses:

A. DE LACY,

WM. H. BISHOP.