No. 615,400. Patented Dec. 6, 1898.

J. J. & T. F. MELDRUM.

FURNACE.

(Application filed Apr. 7, 1896.)

(No Model.)

Fig. 1.

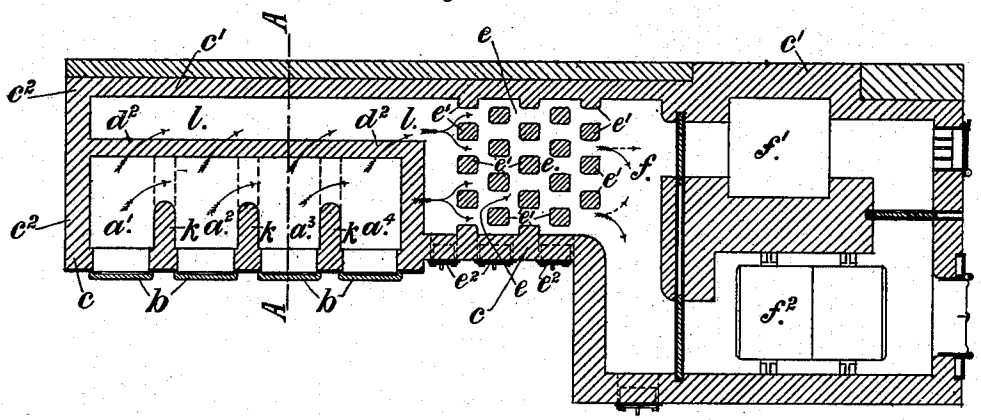


Fig. 2.

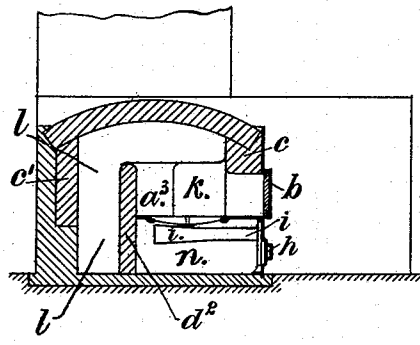


Fig. 3.

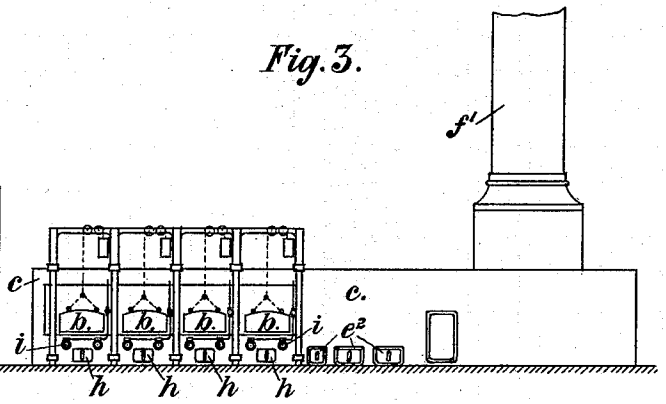


Fig. 4.

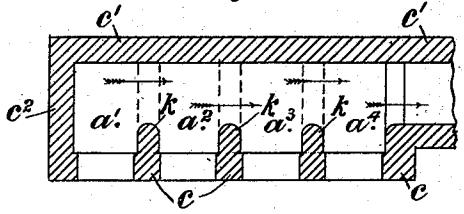
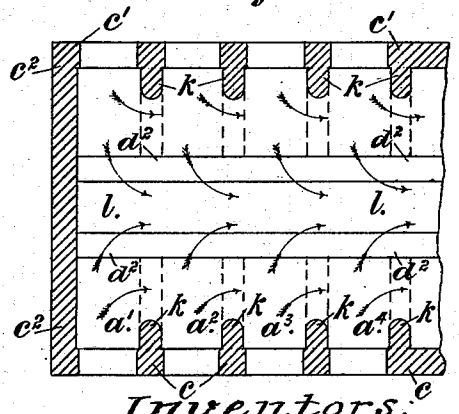


Fig. 5.



