(No Model.)

2 Sheets—Sheet 1.

J. CLEGHORN.

STEAM BOILER FURNACE.

No. 505,094. Patented Sept. 19, 1893.

FIG. II

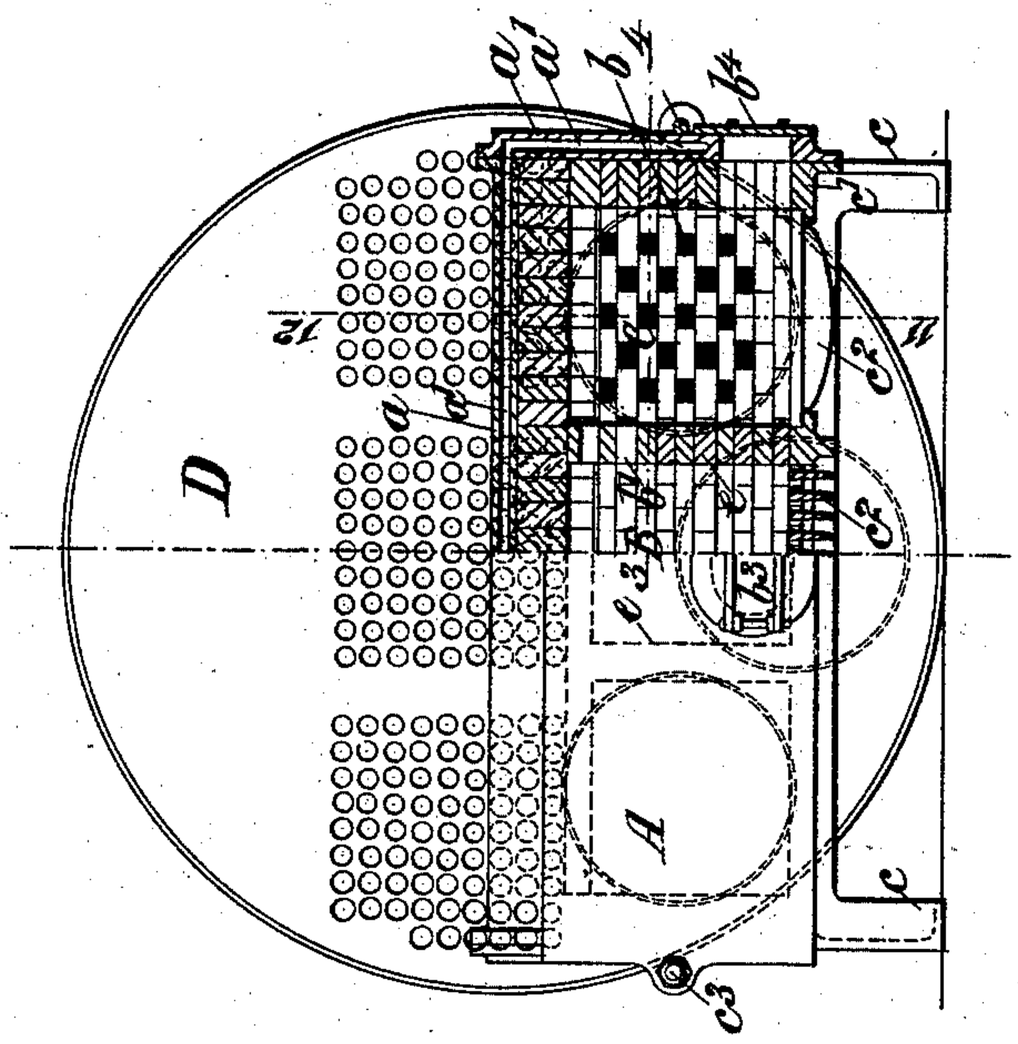
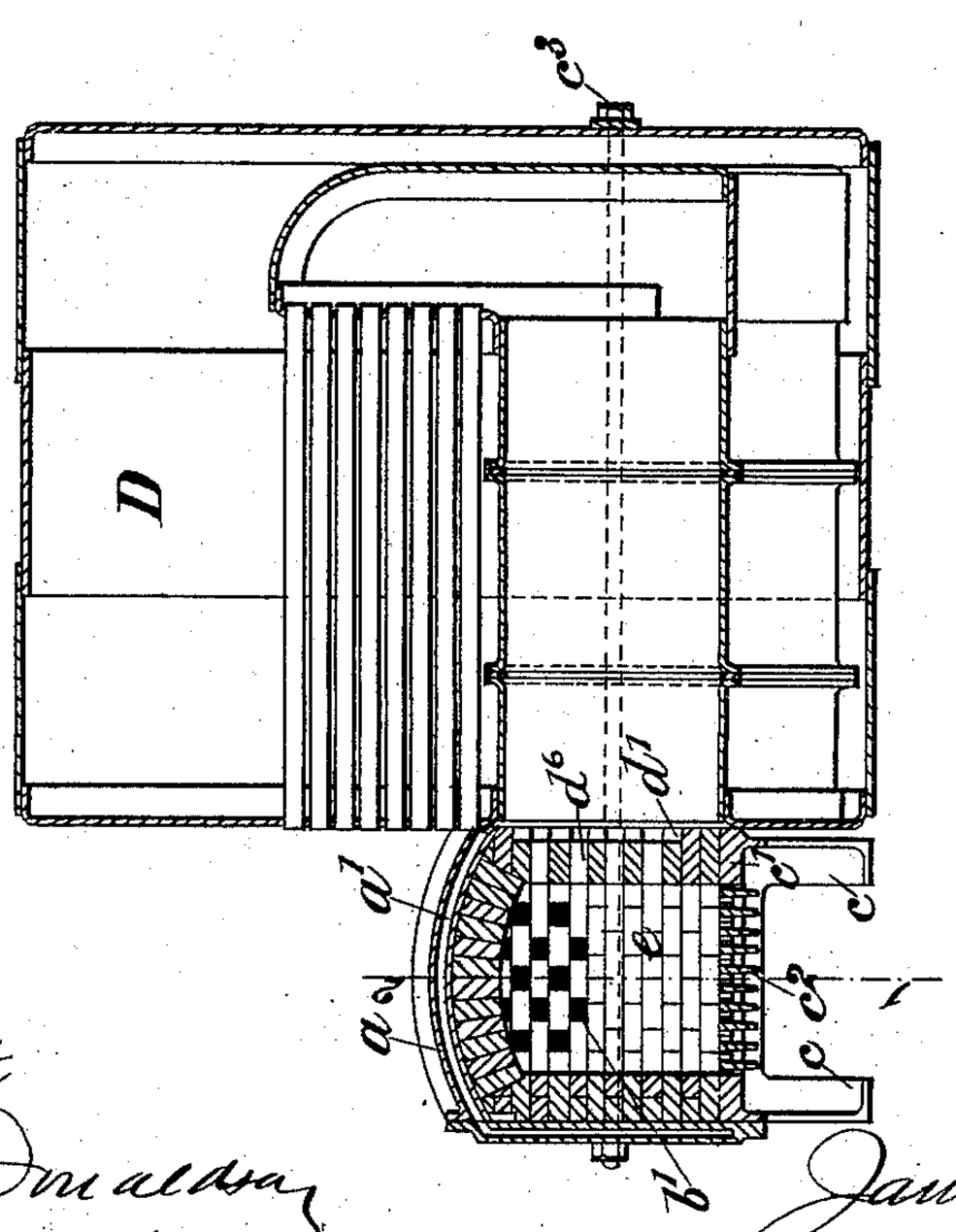


