

(No Model.)

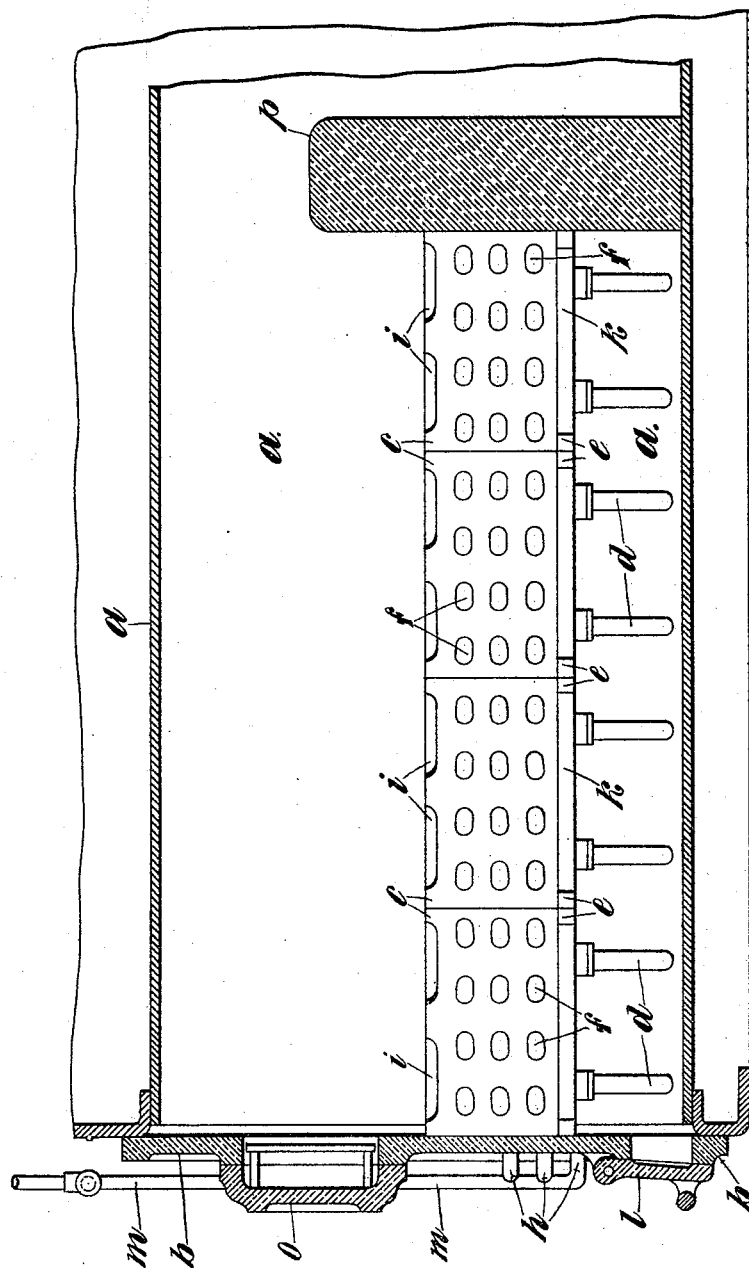
2 Sheets—Sheet 1.

J. SUTTON & J. W. BUCKLEY.
STEAM BOILER FURNACE.

No. 494,041.

Patented Mar. 21, 1893.

Fig. 1.



