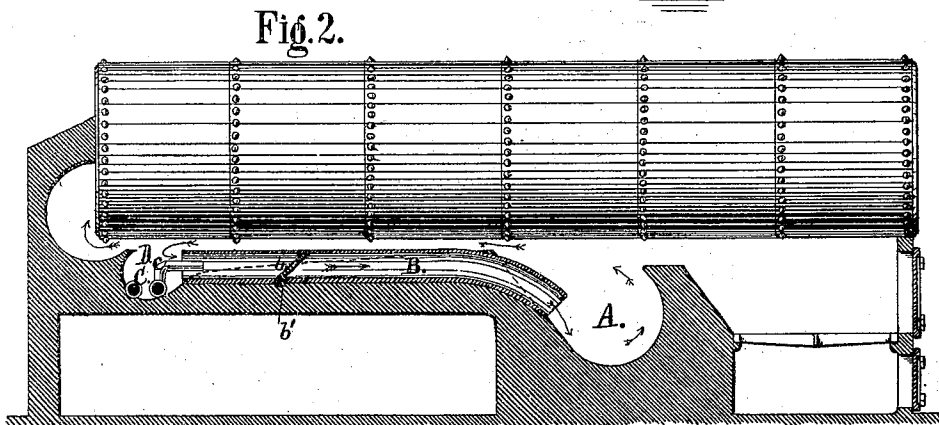
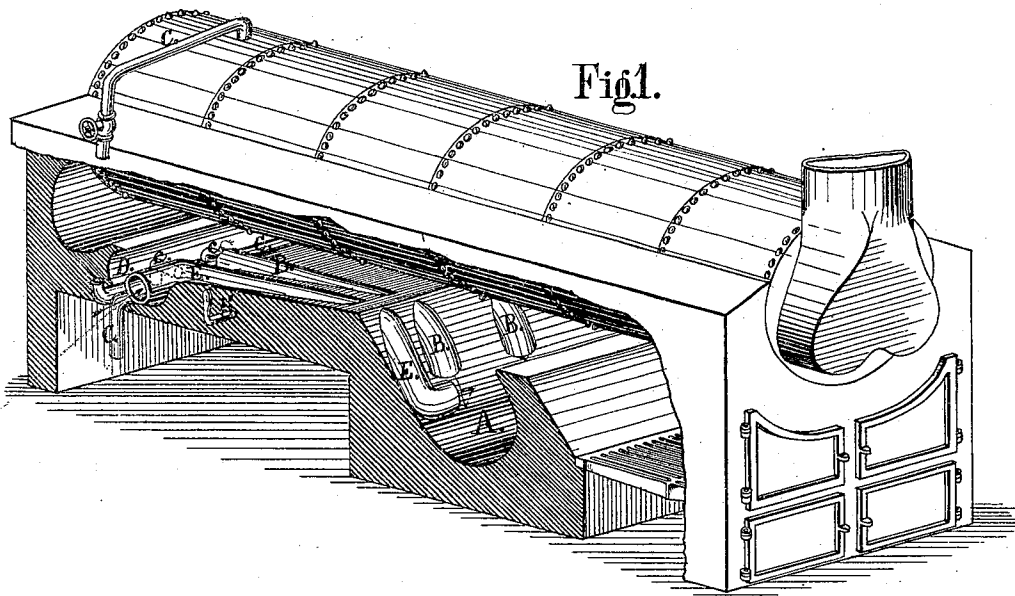


M. A. FOSTER.
Steam-Boiler Furnaces.

No. 138,875.

Patented May 13, 1873.



ATTEST:

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UNITED STATES PATENT OFFICE.

MICHAEL A. FOSTER, OF ST. LOUIS, MISSOURI.

IMPROVEMENT IN STEAM-BOILER FURNACES.

Specification forming part of Letters Patent No. **138,875**, dated May 13, 1873; application filed March 20, 1873.