FIG. I



Attest
Walter Dwadsay
V. W. Middleton.

Inventor
James. Cleghorn
by Richards & Co
Attys

(No Model.) 2 Sheets—Sheet 2.

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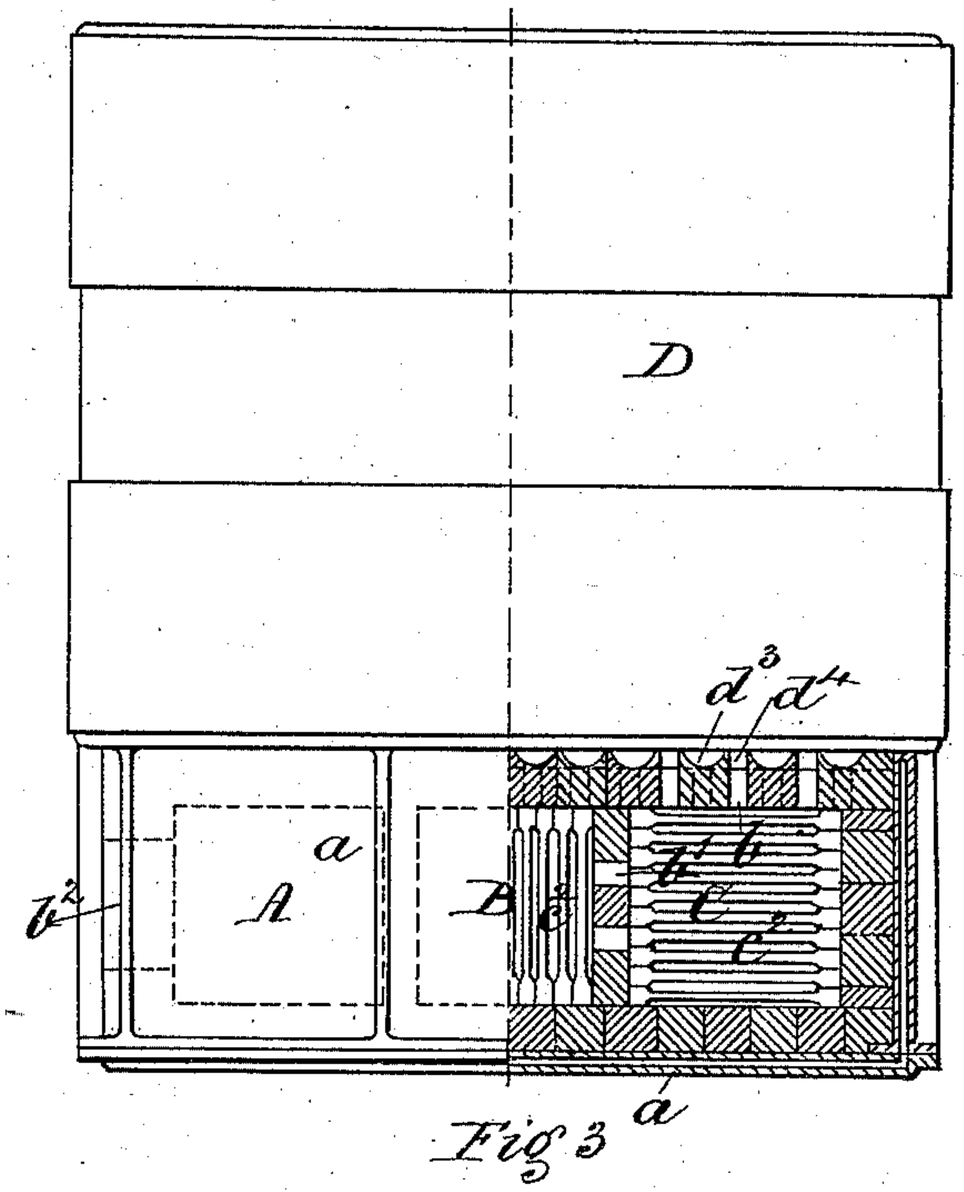

Fig 3

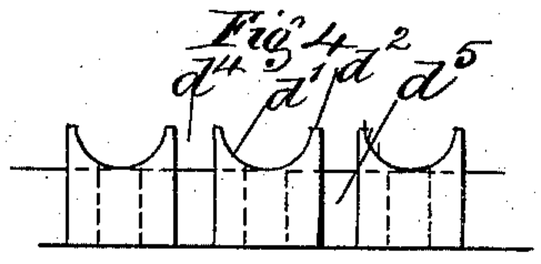

Fig 4

Fig 5 d^5 d^1

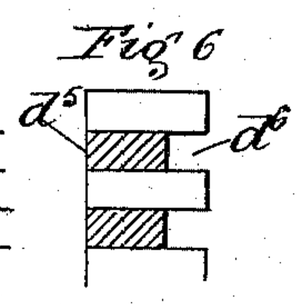

Fig 6

Witnesses.
Henry Hughes Jnr.
Sybil Mary Hughes.

Inventor
James Cleghorn
per Henry Hughes
Attorney

UNITED STATES PATENT OFFICE.

JAMES CLEGHORN, OF PORT CHALMERS, NEW ZEALAND.

STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 505,094, dated September 19, 1893.

Application filed April 20, 1892. Serial No. 429,977. (No model.)

To all whom it may concern:

Be it known that I, JAMES CLEGHORN, a British subject, residing at Glendermid, Port Chalmers, in the Colony of New Zealand, have invented new and useful Improvements in Steam-Boiler Furnaces, of which the following is a specification.

