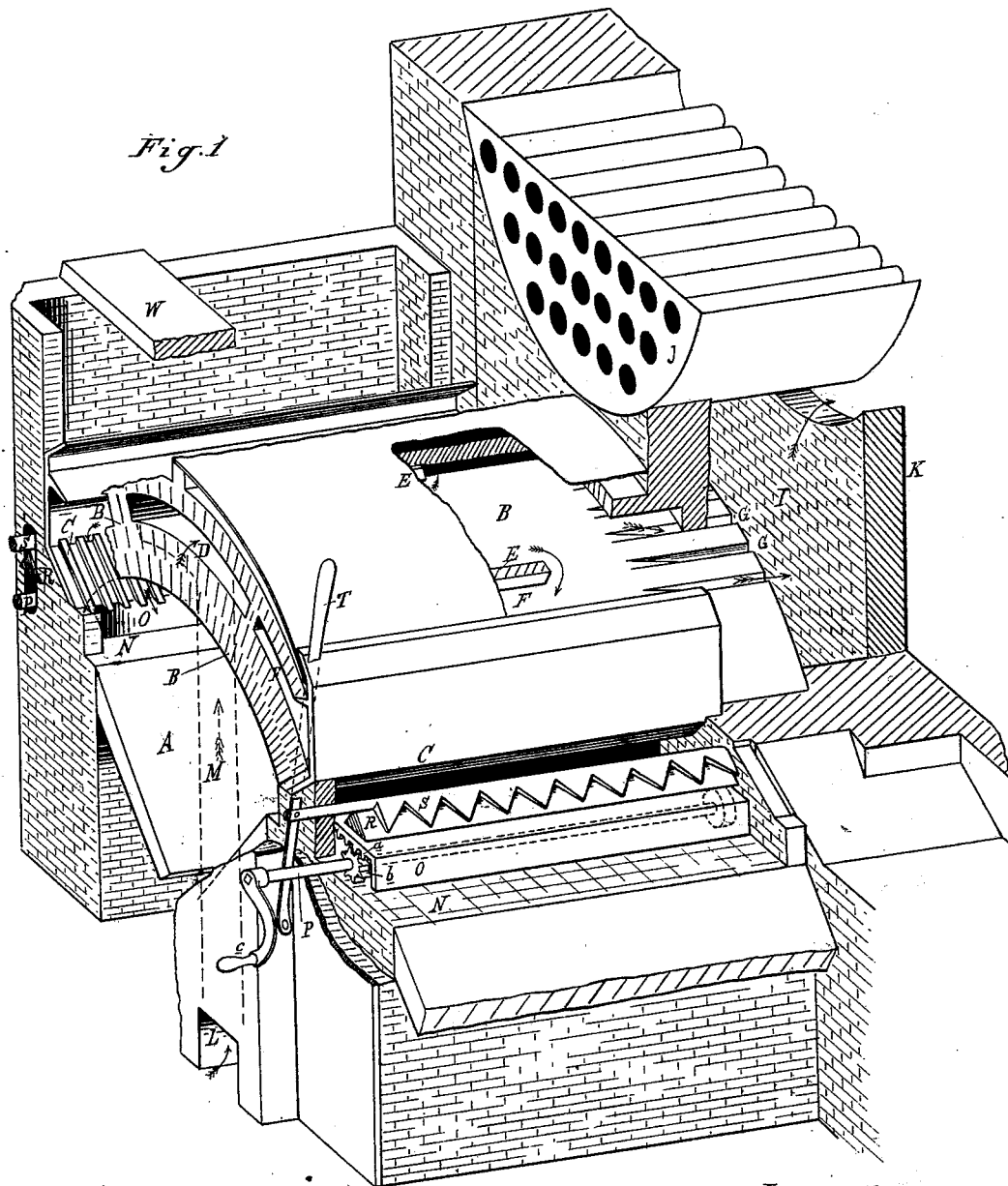


T. MURPHY.
Boiler-Furnace.

N o. 218,049.

Patented July 29, 1879.