To all whom it may concern:

Be it known that I, MICHAEL A. FOSTER, of the city and county of St. Louis and State of Missouri, have invented a certain Improvement in Steam-Boiler Furnaces, of which the following is a specification:

My invention consists in the arrangement of a series of pipes or passages longitudinally in the fire-bed of steam-boiler furnaces. The forward ends are curved downward and project into a semi-elliptical smoke-pit. At the rear end the pipes open into a second semi-elliptical smoke-pit for the collection of the smoke or unconsumed gases, and from which the said gases are forced back through the pipes or passages (by a series of steam-jets) into the forward smoke-pit, where the steam and gases are mixed with a supply of heated air forced by steam-jets into the said smoke-pit through pipes arranged longitudinally in the fire-bed and taking air-supply through the side wall of the furnace. The pipes or passages for conducting smoke and gases, and also the air-pipes, are provided with flap-valves or dampers secured on a common shaft arranged transversely underneath the fire-bed, and extending through the side wall, where it carries a lever, by which it is operated.

The steam-pipe which supplies steam to the jets is provided with a valve to shut off steam when desired.

Figure 1 is a perspective view of a steam-boiler furnace with part of a side wall removed to show my improvements. Fig. 2 is a longitudinal section.

A is the forward smoke-pit of the furnace, of semi-elliptical form, preferably. B are a series of square or round pipes (square preferred) or passages arranged longitudinally in the fire-bed of the furnace. The forward ends of said pipes are curved downward and project into the forward smoke-pit A, so as to discharge into the same. C is a steam coil or pipe arranged transversely in the rear smoke-pit D and having small jet-pipes *c*, which discharge steam into the rear ends of the pipes B and cause a forward current therein. The pipe C is provided with a valve to shut off steam from the jets *c*. The pit D, like that, A, should be semi-elliptical in section, and in it collect the heavier gases passing over the fire-bed, and are forced by the steam-jets into the rear ends of the pipes B, (which open into said pit,) and are car-

ried forward along said pipes and projected downwardly and forwardly into the pit A. The fire-bed slopes downward from the rear side of the pit to the front side of the rear pit D, as shown. E are square or round air-pipes arranged longitudinally in the fire-bed, the rear ends of which pass through the side walls of the furnace, the other ends being curved and projecting transversely into the smoke-pit A, so as to discharge the heated air into the said pit. *e* are steam-jets for forcing air through the pipes E. The smoke-passages or pipes B, and air-pipe E are provided with dampers *b* (see Fig. 2,) arranged on a common transverse shaft *b'* underneath the fire-bed. The shaft has outside the furnace-wall a suitable operative handle or lever.

The operation of my improvement is as follows: The unconsumed inflammable gases passing off from the fire pass back through the space between the fire-bed and the boiler and the heavier portions (containing the most inflammable gases) are collected in the pit D to be forced by the steam-jets *c* through the pipes B into the forward smoke pit A where said gases are mixed with fresh heated air, introduced through the pipes E by jets *e*. The mixed air and inflammable gases passing up from the smoke-pit A come in contact with the flame from the fire-box, and the gases are ignited.

Claims.

1. The return-pipes or passages B, in combination with steam-jets *c* and smoke-pit A, substantially as set forth.
2. The combination of the pipes B, jets *c*, and semi-elliptical smoke-pit A, substantially as set forth.
3. The combination of the pipes B, steam-jets *c*, smoke-pit A, and dampers *b*, substantially as set forth.
4. The pipes B, in combination with the pits A and D steam-jets *c* and *e*, and air-pipes E, substantially as set forth.
5. The combination of pipes B, semi-elliptical pits A and D, steam-jets *c* *e*, air pipe or pipes E, and dampers *b*, substantially as and for the purpose set forth.

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

MICHAEL A. FOSTER.

Witnesses:

SAML. KNIGHT,
ROBERT BURNS.