

(No Model.)

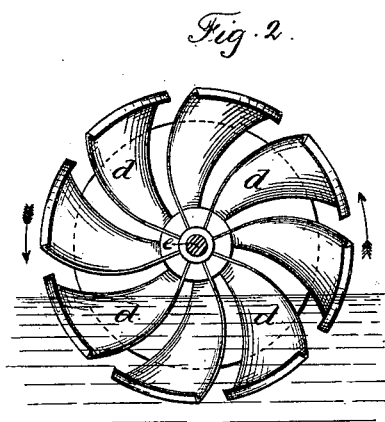
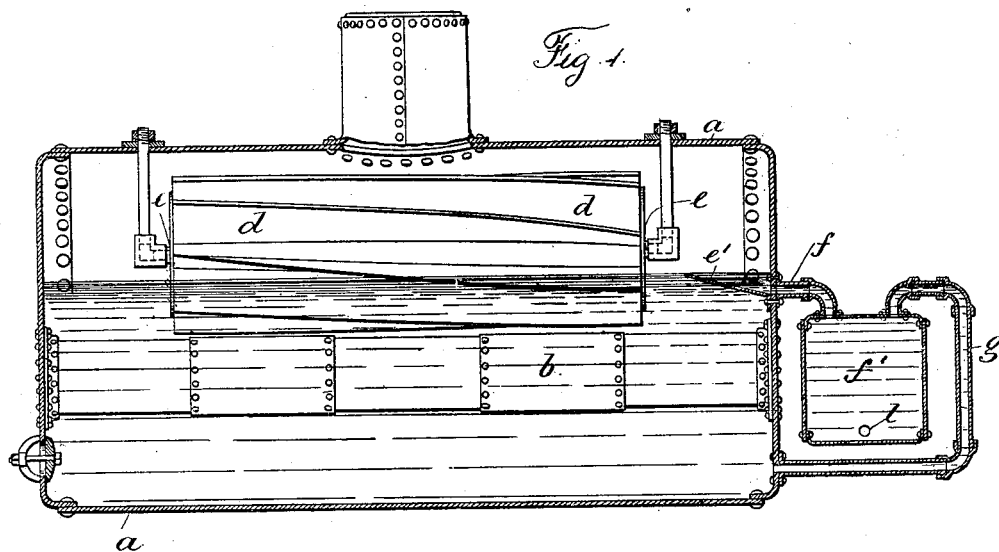
2 Sheets—Sheet 1.

E. FOX.

SURFACE AGITATOR FOR STEAM BOILERS.

No. 266,686.

Patented Oct. 31, 1882.



Witnesses
J. Haib
Chas. H. Smith

Inventor
Edward Fox
per Lemuel W. Perrell atty

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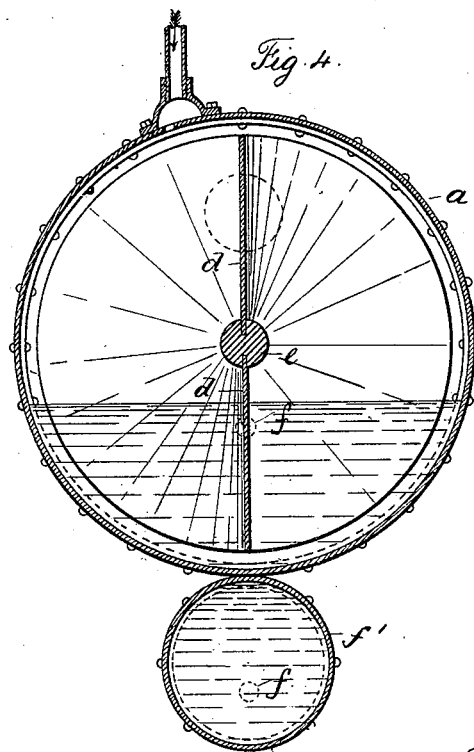
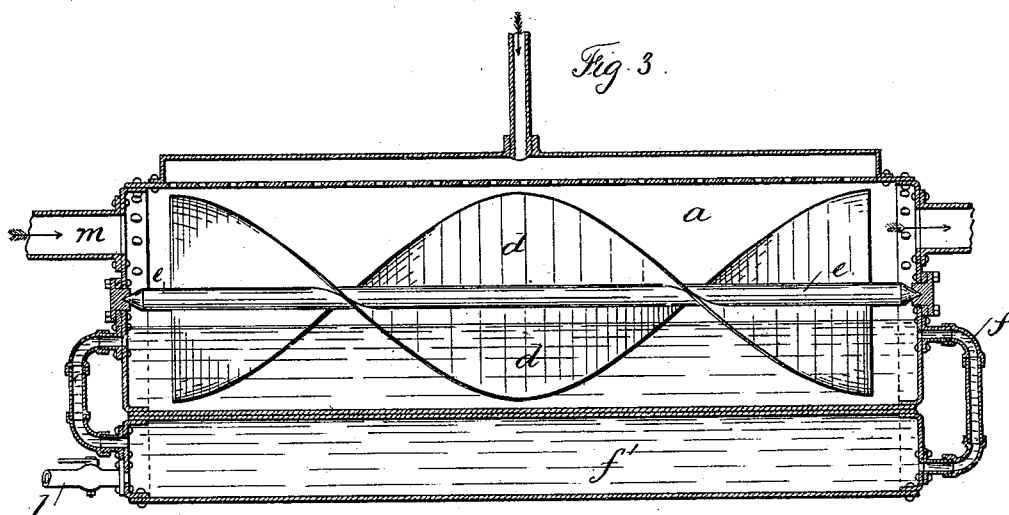
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UNITED STATES PATENT OFFICE.