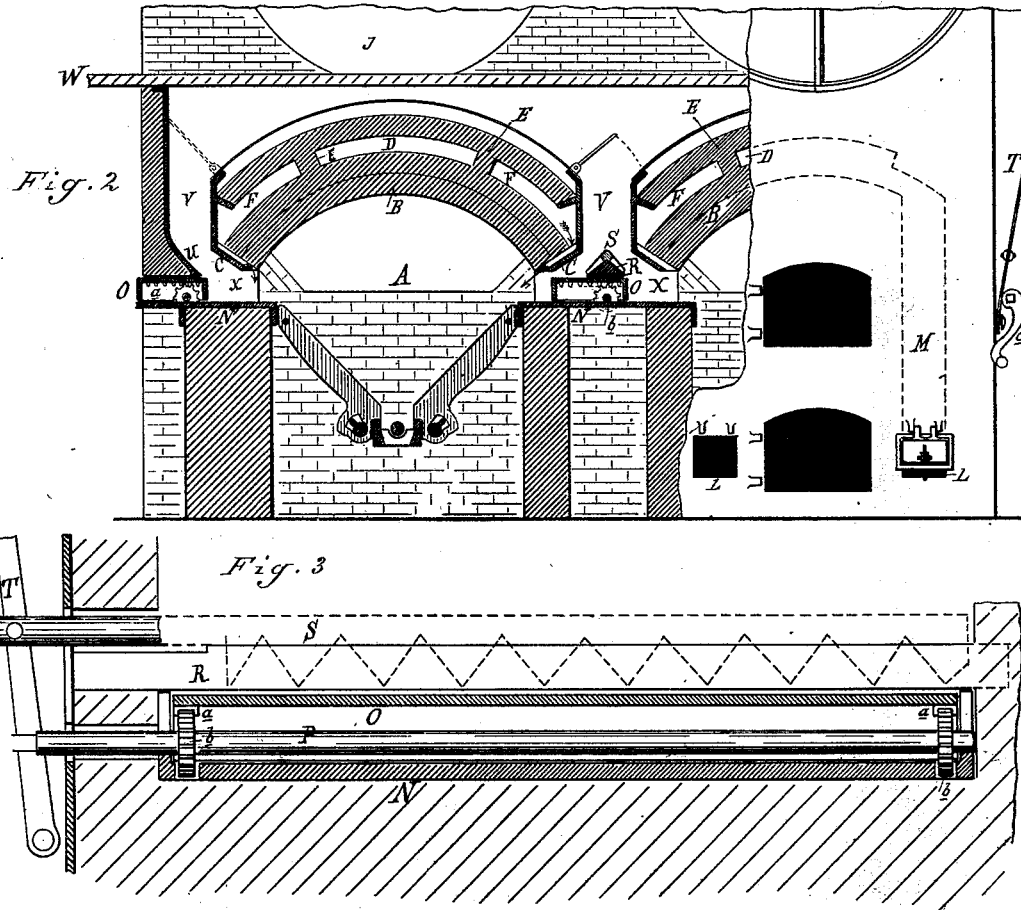
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UNITED STATES PATENT OFFICE.

THOMAS MURPHY, OF DETROIT, MICHIGAN.

IMPROVEMENT IN BOILER-FURNACES.

Specification forming part of Letters Patent No. **218,049**, dated July 29, 1879; application filed January 30, 1879.

To all whom it may concern:

Be it known that I, THOMAS MURPHY, of Detroit, in the county of Wayne and State of Michigan, have invented an Improvement in Boiler-Furnaces, of which the following is a specification.

The nature of my invention relates to new and useful improvements in the construction of boiler-furnaces, wherein provision is made for a supply of heated air to be delivered directly at the point or points where it will be most effectual in furnishing the necessary oxygen for the combustion of the gases thrown off as the coal used for fuel becomes incandescent, by means of which the formation of smoke is almost entirely avoided and the amount of fuel required to evaporate a given quantity of water is materially decreased, by reason of utilizing the gases more perfectly than has heretofore generally been done. My improvements also provide for mechanically feeding the fuel to the boiler-furnaces in such a manner that most of the gases will be thrown off from the coal before the same is fed into the furnace, and, being provided with the necessary oxygen at the proper points and at a proper temperature, these gases will be consumed in the furnace and in a flame-chamber in rear thereof.

The invention consists in the novel construction of the furnace, and, in combination therewith, of certain mechanical devices for feeding the fuel to the furnaces. These mechanical devices may be operated by hand, or they may be so attached to any desired or convenient motor, by means of which, at certain times and in certain quantities, the fuel may be fed into the furnace.

My invention will be found of great value in furnaces wherein bituminous or coking coals (from which, in becoming incandescent, large quantities of gases are thrown off) are employed for generating steam; and it will also be found valuable where anthracite and semi-bituminous and cannel coals are used.

In the accompanying drawings, Figure 1 is a perspective view, taken from the front, of my improved boiler-furnace with the front wall removed. This view shows only a section of one of a battery or series of such furnaces with a portion of the side wall broken

out, and it shows the front end of a tubular boiler with the breeching removed. Fig. 2 is a front elevation of the same, partially in section, and showing the furnace-chamber as provided with a system of inclined grates. Fig. 3 is a side elevation of my improved feeding mechanism detached.

In the accompanying drawings, which form a part of this specification, A represents a furnace-chamber, over which is thrown a brick arch, B, the base of which, on each side, rests upon a ribbed or corrugated plate, C, so that air may pass freely. This arch covers the entire length and width of the furnace, and is provided with a flue, D, extending its entire length, and with flue-strips or divisions E, to divide said central flue, D, from the side flues, F, which open along their outer sides upon the ribbed or corrugated plates C. There are perforations G through the rear ends of said flues, to allow air to pass into the flame-chamber I, which is situated below the boiler J, and between the rear of the coal-consuming chamber proper and the bridge-wall K. Air is admitted to this central flue, D, through an opening or openings, L, in the front of the furnace, and a flue or flues, M, (shown in dotted lines in Fig. 1,) in said front, which communicate with said central flue, D.

