J. McMullen,

Steam-Boiler Cleaner.

No. 10,964. Patented May 23, 1854.

Fig. 2.

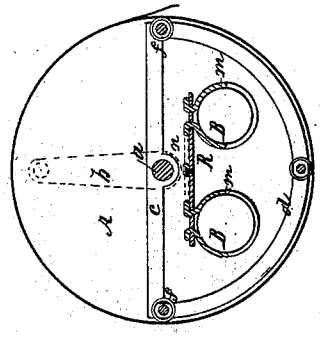
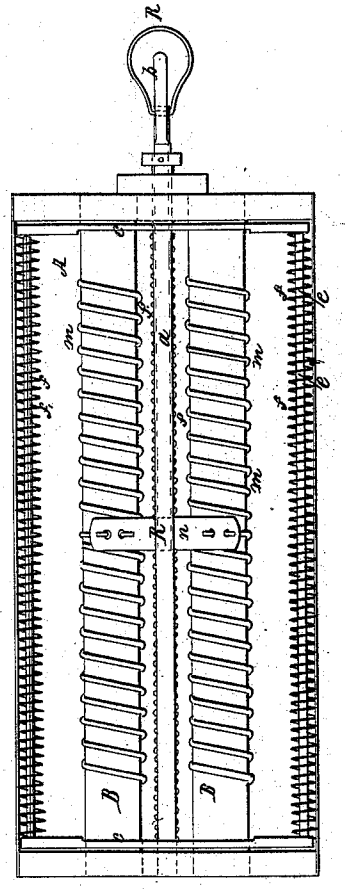
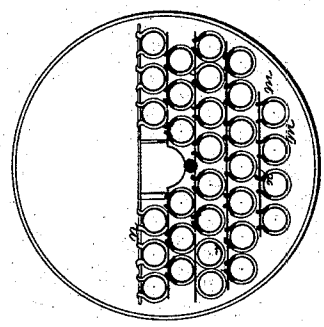


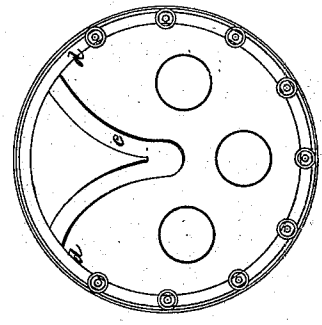
Fig. 1.



Y.



X.



UNITED STATES PATENT OFFICE.

JOHN McMULLEN, OF BALTIMORE, MARYLAND,

IMPROVED MECHANICAL MEANS FOR PREVENTING INCRUSTATIONS IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **10,964**, dated May 23, 1854.

To all whom it may concern:

Be it known that I, JOHN MCMULLEN, of the city of Baltimore, and State of Maryland, have invented a new and improved mode of preventing the incrustation of steam-engine boilers and causing an increased production of steam and in many cases preventing explosion; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, forming part of this specification, in which—

Figure 1 is an interior view of a boiler with two traversing tubes and furnished with my improved apparatus for preventing incrustation. Fig. 2 is a transverse section of the boiler, taken on line *x x* of Fig. 1.

Similar characters of reference in the several figures denote the same part.

The nature of my invention consists in the employment of certain mechanical arrangements, hereinafter to be described, for agitating the water of the boiler along its contact with the sides of the same, for the purpose of preventing the adhesion to the boiler of the sediment or saline substance from the water employed in the generation of steam.

Another object of the mechanical action which forms the basis of my invention is the increase in the quantity of steam generated by the continual removal of the steam-bubbles from the surface of the boiler due to said action, and effected as will be hereinafter fully set forth, as well also its action in preventing explosion.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

In the drawings, A is the boiler, passing longitudinally through which are the two tubes B, for illustration of my mode of agitating the water in tubular boilers, the same devices shown for two tubes being applicable with modifications to boilers with any number of tubes, or to any species of tubular boilers if welded tubes. Longitudinally through the boiler runs the shaft *a*, one end of which may be boxed in the inside of the boiler and the other end pass through a stuffing-box a few inches for the attachment of suitable gearing. In the drawings a crank, *b*, is attached. Should the boiler be of large dimensions and the shaft *a* necessarily long, one or more hangers may depend from the top of the boiler to sustain the shaft at intermediate points. At each extremity of the shaft *a* is the cross-bar *c*, permanently fixed to the shaft by a key or other suitable arrangement, and fastened to bars *c* are the circular pieces *d*, the bars *c* and circular pieces *d* being so arranged as to be capable of motion with the shaft as close to the ends and inside of the boiler as possible without touching. In case of the employment of hangers to sustain the shaft, cross and circular pieces *c* and *d*, as above described, must be placed upon the shaft near each hanger.