EDWARD FOX, OF BROOKLYN, NEW YORK.

SURFACE-AGITATOR FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 266,686, dated October 31, 1882.

Application filed September 12, 1882. (No model.)

To all whom it may concern:

Be it known that I, EDWARD FOX, of Brooklyn, in the county of Kings and State of New York, have invented an Improvement in Surface-Agitators for Steam-Boilers and Feed-Water Heaters, of which the following is a specification.

I make use of an automatic agitator for steam-boilers and water-heaters, which by its revolution exposes a large amount of wet surface in the steam-space, and a circulation of the water is maintained by the revolution of the agitator, so that the impurities rising to the surface are caused to flow toward a mud drum or chamber that is combined with the boiler or heater and receives the impurities, and from which the sediment is blown off from time to time.

In the drawings, Figure 1 is a vertical section of a boiler with my improved agitator placed therein. Fig. 2 is an end view of the agitator. Fig. 3 represents the agitator as applied to a feed-water heater, and Fig. 4 is a cross-section of the same.

The boiler or water-holder *a* is of any suitable size or shape. When used as a boiler there can be tubes or flues through the same of ordinary character, as at *b b*, and the fire-chamber may be at one end or beneath the boiler.

The automatic agitator employed by me is made of blades *d d* upon a shaft, *e*, the said shaft being supported upon suitable hangers or bearings within the boiler or water-vessel *a*. The blades *d d* are inclined or screw-formed and placed at a quarter or less inclination to the shaft. In Fig. 1 the inclination is much smaller than in Fig. 3. In either instance the shaft is to be placed above the water-line, so that the revolution of the agitator will cause a movement of the surface-water toward one end. At the end toward which the water flows there is a ledge, *e'*, to render the water above the ledge free from agitation by bubbles of steam rising, and a pipe, *f*, passing from above the ledge to the mud drum or chamber *f'*, and another pipe, *g*, leading from the said mud-drum to the lower part of the boiler. The scum or foreign matter from the water is passed by the circulation set up by the agitator toward the mud-drum, and the water and impurities flow through the circulation-pipe down into the mud-drum, in which the foreign sub-

stances subside, and are blown off through the pipe *l*. The drum and pipes, being below the water-line, are constantly full of water, and, there being no external heat, there will be a downward circulation, the water returning to the boiler, but the heavier particles subsiding in the mud drum or chamber. In the agitator for the water-heater the rush of steam, as it passes from the exhaust by the pipe *m*, causes the agitator to revolve, and in so doing the water is stirred up, bringing up the cooler water from the lower part of the heater, and the steam condenses on the blades, and the water and the blades become heated; but there is no obstruction to the passage of the exhaust-steam, because the agitator turns very freely as the steam passes along in the upper part of *a*, and the steam imparts heat to the blades and the water in the heater, and the feed-water is purified to a considerable extent by the agitator passing the scum, floating grease, and other impurities into the mud drum or chamber *f'*, from which they are blown off from time to time. The agitator in the boiler is also revolved by the action of the steam, because, as such steam rises, the inclined and twisted form of each blade causes an accumulation of steam beneath the blades successively on the right side of the agitator, Fig. 2, so that that side is rendered buoyant and rises similar to the wheel in a gas-meter; and with this object in view the blades are to be curved, as shown, and formed with ledges or flanges at the edges, and with ends to retain the steam and cause it to accumulate and exert the force required to revolve the wheel. As the agitator revolves automatically, its surfaces are constantly wet, and in the feed-water apparatus the agitator acts to heat the water by the steam partially condensing on the wet blades; but in the boiler the agitator-blades, rising out of the water, form a large area from which the steam is developed, the blades being heated while in the water, and hence imparting to the water the necessary volume of heat as the same assumes the form of steam.

The blades in the feed-water heater may be perforated or formed of gauze or netting, if desired, and the water, as it flows into the heater, is allowed to fall in the form of spray or streams upon the descending side of the ro-

tary agitator, so that the weight of the water aids in rotating the agitator.

I claim as my invention—

5 1. The combination, in a feed-water heater or boiler, of an automatic rotary agitator formed of inclined blades upon a shaft, supports for the same, a mud drum or chamber below the water-line, and circulating-pipes connecting the same with the water-space, substantially
10 as specified, whereby the water near the surface is automatically caused to circulate toward the pipe leading to the mud drum or chamber, substantially as set forth.

2. The combination, with a steam-boiler or

water-heater, of an automatic agitator and surface evaporator formed of a shaft and inclined blades and supports for the same, substantially as specified, whereby the agitator is revolved by the steam as it rises, and a movement of the water near the surface toward one end of the heater or boiler is effected by the rotation, substantially as specified. 15 20

Signed by me this 8th day of September, A. D. 1882.

EDWARD FOX.

Witnesses:

GEO. T. PINCKNEY,
WILLIAM G. MOTT.