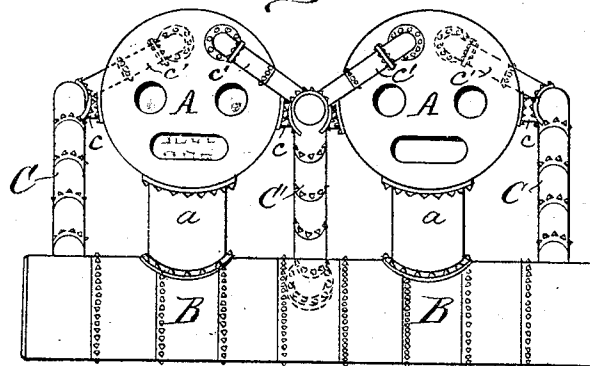
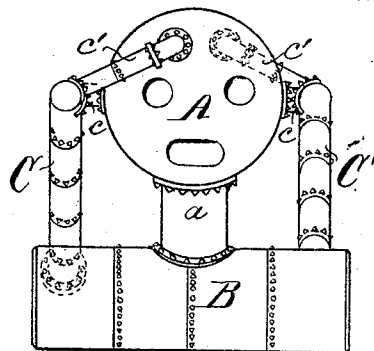
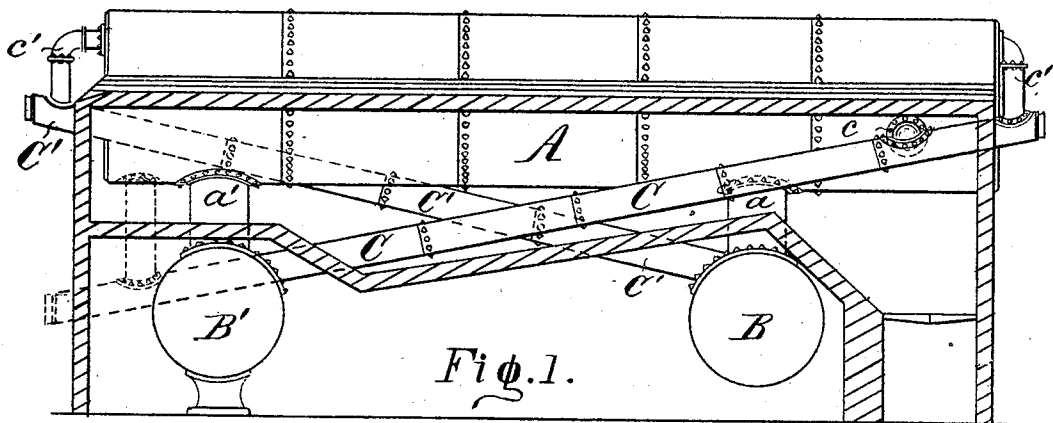


J. RYAN.
Steam-Generators.

No. 145,530.

Patented Dec. 16, 1873.



Witnesses:
Chas Meisner.
J. M. Ferthel.

Inventor:
Joseph Ryan
for
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UNITED STATES PATENT OFFICE.

JOSEPH RYAN, OF ST. LOUIS, MISSOURI.

IMPROVEMENT IN STEAM-GENERATORS.

Specification forming part of Letters Patent No. **145,530**, dated December 16, 1873; application filed September 22, 1873.

To all whom it may concern:

Be it known that I, JOSEPH RYAN, of the city and county of St. Louis and State of Missouri, have invented an Improved Circulator, Steam-Generator, and Equalizer for Steam-Boilers, of which the following is a specification:

This invention chiefly consists in the vice-versa arrangement of the circulating-pipes, either in connection with boilers or drums, so as to cause at one and the same time a reverse circulation of the water to take place, as will hereinafter more fully appear.

Of the drawings, Figure 1 is a side elevation. Fig. 2 is a front elevation; Fig. 3, a front elevation, showing circulating apparatus applied to one or more boilers.

A is the boiler. The boiler A connects, by legs *a a'*, front and rear, to mud-drums B B', as ordinary. C C' represent my improved circulating-pipes. The circulator C I arrange in the inclined position in order to achieve a better effect from the heat of the furnace, and as being conducive to obtain a better circulation. The circulator C I connect to front of boiler by a bonnet or leg, *c*, and at the rear to the rear drum B'. (See Fig. 1.) Similarly, the circulator C' is connected to front and rear of boiler A, but in reversed inclined position, so as to receive circulation from front of boiler or drum B, and discharge at the rear end of boiler, as shown in Fig. 1. Instead of the bonnets *c*, an addition or continuation of the circulators C C', as at *c'*, (see figures,) can be provided.

The circulation would, therefore, be as follows: Passing from rear of boiler A, through leg *a* and drum B', into rear end of circulator C, thence through same and discharging through leg or bonnet *c* or *c'* into the front of boiler A. Also, circulation would pass from front end of boiler A through leg *a*, front drum B into the opposite circulator C', thence through same, discharging through bonnet or legs *c c'* in rear of boiler A.

Here it will be noticed that there is thus obtained a vice-versa circulation—that is, as

the circulation of water from front of the boiler through circulator C takes place to discharge at the rear thereof, the opposite action of circulation of water through circulator C' from the rear end of boiler is caused at same time to discharge at front end thereof. Further—this vice-versa circulation gives a new result: the important feature of drawing, forcing, and otherwise by suction producing a vortex, by means whereof whatever impurities or deposits contained in the water and boiler are deposited in the mud-drums.

By means of the above manner of circulation, the same is better adapted by its nature to suit the varying conditions of the boiler as to temperature—also the construction of fire-beds—causing a more equalizing effect or action of the water to take place, and otherwise in general protecting any part of boiler from undue heat, besides being greatly conducive to the more rapid and full generation of steam.

Either one or the other of the circulators C C' can be used. Also, the arrangement of circulators C C' is readily adapted for use for a battery of boilers, with increased advantages as to improved circulation, equalization of water-levels, and generation of steam.

I claim—

1. The combination, with relation to boiler A or drums B B', of one or more circulating-pipes, C C', bonnets *c c'*, arranged as herein shown and described.

2. The arrangement of the pipes C C' with relation to boiler A or drums B B', so that, as circulation of water takes place through pipe C, from front of boiler to discharge at rear thereof, there is, at same time, an opposite action of circulation taking place through pipe C' from the rear of boiler, and discharging at front thereof.

In testimony of said invention I have hereunto set my hand.

JOSEPH RYAN.

Witnesses:

WILLIAM W. HERTHEL,
CHAS. MEISNER.