My invention relates to improvements in steam boiler furnaces, and has for its objects constructing the same in such a manner as to consume the fuel to better advantage, to obtain a larger heating surface, to more thoroughly ignite the products of combustion before they come into contact with the plates of the boiler flue, and at the same time is cheap in construction, easily operated, occupies little space, and is economical in use. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1. is a sectional elevation, on line 11—12 Fig. 2. Fig. 2. is an end elevation, part in section on line 1—2 Fig. 1. Fig. 3 is a plan part in section on line 3—4 Fig. 2. Fig. 4. is a detail plan on a larger scale. Fig. 5. is an elevation of the same. Fig. 6. is a section of the same on the line 5—6 Fig. 5.

Similar letters refer to similar parts throughout the several views.

A. B and C Figs. 1. 2. and 3, are a furnace constructed of firebricks or other suitable non-combustible material, and having an outside casing *a* of iron provided with a space *a'* for the circulation of water. This furnace is divided into three chambers as shown, having the sides next to the boiler in chambers A and C perforated with apertures *b*, and the dividing walls *e* with apertures *b'*. I find by experiment that the combined areas of the apertures *b* in chambers A and C should be about one third of the area of the boiler flue. The wall next to the boiler in chamber B is perforated.

b^2. b^3. and b^4 are the fire doors of the respective chambers A. B and C.

c. are the legs or supports for the furnace.

c'. is a base plate of cast iron upon which the brickwork is constructed and which also supports the fire bars c^2.

c^3 are stay bolts securing the furnace to the boiler.

Figs. 4. 5. and 6 show the details of the perforated side of the chambers A and C, the firebricks *d* of which are manufactured with a scalloped edge *d'*. The points d^2 rest against the boiler plate leaving a vertical passage as shown at d^3, in Fig. 3. The spaces d^4 also form vertical passages. Alternately with the said scalloped firebricks is placed a layer of rectangular firebricks d^5, which together form an even wall on the inner side of the chambers A and C, but on the side next to the boiler leave vertical spaces d^3, Fig. 3, and horizontal spaces d^6, Figs. 1 and 6.

D is an ordinary marine boiler.

Having described the details of my furnace, I will now proceed to explain how the same is operated. The chamber B having been charged with coal to the height of the lowest perforations *b'* Fig. 1, fires are lighted in the chambers A and C, and maintained at a height of about six inches. Inferior quality of coal may be utilized in the middle chamber B, and refuse coal burned in the chambers A and C, and great economy thereby obtained. The temperature of the walls *e* of the chamber B is raised until the coal contained therein gives off its gas. This gas immediately ignites and passes through the apertures *b'* to the chambers A and C where the products of combustion are raised to a still higher temperature, and more thoroughly ignited. After passing through the apertures *b* the heated gases circulate through the vertical passages d^3 and d^4 Fig. 3, and the horizontal passages d^6. Fig. 1, which have also attained a high temperature heating the exposed front plate of the boiler and then finding an exit through the boiler flue. In this manner the chambers A. B and C attain a high degree of temperature, where the liberated gases are more thoroughly ignited than if they came into immediate contact with the relatively cool plates of the boiler.

The exterior furnace described above leaves the whole interior surface of the flue and a portion of the end plate of the boiler to be used as heating surface, but the exterior furnace may be constructed without chamber B, thus making the compartments A. B. and C into one furnace with the whole wall next to the boiler perforated with apertures *b* as shown in chambers A and C.

The length, breadth, and height of the furnace depend on the class of boiler to which

it may be applied, and it will be evident that the furnace may be placed underneath the boiler more especially when the boiler is outwardly fired.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In combination with the boiler, the furnace comprising the end chambers A, C, and the intermediate chamber B, divided from said end chambers by perforated walls, said end chambers having openings leading to the boiler, substantially as described.

2. In combination with the boiler, the furnace comprising the end chambers A, C, and the intermediate chamber B, divided from said end chambers by a perforated wall and having an imperforate wall between it and the boiler, the said end chambers communicating with the boiler through openings and the passage or space extending between the perforated walls of the end chambers and the boiler and from one end chamber to the other across the imperforate wall of the intermediate chamber and between said imperforate wall and the boiler, substantially as described.

3. In combination, the boiler and the furnace and having a perforated wall extending adjacent to the boiler, said wall being formed of the bricks having bearing points d^2 and intermediate cut away edges d', the spaces d^4 between the said bricks, the bricks d^5 arranged in alternate layers with the bricks d and adapted to form with said bricks d, the vertical passages d^3, and d^4 and the horizontal passages d^6, substantially as described.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

JAMES CLEGHORN.

Witnesses:

GRANT PRESTON FARQUHAR,

NEVILLE SIEVWRIGHT.