In marine boilers it may be found expedient to construct this arch as a water space or jacket, and this would not depart from the spirit of my invention; neither would it do so if the discharge from the side flues, F, was at the ends of said flues, as may be found necessary to do under certain circumstances.

Upon the top of the side walls of the furnace-chambers A are placed what I denominate "dead-plates" N, which, when so placed, extend the whole length of said furnace-chambers, and upon these dead-plates are placed the pushers O, made substantially in the form shown in Fig. 2, and provided upon their under surfaces with teeth *a*, which, engaging with the toothed pinions *b* upon the shaft P, and which projects through furnace-wall, and is provided with a crank, *c*, enables the operator to give motion to said pusher.

When the boilers are set in battery, as shown in Fig. 2, a triangular plate R, is secured just above the upper face of the pusher, and upon

it a V-shaped toothed slide, S, has a reciprocating motion given to it by the lever T, secured to the end of said slide, projecting through the furnace-wall. When not used in battery, a scraper-plate, U, as shown in Fig. 2, secured to the side wall, is employed, under which the pusher O is withdrawn.

V are coal-spaces, into which coal may be dumped by means of barrows running upon the boards or ways W over the top of the furnace and arch.

It will not depart from the spirit of my invention if, for economy of room or other purposes, it should be desired to feed the fuel into the front or rear, if the mechanical devices herein described are placed at the front or rear, with the flues F delivering air to the front or rear instead of to the sides, as hereinbefore described, nor if the coal, instead of being dumped from above, is thrown into the ends of the coal-space through doors provided in the furnace-walls; and in case this is done, a screw-conveyer or other mechanical device should be employed to equally distribute the coal in the chamber prepared for it, in order to secure an equal distribution of the same onto the fire-grates.

Whether fed from the sides or ends, it is better that the grates incline from both sides, as shown in Figs. 1 and 2, or from both ends toward the center of the furnace proper, although grates of the ordinary construction may be beneficially employed.

In practice, with a furnace constructed as herein described and as shown in the drawings, the fire being made upon the grates in the coal-chamber, and the fuel-chambers being filled with a supply of coal, and the pusher being withdrawn, as shown in Fig. 2, discloses an opening, X, through which the coal falls upon the dead-plate, where it is subjected to great heat from the fire on the grates below. Air being admitted to the flue D in the arch above the furnace is highly heated and discharged through the flues F and ribs or corrugations of the plates C, where, mingling with the gases of the coal which is being coked upon the dead-plates and being brought within the draft force of the furnace, such gases, with a proper supply of oxygen for their combustion, prevent the formation of smoke to a large extent, and pass into the coal-chamber and the flame-chamber in its rear, where they are consumed immediately under the boiler, and the products of combustion then pass over the bridge-wall, and find an outlet to the smoke-stack in the usual manner.

When it is necessary to feed coal onto the grates, the pushers are moved inwardly toward the furnace-chamber, forcing the coked

coal upon the dead-plates over their edges onto the grates. This being done, the pushers are returned to their original position, the triangular scraper-plate R or the scraper-plate U preventing said pushers from carrying back any of the superincumbent coal, and the openings X are again disclosed, allowing a fresh supply of coal to fall upon the dead-plate, and this operation is repeated as often as a fresh supply of fuel is required.

It may happen that when certain descriptions of bituminous coals are used, the great heat from the coal-burning chamber may cause the coal above the pusher to become slightly coked, sufficient to make it stick together. In this case a reciprocation of the toothed slide S will break the coal up sufficiently to make it feed down freely.

What I claim as my invention is—

1. In a furnace, the arch B, provided with central flue, D, which is supplied by flue M with air at its front end, and the flues F, at the sides of the arch, separated from the central flue by strips E, constructed and arranged substantially as described and shown.

2. In a furnace, the combination, with the arch B, having central and side flues, D F, of the ribbed or corrugated base-plates C, upon which the arch rests, the said arch receiving air at its top and discharging it at its bottom sides in jets upon the fuel, substantially as described and shown, for the purpose set forth.

3. In a furnace, the combination of the coal-burning chamber A, the bridge-wall K, and the hollow arch B, receiving air at its front and discharging the same at its sides into the coal-burning chamber and at its rear end into the flame-chamber I in front of the bridge-wall, substantially as described and shown.

4. In a furnace provided with the arch B, constructed with flues and resting upon the ribbed or corrugated base-plates C, the dead-plates N, upon which the fuel in the chambers V is coked preparatory to being fed to the grates, substantially as set forth.

5. In a furnace, the dead-plates N and fuel-openings X on the sides of the furnace, in combination with the pushers O, having racks a, and the shaft P, provided with cog-wheels, constructed and arranged substantially as described and shown.

6. In a furnace-feeder, the combination, with said dead-plate, pusher O, and scraper R, of the reciprocating coal-breaker bar S, substantially as and for the purposes specified.

THOS. MURPHY.

Witnesses:

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CHAS. J. HUNT.