Witnesses

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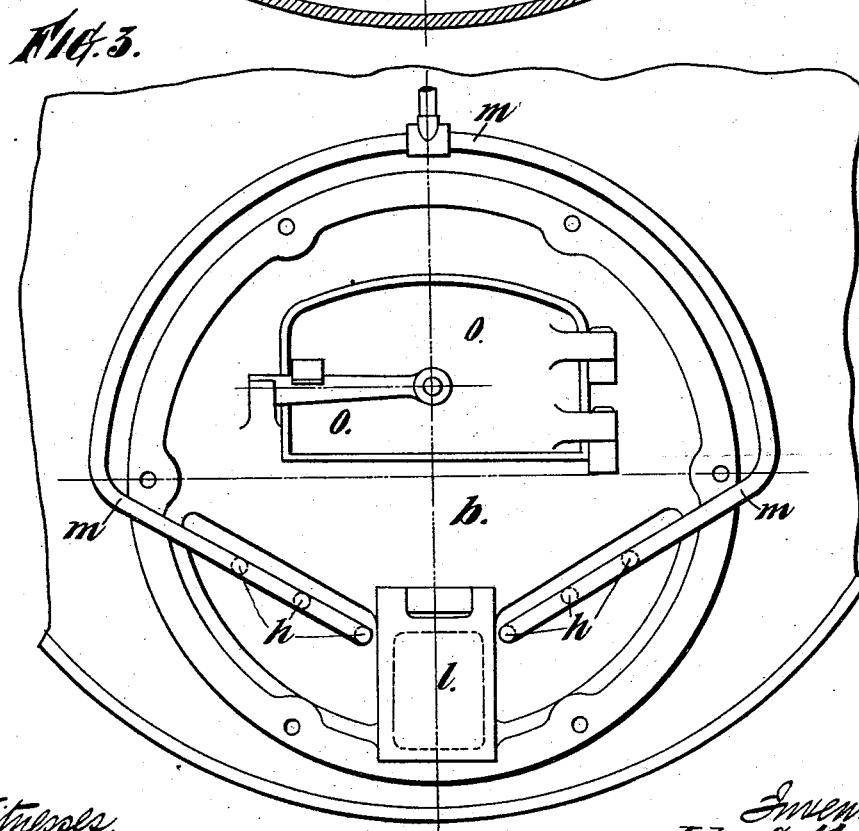
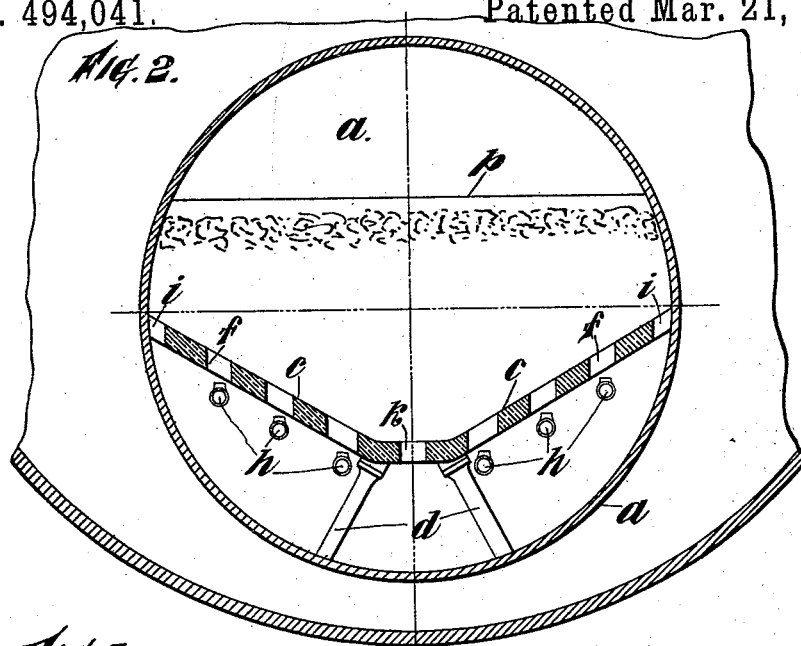
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2 Sheets—Sheet 2.

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STEAM BOILER FURNACE.

No. 494,041.

Patented Mar. 21, 1893.



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UNITED STATES PATENT OFFICE.

JOHN SUTTON AND JOHN WILLIAM BUCKLEY, OF FORMBY, ENGLAND.

STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 494,041, dated March 21, 1893.

Application filed December 6, 1892. - Serial No. 454,309. (No model.)

To all whom it may concern:

Be it known that we, JOHN SUTTON and JOHN WILLIAM BUCKLEY, both subjects of the Queen of Great Britain and Ireland, residing at Formby, near Liverpool, in the county of Lancaster, England, have invented new and useful Improvements in Steam-Boiler Furnaces, of which the following is a specification.

This invention has reference to the furnace of steam generators and other furnaces, but for convenience we will describe its nature as applied to the furnaces of steam generators.