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UNITED STATES PATENT OFFICE.

JAMES JONES MELDRUM AND THOMAS FREDK. MELDRUM, OF MANCHESTER, ENGLAND.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 615,400, dated December 6, 1898.

Application filed April 7, 1896. Serial No. 586,589. (No model.)

To all whom it may concern:

Be it known that we, JAMES JONES MELDRUM and THOMAS FREDERICK MELDRUM, engineers, subjects of the Queen of Great Britain, residing at Manchester, in the county of Lancaster, England, have invented certain new and useful Improvements in or Connected with Furnaces, (for which we have obtained Letters Patent in Great Britain, No. 17,869, dated September 20, 1894,) of which the following is a specification.

This invention has special reference to furnaces for burning combustible or partially combustible material, as town refuse.

According to this invention a furnace has a plurality of fireplaces practically separate, on which the material is separately worked and burned, and the flames and combustion-gases from all the separate beds or fireplaces travel in the same direction, either from left to right or from right to left, when facing the fire or other like doors. In other words, the fire-gases travel sidewise, passing from the first grate over fires Nos. 2, or 2, 3, 4, &c., as the case may be, from the second fire over Nos. 3, 4, &c., and from the third fire over No. 4, &c. Thus all the gases of the different fireplaces are caused to mingle together before leaving the last fireplace of the series, while the different fireplaces should be worked at different times, as in series or rotation. The fires being worked in series and at proper intervals, the material on one or more of the fireplaces will be in a state of full combustion at all times, and thus when new material is fed or worked onto the different fireplaces the gases given off therefrom will become mixed with the flames and gases from the others, which tends to promote complete combustion and prevents the formation of smoke. If fires are cleaned and fed in a series at even intervals—say with four fires, one fire every fifteen minutes and each fire once in the hour—the prevention of smoke will be best accomplished, and at the same time the final temperature of the gases as they pass away from the furnace will be fairly constant.

The number of separate grates or fires will vary according to circumstances. Three or four are convenient numbers, though more or less may be employed, the general nature of the construction being to subdivide the furnace crosswise—that is, at right angles to its length—each portion being separately fed with fuel and air and separately cleaned, so that an approximately constant average temperature is maintained.

Beyond the last fireplace or bridge is a series of baffle walls or pillars, which will be kept at a high temperature, as a white or red heat, by the products of combustion. By these and by mixing up the gases at the high temperature the final combustion of all fumes or offensive gases from the town's refuse or like offensive material that may have previously escaped destruction will be insured.

In the case of destructors or other cases where the furnace is not primarily intended for the generation of steam the waste gases may be used for raising steam for working the furnace.

Drawings illustrative of this invention are annexed hereto and form part thereof.

Figure 1 in the drawings is a sectional plan illustrating the invention. Fig. 2 is a cross-section at A A, Fig. 1; and Fig. 3 is a front elevation. Figs. 4 and 5 are sectional plans illustrating other modifications.

Referring in the first instance to Figs. 1, 2, and 3, a' a^2 a^3 a^4 are four fireplaces, each having a grate and a firing-door b in the front wall c of the furnace. e is a chamber, and e' brick-work pillars beyond the last fireplace or bridge, through and over which the gases pass, and f is a flue beyond this part, from which the gases are caused to pass by suitable valves or dampers either to a chimney f' direct or to a steam-generator f^2, or partly to one and partly to the other.

By the example given it will be seen the direction of flow of gases is in a line from the fireplace toward the flue f, and that the fireplaces are in the line of that flow, and that therefore the gases for each and all of the fireplaces a', a^2, and a^3 have necessarily to pass over the furnace a^4, and, excepting a^3, the gases from the others will have to pass over two or more fireplaces, accordingly as they are farther removed in the series from a^4.

The ash-pits of the fireplaces are separate,

they being divided by a partition-wall n, and each ash-pit is provided with a door h and steam-jet blowers i, placed horizontally under the grate with their bodies lying practically wholly within the ash-pit. By these blowers air to support combustion of the material is supplied, and it is maintained by them at a pressure above that of the atmosphere.