Running between the frames *c d* are the bars *e*, the number to be decided upon by circumstances, and each of these bars may be covered with a loose spiral, *f*, or any equivalent arrangement; or, if desired, chains may extend between the frames *c d* instead of the bars *e* and spirals *f*. This is the arrangement for a plain cylindrical boiler, which will be kept free from incrustation by the alternate partial revolutions of the shaft *a*, causing the spirals *f*, or whatever may be placed between the frames *c d*, to rub over or near the interior surface of the boiler at each movement of the shaft, thereby preventing the settling and adhesion of sediment by keeping any impurities there may be contained in the water constantly mixed with it, so that they may be blown out at stated periods during the movement of the agitator.

The tubes B are surrounded by spirals *m*, connected by a brace, *n*, to which is attached the rod R, one extremity of which protrudes through a stuffing-box in the end of the boiler. The reciprocating motion of this rod, caused by a suitable connection with the engine, moves the spirals *m* alternately backward and forward over the tubes, producing an agitation of the water surrounding them, with the same result as that above described for the spirals *f*.

The general arrangement above described would require but slight modifications to adapt it to tubular and many flue boilers, the principal change being in the form of the frame *c d*.

In the drawings, X shows the cross-section of a flue-boiler in which the cross-piece *c* is altered so as to run near the extremities of the extended curved piece *d*, which may support any required number of bars *e* and spirals

f. In the tubular boiler shown in cross-section by Y the spirals surrounding the tubes are all connected with a rod, which, operating as the rod R, moves the spirals over the surfaces of all the tubes in the same manner as described for the two tubes B shown in the drawings. The curved pieces *d* in this latter case may extend nearly or the entire circumference of the boiler and the cross-piece *c* become a forked arm, as shown in X. As the movement of the rim *d* is but small, the number of rods *e* and spirals or chains is proportionally increased, so that the entire inner surface of the boiler may be swept. These are but some of the many modifications which may be made to suit the various constructions of boilers, all of which will contain the general principles which govern the described arrangement.

The action of the spirals *f* and *m* with regard to the increase in the amount of steam generated is as follows: The continual action near the surfaces of the tubes and boiler by the spirals removes the bubbles of steam as fast as they are produced, and consequently exposes the surface of the boiler to be in constant contact with the water instead of the bubbles of steam, as it is often the case that the steam-bubbles produced so rapidly where the heat is most intense causes a thin stratum of steam to be held between the water and the surface of the boiler. This constant liberating of the steam as soon as formed cannot fail to greatly assist the generation and increase the quantity of steam generated.

Regarding the prevention of explosions by the employment of my agitating apparatus, I will here state that a frequent cause of explosion is the bursting loose of sediment, and consequent exposure of an overheated surface of metal, which, as the water comes in contact with it, produces explosive steam, either from the amount of steam suddenly generated or from the foaming condition of the water in the boiler, rendering the safety-valve ineffectual to give vent to it. As no sediment or foaming can accumulate or occur when my improved apparatus is employed, the danger of explosion from this cause is entirely obviated.

The throwing of the water above the water-line by the agitation produced will prevent danger of explosion from a low state of water in the boiler, as the boiler cannot become overheated while kept wet, thus forming a safeguard against another frequent cause of explosion, as the action of the bars *e* and spirals *f* or chains will always extend up to or above the water-line.

I wish it to be understood that I do not intend to confine myself to the precise mode of construction as herein described, but reserve liberty to vary it as occasion may require, the general principles and action being substantially as herein described.

I do not claim scouring the bottom of an upright boiler by means of chains attached to arms of an upright shaft; but

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

Agitating the water in steam-boilers and preventing incrustations in the same by the action of the spirals *f*, coiled around the bars *e*, attached to arms *c*, radiating from the shaft *a*, having an oscillatory rotary motion, and by the spirals *m*, coiled around the tubes B, having a longitudinal action, as herein described.

In testimony whereof I have hereunto signed my name before two subscribing witnesses.

JOHN McMULLEN.

Witnesses:

WM. P. ELLIOT,

SAML. GRUBB.