In the furnace space of a steam generator, we provide on each side, inclined fuel plates or bearers, with apertures provided therein for the admission of air and steam, as hereinafter described. Then again at the bottom a suitable aperture or space is provided to let out the dust and other matter it is desired to remove. In the front of the furnace suitable doors are provided, and under the fire bearers, apertures are provided to admit air, while steam pipes are also led to this space or spaces to deliver steam, which forces in and mixing with air, and both pass into the fuel on the fuel bearing plates, and pass upward through the depth of fuel, which is of considerable depth. The effect of this arrangement and invention is that clinkers are prevented from forming; a great saving of fuel is effected; the formation of smoke is prevented; a saving of labor is effected. Above the level of the fuel and in front or at other suitable parts of the furnace, a firing door, or doors for the introduction of fuel is or are provided.

The drawings appended to this specification illustrate a cornish or other internally fired steam generator provided with our improvements.

In the drawings, Figure 1 is a longitudinal section through the furnace flue showing the interior construction of our furnace. Fig. 2 is a cross section through same; and Fig. 3 is a front outside view.

Referring to the drawings, *a* is the furnace flue; *b* is the furnace front plate; and *c* are the fuel bearing plates. The plates *c* are supported at their outer edges by contact with the furnace flue *a*, and at their lower ends by feet *d*, which rest upon the bottom of the furnace flue, such feet being fitted or fastened in the

plates in any suitable way. The lower edges of the plates abut against each other at each end, where they are provided with projections *e*. Although each half of the fuel bearers may consist of a single plate, yet we prefer to form the grate of a number of plates, such as shown: any suitable number of plates may be used.

The plates *c*, as will be seen, are provided with holes or apertures *f*, beneath which steam pipes *h* are provided, from which jets of steam issue opposite each hole *f*, and aid in forcing in air and assisting in complete combustion of the fuel. The edges of the plate are recessed at *i* as shown, and these recesses also admit air into the fuel. The longitudinal apertures *k* at the bottom of the furnace plates serve chiefly to allow of ashes falling through the grate, and partly enable clinkers or other incombustible matters, should they occasionally be formed, to be removed.

The front of the furnace is provided at the bottom with a door *l*, through which access may be had to the space under the furnace in which the ashes fall and through which they may be removed. At each side of this door the front plate *b* is open up to the level of the plates *c*, and through the apertures, air passes to the space below the said plates. Also the steam pipes *h* are introduced through these apertures, and they are coupled up to a main steam supply pipe *m* outside the furnace front.

o is the ordinary fire door through which the fuel is charged into the furnace, and *p* is the ordinary bridge at the back of the furnace. A large depth of fuel is preferably maintained on the plates *c* and air and steam are forced through the fuel, by way of the holes or apertures *f*, and a very efficient and perfect combustion takes place; also, the formation of clinkers is wholly or very nearly obviated and relatively a very small quantity of solid matter falls through the grate into the ash-pit, and what does so fall through, is purely ash.

By the use of this furnace, the rate of steam production of a steam generator may be increased over that produced in the ordinary way, and at the same time with a large saving of fuel, and economy in fire bars or bearers is effected. Furthermore, small and cheap

qualities of coal can be used and burned with advantage on this grate, and the formation of smoke prevented.

5 It is to be remarked in conclusion that the invention is not confined to the particular disposition of apertures therein in the plates *c*, as shown in the drawings, nor to the particular mode of supporting same, or the fittings illustrated.

10 Having now fully described our invention, we declare that what we claim is—

15 In a steam generator or analogous furnace, the combination of plates *c* having a plurality of holes *f* therein and disposed at an inclination sloping downward from each side of the furnace toward the center; steam pipes *h* disposed under said plates and having holes

therein under said aperture by which jets of steam issue into and force air through said apertures into and through the fuel on said plates; and an aperture or apertures *k* at the lower part of said plates by which ash and dust are removed from the fuel into the space below said plates: all substantially as set forth with reference to the drawings. 25

In testimony whereof we have hereunto set our hands in presence of two witnesses.

JOHN SUTTON.

JOHN WILLIAM BUCKLEY.

Witnesses:

FREDERICK JOHN CHEESLOUGH,

JAS. A. CONBROUGH,

Both of 15 Water Street, Liverpool.