Doors e^2 are provided in the wall of the chamber e, by which access is had to such chamber and the spaces betwen the columns cleared of the dust which may accumulate there.

In action the fires are fed, preferably, in series at even intervals—say one every fifteen minutes and each fire once in the hour. The gases leaving the furnaces pass or flow along in the direction of the length of the destructor toward the chamber e, those from all the fireplaces a', a^2, and a^3 passing over a^4, those from a^2 over a^3 and a^4, and those from a' over a^2, a^3, and a^4. From the furnace proper, comprising these four fireplaces, they pass over the bridge d^2 and enter the chamber e and pass over the brickwork pillars e', which are disposed in checker arrangement, and then pass away through the outlet-flue f of the steam-generator f^2 or chimney f'. By arranging the fires in this way and working them in series, as described, one or more of the fires will be in a state of full combustion at all times, and as the gases of all the different fireplaces are caused to mingle together before leaving the furnace when new material is fed or worked onto any one of them the fresh or "green" gases given off therefrom will become mixed with the flame and gases from another or others, thereby tending to promote complete combustion and the prevention or formation of smoke. Then, further, the gases passing from over the fireplaces and through the chamber e and over its incandescent pillars e', rendered incandescent by the heat of the furnance-gases passing over them, become baffled or diverted and mixed up, and being at a high temperature the final combustion of all fumes or offensive gases that may previously have escaped destruction is insured. In the destruction of the town's refuse or like material this is very desirable and important.

As regards the pillars e' and their uses, these being constantly maintained at a bright red or white heat take the place of cremator-furnaces commonly used in combination with the primary destructor-furnaces, and by them, in connection with the fireplaces arranged as described, better results are obtained without such cremator-furnaces than where cremator-furnaces are used.

As shown in Fig. 1, within the fireplaces, between the doors for feeding or firing them, we provide internally-projecting walls or divisions k for the purpose of keeping away the intense heat of the furnace from the firemen when cleaning the fire. In order to compensate for the area of flue for the flow of gases which is taken off by the introduction of these walls, a flue l, as shown in Fig. 5, is preferably provided. Obviously, however, the required area of flue could be obtained by raising the crown of the furnace; but since this would be inimical to the best working and results the addition of the flue l is preferred. In this case also a bridge d^2 would be provided at the ends of the furnaces, as well as at the side of the last furnace a^4. As regards this flue l, it may also be used with advantage in other cases—when the roof is low or near the grate-surface or where an unusually large number of fireplaces are placed side by side, as in such a case the combined volumes of gases from the fireplaces will require a greater area for their free passage.

Regarding the modification shown in Fig. 5, this shows a duplex arrangement provided with the flue l and with bridges d^2.

Suitable doors are provided for cleaning out all the dust from the whole of the ash-pits, flues, and chimney, so that the apparatus can be continuously used without danger of any part becoming choked with flue-dust.

What is claimed in respect of this invention is—

1. A furnace for burning refuse or like material comprising a plurality of fireplaces disposed in the line of the direction of the flow of the gases toward their outlet, a door to each fireplace by means of which the fire is attended to; closed and separate ash-pits under the different fireplaces; means for supplying air to the ash-pits for the combustion of the material on the grates, at a pressure above that of the atmosphere; and short walls or screens k, between the fireplaces; substantially as and for the purposes specified.

2. A furnace for burning refuse or like material comprising a plurality of fireplaces disposed in the line of direction of flow of the gases toward their outlet, a door to each fireplace by means of which the fire is attended to; closed and separate ash-pits under the different fireplaces; means for supplying air to the ash-pits for the combustion of the material on the grates, at a pressure above that of the atmosphere; and a flue l; substantially as and for the purposes described.

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

JAMES JONES MELDRUM.
THOMAS FREDK. MELDRUM.

Witnesses:
H. W. DAWSON,
I. P. DAVIE.